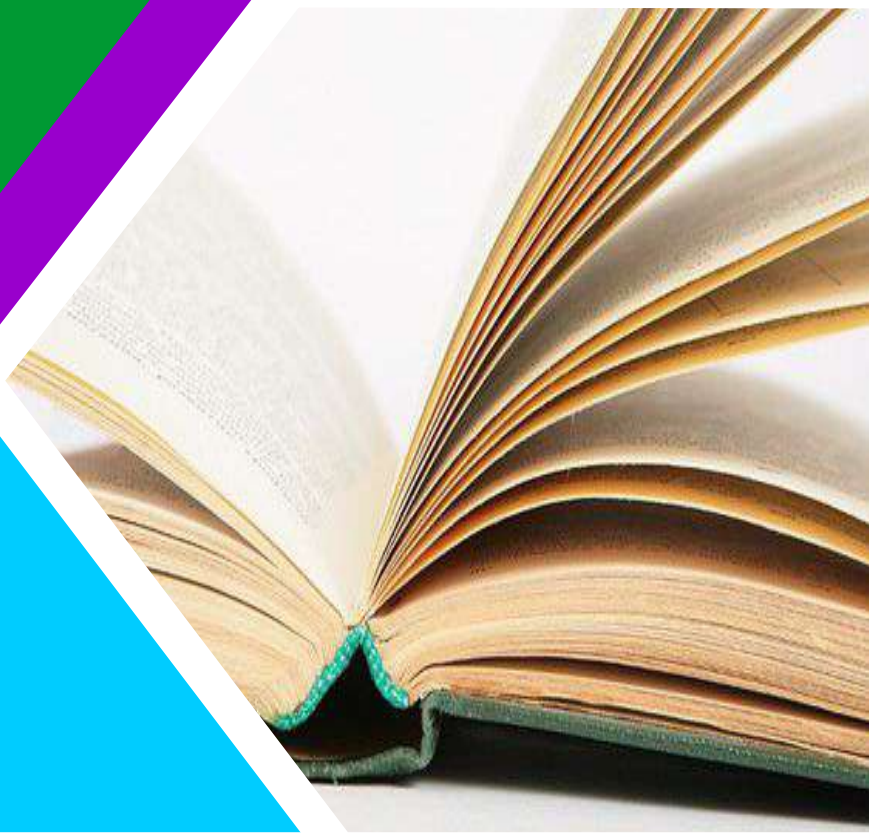
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EDITORIAL NOTE

Zamfara International Journal of Education (ZIJE) is the official Journal of the Faculty of Education, Federal University Gusau Zamfara State, Nigeria. The Journal publishes articles of diverse fields of interest in Education. Papers reporting original research and extended version of already established conference and journal articles are welcomed. Papers for publication are selected through peer review process to ensure originality, relevance and readability.

The aim and scope of the journal is to provide an academic medium and an important reference for the advancement and dissemination of information that supports high level learning, teaching and research in the fields of Education.

This edition, Volume 6, Number 6, October, 2026 is poised to present research reports in the following fields of education: Educational Foundations, Science Education, Educational Psychology, Curriculum & Instructional Technology, Guidance & Counselling, Philosophy & History of Education, Sociology of Education, Entrepreneurship education, Special and inclusive Education, Physical & Health Education Religious Education, Gender Studies, Peace & Security Education among Others. The articles in this volume are academic and professional discourse written by reputable scholars in their areas of specialization.

The Board wish to also acknowledge the efforts of the editorial members, for their ceaseless support towards successful publication of the journal. In the same vein, we acknowledge quite sincerely the assistance and support of our esteemed consulting editors for ensuring the credibility of this edition. Also, worthy of appreciation are the Authors and their immense contributions to this publication.

Prof. Umar Sodangi
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CALL FOR ARTICLES

The Zamfara International Journal of Education (ZIJE) calls for scholarly articles for review and possible publication in its next edition (Volume 6, Number 7, December, 2026), ZIJE publishes articles that emphasizes on research development and application within the fields of Education. All manuscripts are reviewed by editorial review committee. Contributions must be original, not previously or simultaneously published elsewhere, and are critically reviewed before they are published. Papers, which must be written in English language, should have good grammar and proper terminologies. Hence, prospective articles are subjected to plagiarism assessment test to estimate the percentage of originality of the papers. Hence, Plagiarism threshold of ≤20% is recommended.

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1. Manuscripts including references, appendices, tables and diagrams should be double-spaced and single coded on A4 paper with generous margins (at least 1.5cm).
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Perceived Influence of Short Semester Break on Commitment to Studies among Self-Sponsoring Science Education Undergraduates in Regular Public Universities in Makurdi

TAANGAHAR, Benjamin Akura[1]
benjamintaangahar@gmail.com
+2348085158616
AYUA, Geoffrey Aondolumun[1]
ayuageoffrey@gmail.com
+234 806 933 7213
OHADIUGHA, Marian Nwakaego[2]
mohadiugha@noun.edu.ng
+234 814 739 9330
OKANCHE, Samuel[1]
sokanche-pg26@bsum.edu.ng
+234 916 482 5455
AVULE, Igbawase[1]
avuleigba@gmail.com
+234 813 203 2467
KANGE, Benjamin[1]
kangebenode@gmail.com
+234 816 777 1520

[1]Department of Science Education, Benue State University (now Rev. Fr. Moses Orshio Adasu University), Makurdi, Nigeria
[2]Department of Arts and Social Sciences Education, Faculty of Education, National Open University of Nigeria, Abuja.

Abstract

The study investigated the perceived influence of short semester break on commitment to studies among self-sponsoring science education undergraduates in regular public universities in Makurdi, Benue State, Nigeria using a descriptive survey design. The study had two research objectives and corresponding questions. The population for the study included all the 2003 science education undergraduates in the Department of Science and Mathematics Education, Benue State University (now Rev. Fr. Moses Orshio Adasu University), Makurdi, Nigeria (411) and those from Joseph Sarwuan Tarka University (formerly Federal University of Agriculture), Makurdi (1592). A multistage sample of 91 self-sponsoring undergraduates (47 federal + 44 state) was used for the study. Data were collected using Short Semester Break and Self-sponsoring Undergraduate Questionnaire (SSBSUQ). The researchers'-made 5-point SSBSUQ was validated by experts and trial-tested on 15 undergraduates other than those involved in the actual study. The SSBSUQ's reliability value of 0.73 was determined using Cronbach's Alpha statistic. The research questions were answered by mean and standard deviation. The study revealed that short semester break has negative influence on school attendance (mean = 4.11) and time management (mean = 4.19) of self-sponsoring undergraduates. The study recommended among others that university administrations should increase the length of semester break to enable self-sponsoring undergraduates prepare better for upcoming semesters or the government should grant them study loan with bonds to work for the Nigerian government for a given period after graduating.

Keywords: Short Semester Break, Commitment to Studies, Self-sponsoring Undergraduates, School Attendance, Time management.

Introduction

Education is universally defined as the systematic process of acquiring knowledge, skills, values, attitudes, and habits through teaching, training, research, and practical experience. It is both a formal and informal process that facilitates personal development, social integration, and cultural continuity; which goes beyond rote learning, encompassing the holistic development of a person's intellectual, moral, emotional, and physical capacities (Ayua, 2003; Ayua, 2015a). In Nigeria, education is structured into a 9-3-4 system. This system entails 9 years of basic education, 3 years of post-basic education and at least 4 years of tertiary education (Federal Republic of Nigeria [FRN], 2013). Universities in Nigeria generally organize their academic programme into academic semesters with scheduled breaks between these periods. These

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breaks provide both faculty and students with the opportunity to rest, attend to personal and family responsibilities, engage in employment or other activities and prepare for subsequent academic period. However, the duration and timing of semester breaks vary across universities and could be long or short. Short semester breaks refer to the limited periods between academic semesters, often lasting less than a month. These breaks, designed for rest and recovery, provide undergraduates with opportunities to rejuvenate mentally and physically after intensive study periods (Steiner & Gertel, 2020). However, the short duration can also present challenges, as undergraduates may struggle to transition smoothly between academic demands and personal obligations. While some research suggests that breaks improve focus and productivity upon returning to school (Schaufeli et al., 2019), others argue that insufficient time off, may leave undergraduates feeling unprepared for the new semester. The effectiveness of these breaks often depends on how undergraduates utilize the time, whether for relaxation, employment, or academic preparation. However, this form of break could be very challenging to self-sponsoring undergraduates, who need adequate time to source financial requirement of the institution before returning to settle in for the semester. Ayua (2022a) and Ayua (2022b) reported that when learners are faced with unresolved dilemmas, they get themselves caught in the web of thought cycles, which distort their attentiveness in class besides developing negativity to learning due to emotional traumas. Self-sponsoring undergraduates are students who independently finance their education without reliance on institutional scholarships, government funding, or parental support. These undergraduates typically balance academic responsibilities with part-time jobs, entrepreneurship or other income-generating activities. Self-sponsoring undergraduates often face financial obligations during breaks, such as working additional hours to accumulate savings for tuition or living expenses (Broadbridge & Swanson, 2005). This financial focus may hinder their ability to fully relax or engage in academic preparation, affecting their readiness for the subsequent semester. This financial focus may leave them fatigued or stressed at the start of the semester, reducing their ability to attend classes consistently. Additionally, inadequate rest during the break can disrupt physical and mental recovery, making it harder for undergraduates to transition back to academic routines (Schaufeli et al., 2019). Understanding the experiences of self-sponsoring undergraduates is essential to designing supportive policies and interventions that enhance their academic success and improve their commitment to studies.

Commitment to studies can be seen as students' dedication to academic goals, measured through time, effort, and consistent focus on learning activities (Ayua & Pila, 2018; Tinto, 1994). It involves self-discipline, time management, and the ability to prioritize academic pursuits over competing interests. High commitment is essential for academic success, as it fosters: efficient time management, consistency in school attendance and improvement in overall performance (Ayua & Akaabo, 2016; Bean & Eaton, 2001; Kuh et al., 2016). In the context of undergraduates, commitment to studies is particularly critical because it directly impacts their ability to balance academic requirements with social, financial, and personal responsibilities. However, many factors influence students' commitment to studies such as personal, financial and psychological factors. Among self-sponsoring students, short semester breaks could limit the time for rest, financial or work activities and personal/family responsibilities. Theoretically, Tinto (1975) Student Integration Theory constitutes the framework for the study. The basic assumption of the theory is that student retention and academic commitment are significantly influenced by the degree of integration into both the academic and social environments of an institution. According to Tinto (1975) students who feel connected to their academic community through interactions with faculty, engagement in coursework, and participation in extracurricular activities are more likely to persist and succeed. This integration fosters a sense of belonging, which strengthens students' motivation and commitment to their studies. Conversely, students who experience isolation or disengagement, particularly due to financial burdens or external work obligations, are more likely to struggle with commitment and eventually drop out. Another key assumption of the theory is that external factors, such as financial pressures and personal responsibilities, influence students' ability to integrate into the academic environment. The theory holds that while personal motivation is important, institutional policies and support systems also play a crucial role in student success. The theory is relevant as it explains how self-sponsoring students' financial constraints and work commitments may reduce their integration into the academic environment. The short semester break exacerbates this challenge by limiting their ability to recover physically and mentally, leading to irregular attendance, poor time management, and reduced academic participation. Understanding these factors can help institutions

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develop interventions to enhance student engagement and retention. Based on the two objectives of the study, the following empirical studies were reviewed. As regards school attendance and financial constraints of self-sponsoring/working undergraduates, Mhlongo et al. (2024) explored the impact of financial exclusion on student performance and retention at Mangosuthu University of Technology (MUT), South Africa using a cross-sectional survey of 220 undergraduates; and discovered that among financially excluded students (self-funded or partially supported), 68% reported frequent class absenteeism due to unmet basic needs such as textbooks, accommodation and food, while 43% were uncertain about completing the academic year. There was a significant negative correlation between financial pressure and academic performance ($r = -0.51$, $p < 0.01$), displaying that financial destitution directly lessens engagement and attendance. Oyekola et al. (2024) studied challenges associated with working and studying as expressed by undergraduates in the University of Ilorin, Nigeria and found that those who combined work with studies ranked incessant fatigue, poor academic performance, poor time management and poor attendance as major problems. The undergraduates reported that the need to work to sustain themselves affected their ability to resume on time and attend classes steadily, especially at the commencement of a semester. Paul (2025) investigated the impact of self-sponsorship on female academic performance in higher institutions in Nigeria. The study exposed that self-sponsoring students face delicate financial burdens and are forced to take up employment obligations during and after short semester breaks. These responsibilities lead to late resumption, irregular attendance, reduced concentration in class, and hinder optimal academic performance. On short semester break, time management and work-study conflict, Ede et al. (2025) explored work-study-life balance among students in four higher institutions in Imo State, Nigeria. With 930 valid responses, they reported a high prevalence of self-employment (44.3%) among students. Ordinal regression showed that full-time employment negatively affected GPA ($\beta = -0.534$, $p = 0.016$). The major issues recognized were physical/emotional strain (68.8%) and time conflicts (57.0%). Focus group discussions established that financial restraints during short breaks compel students to work intensively, leaving little time to plan for the approaching semester. Mukwevho (2018) studied time management challenges on students' academic performance at a rural university in Limpopo Province, South Africa. The findings were that work overload, stress and lack of institutional support for time management contributed to poor academic planning, missed deadlines and disorganized study habits at resumption. Ayua (2011) and Ayua (2015b) reported that undergraduates who lacked operative time management tactics, effective study habits; struggle to balance academic and work tasks. These researches offer empirical basis that financial exclusion, self-sponsorship and work during short semester breaks constitute structural barricades to attendance and effective time management among undergraduates.

Statement of the Problem

It is observed that the academic commitment of self-sponsoring undergraduates in universities is increasingly being challenged by the structure of academic calendars, particularly the short semester breaks (Ede et al., 2025; Mhlongo et al., 2024; Mukwevho, 2018; Oyekola et al., 2024; Paul, 2025). While these breaks are intended to provide undergraduates with rest and rejuvenation, their limited duration often creates a mismatch between the academic outcomes and financial responsibilities of self-sponsoring undergraduates. This issue is especially critical because many self-sponsoring undergraduates depend on semester breaks to work additional hours, accumulate savings, or address financial obligations, leaving them physically and mentally fatigued at the start of a new semester. Accordingly, the short semester break is observed to be the determinant of their inability to attend classes regularly, disrupting their academic continuity and diminishing their overall commitment to effective studies. It is against this backdrop, that the perceived influence of short semester break on commitment to studies among self-sponsoring science education undergraduates in regular public universities in Makurdi, Benue State, Nigeria was studied.

Objectives of the Study

The objectives of the study were to:

1. Examine the influence of short semester break on school attendance of self-sponsoring undergraduates in regular public universities in Makurdi.
2. Ascertain the influence of short semester break on time management of self-sponsoring undergraduates in regular public universities in Makurdi

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Research Questions

The following research questions guided the study.

1. What is the influence of short semester breaks on school attendance of self-sponsoring undergraduates in regular public universities in Makurdi?
2. What is the influence of short semester breaks on time management of self-sponsoring undergraduates in regular public universities in Makurdi?

Research Methodology

This study was conducted using a descriptive survey research design. Out of the population of 2003 (411 State + 1592 Federal) science education undergraduates in the two regular public universities in Makurdi (MOAUM Directorate of Academic Planning, 2025; JoSTUM Academic Directorate, 2025), a multistage sample of 91 self-sponsoring science education undergraduates (47 Federal + 44 State) was drawn for the study. The multistage sampling had three stages involving stratified, purposive and simple random sampling. In the first stage, the population was stratified into state and federal regular public universities. Secondly, the undergraduates in the federal and state universities were purposively split into self-sponsoring, partially self-sponsoring and non-self-sponsoring. Lastly, only the fully self-sponsoring science education undergraduates were drawn at random and used for the study. The instrument for data collection was a questionnaire titled Short Semester Break and Self-sponsoring Undergraduates Questionnaire (SSBSUQ) developed by the researchers. The SSBSUQ was structured on a 5-point scale of Strongly Agree, Agree, Undecided, Disagree and Strongly Disagree with a cut-off mean of 3.00. The SSBSUQ was divided into three sections. Section "A" was on demography of respondents; Section "B" contained items on short semester break and school attendance and Section "C" contained items on Semester break and time management. The SSBSUQ was validated by three university academic experts: Two in Science education and one in measurement and evaluation. To determine the reliability index, SSBSUQ's trial testing was carried out using 15 respondents outside the study area, representing 16.48% of the main sample (91 undergraduates). This is in line with the recommendation of Hertzog (2008) that pilot sample should be 10% of the main study sample, and that trial-test sample of 15 to 30 participants is adequate for establishing the reliability of a research instrument. Respondents for the trial test did not participate in the main study. Thereafter, the trial test data were analysed using Cronbach's Alpha statistic which yielded a reliability coefficient of 0.73. Thus, SSBSUQ was deemed reliable for the study. The main data collected for the study were analysed using mean and standard deviation statistics to answer the research questions.

Presentation of Results

The results of the study are presented in order of the research questions as follows:

Research Question One: What is the influence of short semester breaks on school attendance of self-sponsoring undergraduates in Makurdi?

Table 1: *Mean and Standard Deviation of Short Semester Break's Influence on School Attendance of Self-Sponsoring Undergraduates*

S/n	Item description	SA	A	U	D	SD	Mean	SD	Remark
1	I often miss early semester classes in order to arrange my school fees.	58	29	0	2	2	4.53	0.81	Accepted
2	Making efforts to cope with responsibilities usually delay my resumption.	50	38	1	0	2	4.47	0.74	Accepted
3	In a bid to meet financial demands, I hardly attend classes from the beginning to the end	47	28	3	7	6	4.13	1.20	Accepted
4	I sometimes miss classes because I have to go out to look for money for my upkeep.	47	32	2	2	8	4.19	1.18	Accepted
5	I feel mentally unprepared to resume school after a short semester break	34	34	9	10	4	3.92	1.15	Accepted
6	Short semester break affects my readiness to participate actively in school activities.	25	44	0	16	6	3.73	1.23	Accepted

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7	Struggling to balance my job during short semester reduces my regular class attendance.	43	33	9	4	2	4.22	0.95	Accepted
8	The short semester break does not provide enough time for me to reflect on my academic goals which affect my class attendance.	43	34	4	8	2	4.19	1.02	Accepted
9	The stress of managing financial responsibilities during the semester often makes me late to class.	34	35	3	15	4	3.88	1.21	Accepted
10	The difficulties of managing financial demands sometimes force me to consider deferring a semester.	33	32	9	11	6	3.82	1.24	Accepted
	Cluster Mean						**4.11**	**1.07**	Accepted

Table 1 presents responses from self-sponsoring undergraduates regarding the influence of short semester breaks on their school attendance. The items focus on financial preparedness, mental readiness, and time constraints linked to short semester breaks. The cluster mean of 4.11 suggests a high overall agreement among respondents that short semester breaks influence their school attendance. The cluster standard deviation of 1.07 indicates a moderate spread of responses around the mean.

Research Question Two: What is the influence of short semester break on time management of self-sponsoring undergraduates in Makurdi?

Table 2: *Mean and Standard Deviation of Short Semester Break's Influence on Time Management of Self-Sponsoring Undergraduates*

S/N	Item description	SA	A	U	D	SD	Mean	SD	Remark
1	The short semester break does not give me enough time to plan my academic schedule for a new semester.	31	48	4	6	2	4.10	0.92	Accepted
2	I struggle to balance work with responsibilities immediately after a short semester break.	41	34	5	11	0	4.18	0.96	Accepted
3	I begin semesters without a clear time management plan due to the short duration of the break.	39	34	10	6	2	4.12	1.00	Accepted
4	Because of work during the short break, I often resume school feeling mentally disorganised to manage my time effectively.	47	32	6	6	0	4.32	0.87	Accepted
5	I have little time left for academics due to work demands	44	40	5	2	0	4.38	0.70	Accepted
6	I find it hard to meet assignment deadlines because of limited time.	38	37	14	0	2	4.20	0.86	Accepted
7	I struggle to allocate enough time for studying after work.	42	30	6	8	5	4.05	1.18	Accepted
8	I often postpone my academic work because of the time spent on income-generating activities.	42	35	3	9	2	4.16	1.04	Accepted
9	I find it difficult to be in school all the time because the break is usually too short to handle my struggles well.	37	38	5	8	3	4.08	1.06	Accepted
10	It is difficult to combine work with study time.	42	40	4	4	1	4.30	0.84	Accepted
	Cluster Mean						**4.19**	**0.94**	Accepted

Table 2 presents students' responses on the influence of short semester breaks on their ability to manage time effectively for academic activities. The items reflect challenges in planning, balancing work and academics, and maintaining regular

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attendance due to financial demands. The cluster mean of 4.19 indicates that the respondents generally agree that short semester breaks disrupt their time management. These disruptions are primarily due to the necessity of working during or immediately after the break, lack of sufficient time to plan academically, and mental exhaustion. The findings suggest that short semester breaks negatively affect students' ability to start the semester with organized schedules, leading to lack of proper commitment to studies and inefficient academic planning

Discussion of Findings

As regards the influence of short semester break on school attendance, the finding revealed a high negative influence of short semester break on school attendance of self-sponsoring undergraduates with a cluster mean of 4.11. This indicates that undergraduates strongly agreed that short breaks hinder stable school attendance. Items such as adding extra time before resumption to arrange fees, delay in resumption due to responsibilities, and inability to gather fees within the short break were highly rated. This implies that short breaks do not give self-sponsoring undergraduates reasonable time to engage in income-generating activities, leading to late resumption and irregular school attendance. This aligns with Tinto's (1975) Student Integration Theory that external financial burdens reduce academic integration. The result is in agreement with Mhlongo et al. (2024) at Mangosuthu University of Technology, South Africa, who found that 68% of self-funded students reported frequent class absenteeism due to unmet basic needs, with a strong negative correlation between financial pressure and academic outcomes ($r = -0.51$). The finding also supports Oyekola et al. (2024) in University of Ilorin, Nigeria, who ranked poor attendance, incessant fatigue and poor academic performance as top challenges expressed by self-sponsoring undergraduates, and Paul (2025), who found that self-sponsorship with financial pressures hinders optimal academic performance. The implication of the finding that short semester break highly hinders school attendance is that the academic calendar is not considerate of the socio-economic realities of self-sponsoring undergraduates. Because respondents strongly agreed that they need extra time to arrange fees, experience delay in resumption due to responsibilities and cannot gather fees within the short break, they miss foundational lectures and continuous assessments at the start of the semester. This results in learning loss, particularly in science courses that are sequential, and could force lecturers to repeat content, thereby distorting syllabus coverage. It may also widen inequality and increases dropout risk among self-sponsoring undergraduates, as supported by Mhlongo et al. (2024) who found 68% absenteeism among self-funded students, and by Oyekola et al. (2024) and Paul (2025). The implication for educational planning is the need for calendar reform and flexible fee policies. Concerning the influence of short semester break on time management, the study revealed a strong negative influence with a cluster mean of 4.19. This suggests that the shortness of the break leaves students mentally or psychologically disorganized and with no clear academic plan at the beginning of a new semester. Responses for self-sponsoring science undergraduates agreed that a longer break would help improve their academic time management, that they resume feeling mentally disorganized, find it difficult to combine work with study time (Mean = 4.30), and have to share school time with work. Because the break is consumed by intensive work to raise tuition, they resume stressed and unable to properly schedule their academic activities effectively. This finding is in line with Tinto's theoretical assumption that external pressures decline academic integration. The result is also consistent with Ede et al. (2025) in Imo State, Nigeria, who found that 57.0% of working students experienced time conflicts and 68.8% experienced physical/emotional strain, and that full-time employment negatively affected GPA (Grade Point Average), and with Mukwevho (2018) in Limpopo Province, South Africa, who found that time management challenges due to work overload and stress led to poor academic performance. The finding that short semester break strongly impairs time management implies that undergraduates resume psychologically unprepared for academic work. Since they resume feeling mentally disorganized, find it problematic to combine work with study time, and have to share school time with work, they are incapable to allocate time successfully for lectures, laboratory work and personal study. This work-study conflict breeds fatigue, stress and poor academic planning, resulting in missed deadlines and low grades, as substantiated by Ede et al. (2025) where 57.0% reported time conflicts and 68.8% reported emotional strain. The implication is that universities need to strengthen counselling and academic advising on time management, and lecturers should implement flexible pedagogical support in the first weeks of resumption to help self-sponsoring students re-integrate academically.

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Conclusion

The study concluded that short semester break has a high negative influence on the commitment to studies of self-sponsoring science education undergraduates in regular public universities in Makurdi. Specifically, the short break hinders school attendance, as undergraduates lack enough time to raise fees and upkeep money, resulting in late resumption and irregular school attendance. It also interrupts time management, as undergraduates resume mentally or psychologically disorganized, fatigued, and with no clear academic plan, forcing them to share study time with work.

Recommendations

Based on the findings of the study, the following recommendations were advanced:

1. **For University Management on Academic Calendar:** The University management should consider elongating the semester break period from the current short duration to at least 4+ weeks. This will provide self-sponsoring undergraduates adequate time to engage in income-generating activities, arrange school fees and upkeep money, and resume mentally prepared for academic work. This addresses items 1, 2 and 3 in Table 1 which were highly rated with means above 4.
2. **For University Management on Flexible Fee Policy:** The University should adopt a flexible school fees payment policy that allows self-sponsoring students to pay in installments and attend classes while completing payment. This will reduce late resumption, irregular attendance and the intention to defer semester as indicated in Table 1, item 10.
3. **For Department and Lecturers on Academic Support:** Lecturers should avoid fixing major continuous assessments and compulsory practicals in the first two weeks of resumption. Also, lecture materials and notes for the first weeks should be made available online to support late resuming self-sponsoring students to catch up and reduce learning loss in sequential science courses.
4. **For Guidance and Counselling Unit on Time Management:** The University Counselling Centre should organize time management and work-study balance workshops for self-sponsoring undergraduates at the beginning of every semester. This is necessary because findings in Table 2 showed students resume mentally disorganized (Mean = 4.32) and find it difficult to combine work with study time (Mean = 4.30).5.
5. **For Self-sponsoring undergraduates:** Self-sponsoring undergraduates in Makurdi should be sensitized to apply for NELFUND (Nigerian Education Loan Fund) loan for students as a sustainable alternative to hustling during short semester breaks, which disrupts their attendance and time management.

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Assessment of Solid Waste Management Practices and Health Implications on Traders in Oba and New Benin Markets in Benin Metropolis, Edo State, Nigeria

EDOGIAWERIE, Victor Ikponmwosa[1]
victoredogiawerie4@gmail.com
+234-8054894704
EDOSA, Kenneth Omoregieva[1]
kenneth.omorogieva@uniben.edu
+2347057186604

[1]Department of Health, Safety and Environmental Education, University of Benin, Benin City.

Abstract

This study assessed solid waste management practices and health implications among market traders in Oba Market and New Benin Market, Benin Metropolis, Edo State. Four research questions were raised to guide the study while two hypotheses were formulated and tested at 0.05 level of significance. Descriptive survey research design was used in this study. The population comprised 6,450 registered market traders in Oba Market and New Benin Market for the 2024/2025 trading year (Edo State Ministry of Commerce, 2023). The sample size was 420 traders and was selected through multi-stage sampling technique. The instrument for data collection was a self-structured questionnaire titled Solid Waste Management Practices and Health Implications Questionnaire (SWMHIQ). The instrument had 10 items divided into Section B: 5 items on solid waste management practices scored on a 3-point scale of Always = 3, Sometimes = 2, Never = 1, and Section C: 5 items on health implications scored on a 4-point Likert scale of Strongly Agree = 4, Agree = 3, Disagree = 2, Strongly Disagree = 1. The instrument was validated by the researcher's supervisor and three experts in the Department of Health, Safety and Environmental Education, University of Benin. The reliability of the instrument was determined using Cronbach's Alpha method and a reliability coefficient of 0.84 was obtained. The researcher and two trained research assistants administered the questionnaire to the respondents at their market stalls. Data collected were analyzed using descriptive statistics of frequencies, percentages, mean and standard deviation to answer the research questions, while inferential statistics of independent t-test was used to test the hypotheses at 0.05 level of significance. Findings revealed that inadequate waste bins, irregular waste evacuation, and indiscriminate dumping of refuse were the major solid waste management practices among market traders. The reported health implications include malaria outbreak, respiratory problems, skin infections, diarrhea, and foul odors. The study further revealed that there was no significant difference in both solid waste management practices and reported health implications between traders in Oba Market and New Benin Market. These findings indicate that traders in both markets experience similar challenges related to poor waste management. The study concludes that poor solid waste management practices contribute significantly to health problems among market traders. It was recommended that Edo State Waste Management Board, in collaboration with market associations, should provide adequate waste bins, ensure daily evacuation of refuse, and intensify health education campaigns to reduce disease burden in both markets.

Keywords: Solid Waste Management, Market Traders, Health Implications, Oba Market, New Benin Market, Sanitation

Introduction

Solid waste management remains a pressing environmental health challenge in urban markets of developing countries. Markets are hubs of commercial activity where large volumes of waste are generated daily from food items, packaging, and spoiled goods. The accumulation of such waste in trading environments creates unsightly conditions, blocks drainage, and poses serious risks to the health and wellbeing of traders and customers who spend several hours in these spaces daily. The scale of the problem is global. An estimated 2.01 billion tonnes of municipal solid waste are generated annually, with markets contributing significantly due to high commercial activities (World Bank, 2022). In Nigeria, rapid urbanization and commercialization have further increased waste generation in markets (Federal Ministry of Environment, 2020). Oba Market and New Benin Market are two of the largest and oldest markets in Benin Metropolis, hosting over 6,450 traders combined (Edo State Ministry of Commerce, 2023). The high population density in these markets creates conditions for rapid waste accumulation. Solid waste management practices encompass methods of waste collection, storage, transportation, and disposal. Poor practices lead to accumulation of refuse, clogged drainage, and proliferation of disease vectors (Landrigan et al., 2019). Market traders spend 8-12 hours daily in their stalls, making them directly exposed to waste-related hazards. According to the Theory of Planned Behavior, individual practices are shaped by attitude, perceived

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control, and subjective norms (Ajzen, 2020). Health implications of poor solid waste management are well documented. Accumulation of refuse provides breeding grounds for mosquitoes, rodents and flies which transmit malaria, cholera, and typhoid (World Health Organization, 2021). Open burning of waste releases particulate matter that aggravates respiratory conditions such as asthma and bronchitis (Landrigan et al., 2019). A study in Nigerian markets found that a significant proportion of traders reported frequent illnesses linked to poor sanitation in their trading environment (Ezeah et al., 2020). Despite the economic importance of Oba and New Benin Markets, there is limited empirical data on how traders manage solid waste and how it affects their health. Most existing studies focus on residential areas, leaving a gap in market-specific research (Nabegu, 2019). Understanding current practices and health outcomes among traders in these two markets is critical for curbing the ever-increasing menace of solid waste pollution. Therefore, this study assesses solid waste management practices and health implications among market traders in Oba Market and New Benin Market. The findings will provide baseline data for Edo State Waste Management Board and market associations to develop strategies for cleaner and healthier market environments.

Statement of the Problem

Oba Market and New Benin Market are characterized by heaps of refuse, clogged drains, and foul odors, especially during rainy seasons. Despite efforts by Edo State Waste Management Board, waste evacuation in both markets remains irregular. Traders generate substantial waste daily but lack adequate facilities for proper disposal, resulting in indiscriminate dumping within market premises. Health consequences are evident in frequent reports of malaria, diarrhea, and respiratory infections among traders. Blocked drainage due to solid waste also contributes to flooding, causing damage to goods and disruption of business activities. While government has conducted sanitation exercises, the problem persists, suggesting gaps in waste management practices. To the best of the researcher's knowledge, no recent study has specifically assessed and compared solid waste management practices and health implications among traders in Oba Market and New Benin Market. Hence, this study seeks to assess the solid waste management practices and health implications among market traders in Oba Market and New Benin market, Benin Metropolis.

Objectives of the Study

The general objective of this study is to assess solid waste management practices and health implications among market traders in Oba Market and New Benin Market, Benin Metropolis.

Specifically, the study sought to:

1. Identify the solid waste management practices among market traders in Oba Market and New Benin Market.
2. Examine the health implications of poor solid waste management as reported by market traders in Oba Market and New Benin Market.
3. Determine the difference in the solid waste management practices between market traders in Oba Market and New Benin Market.
4. Determine the difference in the reported health implications of poor solid waste management between traders in Oba Market and New Benin Market.

Research Questions

1. What are the solid waste management practices among market traders in Oba Market and New Benin Market?
2. What are the health implications of poor solid waste management as reported by market traders in Oba Market and New Benin Market?
3. What is the difference in the solid waste management practices between market traders in Oba Market and New Benin market?
4. What is the difference in the reported health implications of poor solid waste management between traders in Oba Market and New Benin Market?

Null Hypotheses

The following null hypotheses were formulated and tested at 0.05 level of significance:

Ho_1: There is no significant difference in the solid waste management practices between traders of Oba market and New Benin market.

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Ho_2: There is no significant difference in the reported health implications of poor solid waste management between traders in Oba Market and New Benin Market.

Research Methodology

The descriptive survey research design was adopted for the study. The population comprised 6,450 registered market traders in Oba Market and New Benin Market, Benin Metropolis (Edo State Ministry of Commerce, 2023). A sample size of 420 traders was selected using multi-stage sampling technique. In the first stage, the two markets were purposively selected. In the second stage, 210 traders were selected from Oba Market and 210 traders from New Benin Market. In the third stage, convenient sampling procedures was used to select traders who were available, accessible and willing to participate in the study from each market. A self-structured questionnaire titled Solid Waste Management Practices and Health Implications Questionnaire (SWMHIQ) was used for data collection. The instrument had 10 items divided into three sections. Section A elicited demographic data of the respondents, Section B contained 5 items on solid waste management practices while Section C contained 5 items on health implications. Section B was scored on a 3-point scale of Always = 3, Sometimes = 2, Never = 1. Section C was scored on a 4-point Likert scale of Strongly Agree = 4, Agree = 3, Disagree = 2, Strongly Disagree = 1. Face and content validity of the instrument were ascertained by the researcher supervisor and three other experts in the Department of Health, Safety and Environmental Education, University of Benin. To determine the reliability, a pilot test was conducted on 20 traders who were not included in the study. Data from the pilot test were analyzed using Cronbach's Alpha and a reliability coefficient of 0.84 was obtained. The researcher and two trained research assistants administered the questionnaires to traders at their stalls during trading hours. Informed consent was obtained and participation was voluntary. Data collected were analyzed using SPSS version 26. Descriptive statistics of frequency, percentage, mean and standard deviation were used to answer the research questions, while independent t-test was used to test the hypotheses at 0.05 level of significance.

Presentation of Results

Research Question 1: What are the solid waste management practices among market traders in Oba Market and New Benin Market?

Table 1: Mean and Standard Deviation of Solid Waste Management Practices(N=420)

S/N	Items	Always	Sometimes	Never	Mean	SD	Decision
1.	Inadequate waste bins in the market	210	150	60	2.36	0.72	Accepted
2.	Irregular evacuation of waste	200	159.	61	2.33	0.71	Accepted
3.	Indiscriminate dumping of refuse	190	165	65	2.30	0.72	Accepted
4.	Open burning of waste	170	170	80	2.21	0.75	Accepted
5.	Use of polythene bags for waste storage	160	175	85	2.18	0.74	Accepted

Scoring: Always = 3, Sometimes = 2, Never = 1. Criterion mean = 2.00

Table 1 shows that all items had mean scores above 2.00. Inadequate waste bins had the highest mean (M = 2.36, SD = 0.72), followed by irregular evacuation (M = 2.33, SD = 0.71). This implies that infrastructural deficiency and irregular collection are the major waste management practices affecting both markets.

Research Question 2: What are the health implications of poor solid waste management as reported by market traders?

Table 2: Mean and Standard Deviation of Health Implications(N=420)

S/N	Health Implications	Mean	SD	Decision
1.	Malaria outbreak	3.40	0.62	Agreed
2.	Respiratory problems	3.33	0.65	Agreed
3.	Skin infections	3.25	0.68	Agreed
4.	Diarrhea	3.18	0.70	Agreed
5.	Foul odors and discomfort	3.12	0.73	Agreed

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Criterion mean = 2.50. N = 420

Table 2 reveals that malaria had the highest mean (M = 3.40, SD = 0.62), followed by respiratory problems (M = 3.33, SD = 0.65). This indicates that traders associate poor waste management with vector-borne and communicable diseases.

Hypothesis Testing:

1.There is no significant difference in the solid waste management practices between traders of Oba market and New Benin market.

Table 3: T-test analysis of difference in solid waste management practices between traders of Oba market and New Benin market

Marke	N.	Mean	Std. Deviation	df	t-cal.	p-value.	Decision
Oba Market	210	2.85	0.62	418	1.42.	0.157	Retained
New Benin Market	210	2.77	0.58				

Source: Fieldwork, 2026

Table 3 above shows the t-test analysis of solid waste management practices between the two markets. The mean score for Oba market traders was 2.85 (SD=0.62) and New Benin was 2.77 (SD=0.58). The calculated t-value was 1.42 with 418 degrees of freedom and a p-value of 0.157. Since the p-value (0.157) is greater than the alpha level of 0.05, the null hypothesis is retained. This means there is no significant difference in solid waste management practices between traders of Oba market and New Benin market. In practical terms, both markets practice waste management similarly, mostly poor to moderate such as open dumping, burning, irregular use of waste bins, and reliance on informal waste collectors.

2. There is no significant difference in the reported health implications of poor solid waste management between traders in Oba Market and New Benin Market

Table 4: Independent t-test on difference in health implications by market

Market	N	Mean	SD	t	df	P-Value
Oba Market Health Implications	210	3.29	0.55	1.47	398	0.142
New Benin Market Health Implications	210	3.18	0.51			

Significant at $p < 0.05$

Table 4 shows that traders in Oba Market had a mean score of 3.29 while those in New Benin Market had 3.18. The calculated t-value is 1.47 with a p-value of 0.142 which is greater than 0.05. Therefore, the null hypothesis is accepted. This implies that there is no significant difference in the reported health implications of poor solid waste management between traders in Oba Market and New Benin Market.

Discussion of Findings

The findings from Table 1 revealed that all identified solid waste management practices had mean scores above the criterion mean of 2.00, indicating that poor waste management practices are prevalent in both markets. Inadequate waste bins had the highest mean (M=2.36), followed by irregular evacuation (M=2.33) and indiscriminate dumping (M=2.30). This implies that the problem is more infrastructural and institutional than attitudinal, as traders are willing to dispose properly but lack the facilities and regular collection services. This finding is consistent with the study of Ogundele et al. who assessed solid waste management practices in Oja Oba market, Ado-Ekiti and found that 78% of traders reported insufficient waste bins and 65% reported irregular evacuation by government agencies, leading to indiscriminate dumping and burning (Ogundele, Oke & Adebayo, 2020). Similarly, Debrah et al. in their study of solid waste management in urban markets in Ghana found that market traders in Kumasi Central Market largely depended on polythene bags and open dumping due to inadequate skip containers and poor collection schedules, a pattern identical to what was found in Oba and New Benin markets (Debrah, Vidal & Dinis, 2021). The prevalence of open burning (M=2.21) and use of polythene bags (M=2.18) further shows adoption of coping strategies rather than best practices, which corroborates Nwankwo et al. who reported that traders in Onitsha Main Market resorted to open burning as an alternative when waste exceeded bin capacity

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(Nwankwo, Ifeanyi & Edeh, 2022). Findings from Table 2 showed that traders strongly agreed to all health implications listed, with malaria outbreak having the highest mean (M=3.40, SD=0.62), followed by respiratory problems (M=3.33), skin infections (M=3.25), diarrhea (M=3.18) and foul odors (M=3.12). This indicates that traders are aware that accumulated refuse creates breeding sites for vectors and emits hazardous pollutants. This is in line with Oranusi et al. who established that dumpsites in markets in Ota, Ogun State significantly increased Anopheles mosquito density, resulting in a 34% higher prevalence of malaria among traders near waste heaps compared to those farther away (Oranusi, Dahunsi & Olusola, 2020). The high rating for respiratory problems also supports the findings of Adefila et al. in their study on health effects of open burning of waste in Lagos markets, where they found that traders exposed to smoke from burning refuse reported higher rates of cough, catarrh, eye irritation and asthma-like symptoms due to emission of dioxins and particulate matter (Adefila, Ogunbode & Olatunbosun, 2019). The reported diarrhea and skin infections aligns with the work of Babs-Shomoye et al. who assessed health implications of poor solid waste management among traders in Sagamu market and found a significant association between indiscriminate dumping, leachate contamination of food items, and occurrence of diarrheal diseases and dermatitis among traders (Babs-Shomoye, Kayode & Afolabi, 2023).

The t-test result for the first hypothesis ($t=1.42$, $p=0.157 >0.05$) showed no significant difference in solid waste management practices between traders in Oba Market (M=2.85) and New Benin Market (M=2.77), hence the null hypothesis was retained. This suggests that poor waste management is not peculiar to one market but a systemic failure across Benin Metropolis. This finding is supported by Eze et al. who compared solid waste practices in two major markets in Enugu and found no significant difference ($p=0.21$), attributing it to uniform weaknesses in waste governance and lack of market-specific waste policies (Eze, Amadi & Ogbonna, 2022). Similarly, Abila and Kantola in their comparative study of waste management in markets in Benin City confirmed that both Oba and New Benin markets suffer from the same infrastructural deficit and irregular collection by Edo State Waste Management Board, making locational difference insignificant (Abila & Kantola, 2019). Similarly, the result for the second hypothesis ($t=1.47$, $p=0.142 >0.05$) indicated no significant difference in reported health implications between Oba Market traders (M=3.29) and New Benin traders (M=3.18). This implies that exposure to similar waste types and poor practices exposes traders in both locations to similar health risks. This corroborates the findings of Ojekunle et al. who examined health risks associated with market solid waste among traders in Abeokuta and reported no significant difference in health complaints between traders in two different markets ($p=0.18$), as both were exposed to similar vector breeding sites and air pollutants (Ojekunle, Lateef & Efunshile, 2022). Furthermore, Duru et al. in a study of health implications of market wastes in Owerri found that malaria, cholera and respiratory disorders were uniformly high across markets regardless of location, due to common waste composition dominated by organic waste and plastics (Duru, Nduka & Njoku, 2020). In summary, the absence of significant difference in both practices and health implications suggests that interventions should be city-wide rather than market-specific, focusing on provision of adequate waste bins, regular evacuation, and health education for all traders in Benin Metropolis.

Conclusion

Based on the findings of this study, it was concluded that poor solid waste management practices are highly prevalent among traders in Oba Market and New Benin Market in Benin Metropolis. Practices such as inadequate waste bins, irregular evacuation of waste, indiscriminate dumping of refuse, open burning of waste and use of polythene bags for waste storage were common in both markets, with inadequate waste bins and irregular evacuation being the most pronounced. This shows that the waste management challenge is largely infrastructural and institutional, rather than a lack of awareness by traders. The study also concluded that poor solid waste management has serious health implications as reported by traders. Malaria outbreak, respiratory problems, skin infections, diarrhea and foul odors/discomfort were all agreed upon as consequences of accumulated waste. Traders clearly associate poor waste disposal with increased vector breeding, air pollution from burning, and contamination of food and water. Furthermore, the hypothesis testing revealed that there is no significant difference in solid waste management practices and in reported health implications between traders in Oba Market and New Benin Market. This indicates that the problem is not market-specific but systemic across markets in Benin Metropolis, reflecting common issues such as insufficient waste facilities, poor collection schedules by waste management

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authorities, and similar socio-economic trading environments. In essence, solid waste management in markets within Benin Metropolis is poor and poses significant public health risks to traders, and requires a holistic, city-wide intervention.

Recommendations

Based on the findings of this study, the following recommendations were made:

1. The Edo State Waste Management Board in collaboration with Oredo Local Government Council should provide adequate standard waste bins and skip containers at strategic points in Oba Market and New Benin Market. This will address the major challenge of inadequate waste bins and reduce indiscriminate dumping.
2. There should be regular and timely evacuation of solid waste from both markets. The waste management authority should develop a fixed collection timetable, at least daily evacuation, to prevent accumulation of waste which currently leads to open burning and foul odors. This will also eliminate breeding sites for mosquitoes which was reported as a major health implication.
3. The market leadership and health educators should organize continuous health education and sensitization programmes for traders on proper waste segregation, proper use of waste bins, dangers of open burning and the health implications of poor waste management. This will help reduce respiratory problems, skin infections and diarrhea reported by traders.
4. Government should enact and enforce strict sanitation laws in markets, with penalties for indiscriminate dumping and open burning. Environmental Health Officers should be posted to both markets for daily monitoring and supervision of waste management practices.
5. Traders associations in both markets should form market sanitation committees to ensure internal compliance, contribute to waste management levies, and partner with private waste collectors to complement government efforts, since findings showed no significant difference between the two markets, indicating a need for a unified city-wide market waste management strategy.
6. The Ministry of Environment should discourage the use of polythene bags for waste storage by promoting affordable reusable waste bags and provide waste-to-wealth initiatives, where organic wastes from the markets are converted to compost, thereby reducing the volume of waste burnt.

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Evaluation of Validity and Reliability of Self-efficacy Questionnaire among University Pre-Service Biology Teachers in North-West, Nigeria

IDRIS, Abdulsalam
abdulsalam.idris@slu.edu.ng
08067232359

Department of Science Education, Sule Lamido University Kafin Hausa, Jigawa State, Nigeria

Abstract

*This study focused on the psychometric validation of the Pre-Service Biology Teachers' Self-Efficacy Questionnaire Pre-service BITSEQ developed for use among undergraduate biology education students in state universities within the North-West zone of Nigeria. Grounded in Albert Bandura's Social Cognitive Theory, the research addressed the critical need for culturally and contextually robust assessment tools to measure pre-service science teachers' instructional confidence. Adopting a descriptive survey research design, a sample of thirty (30) pre-service biology teachers was selected using a multistage sampling technique combining simple random and stratified sampling. The validation process evaluated face validity, content validity, construct validity (convergent and discriminant), and internal consistency reliability. The results established a strong logical face validity index of 81.8% among a panel of experts. For content validity, an expert review of the initial twenty items resulted in fifteen retained items, yielding an overall scale content validity index (S-CVI/Ave) of 0.89. Construct validity was successfully demonstrated through a significant positive convergent correlation (*r = 0.76*) with the General Self-Efficacy Questionnaire and a weak discriminant correlation (*r = 0.32*) with an academic procrastination measure, confirming the instrument's distinct construct measurement. Furthermore, the internal consistency reliability yielded an overall Cronbach's alpha of 0.70, with strong subscale coefficients ranging from 0.85 to 0.98. The findings confirm that the PBTSEQ possesses high psychometric rigor, making it a reliable and valid instrument for assessing teacher self-efficacy in science education research.*

Keywords: *Teacher Self-Efficacy, Psychometric Validation, Pre-Service Biology Teachers, Content Validity, Construct Validity, Reliability*

Introduction

Teacher self-efficacy grounded in Albert Bandura's Social Cognitive Theory refers to an individual's belief in their capability to organize and execute the courses of action required to produce designated types of performance or achieve specific goals (Bandura, 1997). It determines how people think, feel, motivate themselves, and behave (Soriano-Sánchez, 2026). Because it is task- and context-specific, an individual may possess high self-efficacy in one domain while exhibiting low confidence in another (Tschannen-Moran & Hoy, 2001). Pre-service teacher self-efficacy represents the confidence that student-teachers or trainees hold in their developing ability to successfully plan, manage, and execute effective teaching tasks before entering the profession full-time (Menon & Sadler, 2016). This construct serves as a crucial baseline in teacher education: it predicts how resilient future educators will be when facing classroom challenges, how readily they will adopt innovative pedagogies, and how long they will remain committed to the profession (Megreya et al., 2021). In the context of science education, self-efficacy takes on unique complexity. Science teaching demands not only general pedagogical competence, but also deep content knowledge, inquiry-based facilitation, and the management of hands-on, potentially unpredictable laboratory environments (Haatainen et al., 2021). Literature highlights three critical dimensions of science teaching self-efficacy:

Personal Science Teaching Efficacy: A teacher's belief in their own ability to understand scientific concepts, answer student questions accurately, and orchestrate effective science lessons (Ribeiroinha et al., 2025).

Science Teaching Outcome Expectancy: A teacher's belief that effective science instruction can positively influence student learning, even when overcoming external barriers like low socioeconomic status or inadequate prior student preparation (Liu et al., 2025).

Inquiry-Based Instructional Efficacy: The confidence to move away from rote memorization and facilitate student-led investigations, open-ended problem-solving, and critical data analysis (Soriano-Sánchez, 2026).

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These beliefs directly shape classroom dynamics and students' learning outcome. Science teachers who are highly efficacious are significantly more likely to utilize inquiry-based learning, implement advanced curricula, and integrate modern instructional tools rather than relying exclusively on traditional textbook lectures (Megreya et al., 2021). Furthermore, when laboratory experiments fail or students struggle to grasp complex biological phenomena, teachers with strong self-efficacy persevere, adapt their strategies, and view setbacks as diagnostic challenges rather than personal failures (Mohammed & Luguterah, 2024). Research consistently demonstrates that students taught by educators with high science teaching self-efficacy exhibit higher conceptual gains, increased intrinsic motivation, and a more positive perception of science as a discipline (Faqihi & Asiri, 2026; Menon & Sadler, 2016; Perera et al., 2022). Despite the recognized importance of self-efficacy, pre-service science teachers often experience fluctuations in confidence during their training and early field placements, a phenomenon frequently linked to instructional anxiety and a lack of mastery experiences (Soriano-Sánchez, 2026). In regions like the North-west zone of Nigeria, preparing robust biology educators requires a careful evaluation of how well teacher education curricula foster these critical psychological constructs (Idris, 2026). However, ensuring that self-efficacy is accurately assessed relies entirely on the psychometric rigor of the measuring instruments used. Validating self-efficacy questionnaires within specific cultural and institutional environments is essential because measurement models can vary across different geographical and educational contexts. Establishing the structural validity, convergent validity, and internal consistency reliability of these scales ensures that researchers and teacher educators can accurately examine pre-service teachers' readiness, address instructional vulnerabilities, and ultimately enhance the quality of future science instruction.

Objectives of the Study

The study has the following objectives:

1. To determine the face validity index of university Pre-Service Biology Teachers' Self-Efficacy Questionnaire in North-west zone, Nigeria.
2. To calculate the content validity index of university Pre-Service Biology Teachers' Self-Efficacy Questionnaire in North-west zone, Nigeria.
3. To find out the construct validity index of university Pre-Service Biology Teachers' Self-Efficacy Questionnaire in North-west zone, Nigeria.
4. To establish the reliability coefficient of university Pre-Service Biology Teachers' Self-Efficacy Questionnaire in North-west zone, Nigeria.

Research questions

The study answered the following research questions:

1. What is the face validity index of university Pre-Service Biology Teachers' Self-Efficacy Questionnaire in North-west zone, Nigeria?
2. What is the content validity index of university Pre-Service Biology Teachers' Self-Efficacy Questionnaire in North-west zone, Nigeria?
3. What is the construct validity index of university Pre-Service Biology Teachers' Self-Efficacy Questionnaire in North-west zone, Nigeria?
4. What is the reliability coefficient of university Pre-Service Biology Teachers' Self-Efficacy Questionnaire in North-west zone, Nigeria?

Research Methodology

This study employed a descriptive survey research design. As a quantitative approach, this framework systematically documents and characterizes the prevailing traits, attitudes, and behaviors of a target population (Creswell & Guetterman, 2019; Sirisilla, 2023). Rather than establishing cause-and-effect relationships, the design focuses on mapping the current status, distribution, and structural characteristics of the research variables. Standardized instruments, including self-efficacy questionnaires, were utilized to convert psychological attributes and behavioral perceptions into quantifiable data suitable for rigorous statistical analysis. The population for this study comprised level 300 biology education students enrolled in state universities within the North-West zone of Nigeria. A sample of 30 pre-service biology teachers was

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selected using a multistage sampling procedure, which combined simple random and stratified sampling techniques across two state universities in the zone.

Presentation of Result and Discussion

Research Question 1: What is the face validity index of university Pre-Service Biology Teachers' Self-Efficacy Questionnaire in North-west zone, Nigeria?

To determine face validity index of Self-Efficacy Questionnaire, a logical face validity index was established. The Self-Efficacy Questionnaire was subjected to ten (10) experts chosen from the field of Psychology, Science Education and statistics with minimum rank of Senior Lecturer to professor from Universities in Northern Nigeria. All the chosen validators were requested to score each item of the instrument. The average percentage agreement scores of the ten (10) experts was calculated in the table below:

Table 1: Face Validity Index for Pre-service Biology Teachers' Self-efficacy

Validators	CI (30%)	TCT (30%)	L (40%)	FVI
1st Validator	24	28	30	82
2nd Validator	26	28	32	86
3rd Validator	23	24	30	77
4th Validator	26	30	29	85
5th Validator	20	22	30	72
6th Validator	26	24	30	80
7th Validator	23	25	36	84
8th Validator	26	23	38	87
9th Validator	24	20	33	77
10th Validator	30	28	30	88
FVIA	24.8	25.2	31.8	81.8

Key: CI: Clarity of Instructions**, TCT:** Time to Complete the Test**, L:** Language Usage**, FVI:** Face Validity Index**, FVIA**: Overall Face Validity Index

The Logical Face Validity index of 81.8% was calculated, this is an acceptable value as suggested by Poopola, (2016) and Roy, et al, (2023).

Research Question 2: What is the content validity index of university Pre-Service Biology Teachers' Self-Efficacy Questionnaire in North-west zone, Nigeria?

In answering research question 2, Content Validity Ratio Index (CVRi) and Scale Validity Index (S-CVI) were used in calculating the indices of the instrument. A panel of six (6) content experts evaluated the initial 20-items of the Self-efficay questionnaire. According to Yusoff (2019) six steps are involved in content validation: creating a content validation form, choosing an expert review panel, performing content validation, evaluating the domain and items, assigning a score to each item, and determining the Content Validity Index (CVI). The experts thoroughly and critically examined the areas and the items after which they assigned a score to each item as they were requested. Their remarks, corrections and suggestions during the validation process were taken into account in the final version of the questionnaire.

Then, the Content Validity Index (CVI) was calculated inform of items CVI (I-CVI) using the formula: $\mathrm{I-CVI} = \frac{\text{Agreed Item}}{\text{Number of Expert}}$ $\mathrm{S-}\frac{\mathrm{CVI}}{\mathrm{Ave}} = \frac{\text{Sum of I–CVI Scores}}{\text{Number of items}}$

The relevance rating was classified as either 1 (relevance scale of 3 and 4) or 0 (relevance scale of 1 and 2). The acceptable cut-off score of CVI is 1 for three to five experts, 0.83 for six to eight experts, and 0.78 for at least nine experts. (Polit, et al., 2007; Yusoff 2019; Wang & Sahid, 2024). This study adopted a cut-off score for the content validity index of 0.83 and above. The validators' judgements is presented in the table 2 below:

Table 2: Relevance Rating On Pre-Service Biology Techers' Self-Efficacy

Item	Expert 1	Expert 2	Expert 3	Expert 4	Expert 5	Expert 6	Expert in Agreement	I-CVI	Remark
1	1	1	1	0	1	1	5	0.83	Retained
2	1	1	1	0	1	1	5	0.83	Retained
3	1	1	1	1	0	1	5	0.83	Retained
4	1	1	1	1	1	1	6	1	Retained

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5	1	0	1	1	1	0	4	0.66	Discarded
6	1	1	1	1	1	1	6	1	Retained
7	1	1	1	0	1	1	5	0.83	Retained
8	1	1	1	1	0	1	5	0.83	Retained
9	1	0	0	1	1	1	4	0.66	Discarded
10	0	1	1	1	1	0	4	0.66	Discarded
11	1	1	0	1	1	1	5	0.83	Retained
12	1	1	1	1	1	1	6	1	Retained
13	1	1	1	0	1	1	5	0.83	Retained
14	1	1	1	1	0	0	4	0.66	Discarded
15	1	1	1	1	1	1	6	1	Retained
16	1	1	1	1	1	1	6	1	Retained
17	1	0	1	1	1	1	5	0.83	Retained
18	1	0	0	1	1	1	4	0.66	Discarded
19	1	1	1	1	1	1	6	1	Retained
20	1	1	0	1	1	1	5	0.83	Retained
							S-CVI/Ave	**0.89**	

Based on the experts' judgment on the inter-rater review of the questionnaire's items, it

Indicates that; Out of the initial 20 items, 15 items (1,2,3,4,6,7,8,11,12,13,15,16,17,19 and 20) achieved an I-CVI of 0.83 or above, indicating that at least five out of six experts found these items to be highly relevant to the self-efficacy construct.; Five items (5, 9.10,14 and 18) failed to meet the 0.83 acceptable value and were consequently discarded.; The S-CVI/Ave or Overall Scale Validity for this instrument was recorded at 0.89. This exceeds the minimum standard requirement of 0.80, confirming that the Self-efficacy scale possesses strong content validity.

Research Question 3: What is the construct validity index of university Pre-Service Biology Teachers' Self-Efficacy Questionnaire in North-west zone, Nigeria?

To evaluate the construct validity of the self-efficacy questionnaire, a comparative pairing strategy was employed. This involved benchmarking scores from the new instrument against established, validated measures. This methodological approach permits the simultaneous examination of convergent and divergent (discriminant) validity via correlation analyses with external standards (Grobler & Joubert, 2018; Mohd Dzin & Lay, 2021). Specifically, convergent validity confirms that the scale correlates appropriately with theoretically similar measures, while discriminant validity ensures the tool remains distinct from unrelated constructs (Liu et al., 2025).

Convergent Validity of Pre-service Biology Teachers Self-efficacy Questionnaire

Convergent validity of the Pre-service Biology Teachers' Self-efficacy Questionnaire Pre-service BITSEQ was established by examining its relationship with General Self-efficacy Questionnaire (GSEQ) developed Schwarzer, et al (1995). The Pearson Correlation analysis revealed a significant positive correlation of r = 0.76 between the Pre-service BITSEQ and GSEQ. The result confirms that the PITBISEQ successfully captures the multi-dimensional facets of students' self-efficacy and proves to be a strong and valid tool for assessing the self-efficacy of pre-service biology teachers for this study (Boateng et al., 2018; Hair et al. 2019).

Divergent or Discriminant Validity of Pre-service BITSEQ

Divergent validity was examined to determine whether the Pre-Service Biology Teachers' Self-Efficacy Questionnaire, measures a construct that is theoretically distinct from academic procrastination Questionnaire (APQ) developed by Gustavsson, et al (2010). Self-efficacy reflects individuals' beliefs in their capability to execute academic or instructional tasks effectively, whereas academic procrastination refers to the tendency to delay or postpone academic tasks unnecessarily. Pearson Product Moment Correlation was computed to examine the relationship between Pre-service BITSEQ and APQ. The analysis revealed r = 0.32. This indicates a significant low correlation between Pre-service BITSEQ and APQ and proves that Self-efficacy, as measured by the Pre-service BITSEQ, is a distinct construct from students' academic procrastination and is pure measure of efficacy rather than a proxy for emotional or affective states (Bobbio & Manganelli, 2023).

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Research Question 4: What is the reliability coefficient of university Pre-Service Biology Teachers' Self-Efficacy Questionnaire in North-west zone, Nigeria?

Reliability of Pre-service Biology Teachers' Self-efficacy Questionnaire

In ascertaining the internal consistency of the instruments the Pre-service Biology Teachers' Self-efficacy Questionnaire was administered, retrieved, and subjected to reliability analysis using Cronbach's Alpha in SPSS Version 26. The Self-Efficacy Questionnaire recorded an overall reliability coefficient of 0.70, which is within the recommended threshold for educational research instruments. The subscales recorded the coefficients of: Mastery (0.98), Experience (0.85), Persuasions (0.93), and Modelling (0.96). All the coefficients achieved the minimum recommended value of 0.70 and above (Kerlinger, 2000; Cohen, Manion & Morrison, 2007; Amirrudin, Nasution & Supahar, 2021). This confirms that Pre-service Biology Teachers' Self-Efficacy Questionnaire possess adequate internal consistency and is suitable for measuring the Pre-service Biology Teachers' Self-efficacy in university.

Conclusion

Based on the findings of this research study, the following conclusions were made:

1. The Logical Face Validity index of 81.8% was established, confirming that the Pre-service Biology Teachers Self-efficacy Questionnaire is relevant, clear, and logically related to cognitive engagement of Pre-service biology teachers.
2. Overall Scale Validity) of 0.89 was recorded. This indicates a high degree of content representation and demonstrates strong evidence of content validity, ensuring that the instrument is fit for measuring the intended psychological constructs.
3. A convergent validity index revealed significant positive correlation of (r = 0.76) indicating a high degree of linear relationship with an existing, validated measure of the same construct and successfully captures the cognitive dimensions of student cognitive engagement and hence is good for the study.
4. Divergent validity coefficient (r = 0.34) was found indicating a weak positive relationship proving that PITBISEQ, is a pure measure of cognitive engagement rather than a proxy for emotional or affective states.
5. The overall reliability coefficients of PBTSEQ (r = 0.70) was established, indicating strong internal consistency, that of subscales are Mastery (0.98), Experience (0.85), Persuasions (0.93), and Modelling (0.96). These confirmed that the instruments possess adequate internal consistency and are suitable for measuring Pre-service Biology Techers' Self-efficacy.
6. The final version of PBTSEQ is as follows:

	Sub scale: Mastery					
S/N	**Items**	**5**	**4**	**3**	**2**	**1**
1	I am a good Biology student.					
2	Sometimes I think Biology assignment is easy when other students think it is difficult.					
3	I am one of the best Biology students in my class.					
4	My Biology teacher considers me to be smart.					
	Sub-Scale: Experience					
5	I am good in reading Biology notes.					
6	It is not hard for me to get good Biology grades in my class.					
7	When Biology teacher asks a question, I usually know the answer even when the other students don't.					
	Sub-Scale: Persuasion					
8	Most of my course mates like to study Biology because it is easy.					

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9	No one concerns if I do well in Biology.					
10	What I learn in school is really important to me					
11	Teachers like students when they make good grades.					
Sub-Scale: Modelling						
12	I will get better grades in Biology if my Biology teacher like me better.					
13	Students who get better grades than I do, are those get more appreciation from the teacher.					
14	Adults who have good jobs probably were good students when they were young.					
15	I always get good grades when I tried hard in Biology.					

Rating Scales: Strongly Agree=5, Agree=4, Undecided=3, Disagree=2, Strongly Disagree=1

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Evaluating Stakeholders' Perceptions of Compromise and Negotiation as Conflict Management Techniques among Federal Unity Schools in South-South, Nigeria

MAINA, Bashir Alhaji[1]
EGBEBI, John Oluyemi[1]
Email: oluyemiegbebi@gmail.com
08033447559
IBRAHIM, Musa Muhammad[1]
Email: musaibraheem01@gmail.com
08034976985
OJOAGO, Naomi Oghenereke[1]
Email: naomi.oghenereke@gmail.com
08063123367
[1]Department of Educational Foundations and Curriculum, Faculty of Education, Ahmadu Bello University, Zaria.

Abstract

This study evaluated stakeholders' perceptions of compromise and negotiation as conflict management techniques in Federal Unity Schools in Nigeria's South-South geopolitical zone. Two objectives guided the study: to ascertain stakeholders' perceptions of the application of compromise technique, and to determine the extent to which stakeholders perceive the application of negotiation technique, in resolving and managing conflict in these schools. Two research questions and two corresponding null hypotheses were formulated accordingly. A descriptive survey design was adopted, drawing on a population of 2,566 principals, teachers, Ministry of Education officials, and Parent-Teacher Association members across Federal Unity Schools in six South-South states. Using proportionate and cluster sampling techniques, 333 respondents were selected, of whom 315 returned validly completed, structured questionnaires built on a five-point Likert scale. Frequency counts and mean scores answered the research questions, while One-way Analysis of Variance (ANOVA) tested the hypotheses at the 0.05 level of significance. Findings showed that both compromise (grand mean = 4.00) and negotiation (grand mean = 4.21) are actively applied in Federal Unity Schools, with compromise used mainly as a quick, give-and-take settlement for day-to-day disputes and negotiation used for more structured bargaining with unions, Ministry officials, and other external parties. ANOVA results indicated no statistically significant difference in the perceptions of principals, teachers, MOE officials, and PTA members regarding either approach (compromise: $p = 0.347$; negotiation: $p = 0.392$), pointing to broad stakeholder consensus. The study concludes that compromise and negotiation are complementary bargaining-based approaches that help stabilise Federal Unity Schools, and recommends that both be reinforced through structured training for administrators and staff.

Keywords: *compromise, negotiation, conflict management approaches, stakeholders' perceptions, Federal Unity Schools*

Introduction

Conflict is an inevitable feature of school life, arising wherever individuals or groups with differing interests, values, or expectations interact (Deutsch et al., 2020). In Federal Unity Schools, which bring together principals, teachers, Ministry of Education (MOE) officials, and Parent-Teacher Association (PTA) members from diverse ethnic and religious backgrounds, disputes over welfare, resource allocation, discipline, and administrative policy are a recurring reality. How these disputes are managed has direct implications for staff morale, institutional stability, and the quality of teaching and learning. Among the various approaches available to school stakeholders, compromise and negotiation are both bargaining-based strategies, but they differ in structure and scope. Compromise is a middle-ground settlement in which each party gives up part of its demands to reach a quick, mutually tolerable agreement; it operates on a "fixed-pie" assumption and is most useful when a decision must be reached rapidly between parties of roughly equal standing (Robbins & Coulter, 2020; Rahim, 2023). Negotiation, by contrast, is a more structured and interactive process of dialogue and bargaining, often used to reconcile the demands of different institutional actors — staff unions, Ministry officials, PTA/SBMC representatives — through formal discussion, concession, and documented agreement (Lewicki et al., 2021; Fisher & Ury, 2019). Where compromise is typically fast and informal, negotiation is typically deliberate and can be formalised into binding agreements. Despite the frequent, everyday use of both approaches in school administration, there is limited empirical evidence on how stakeholders in Federal Unity Schools in the South-South zone perceive their application, and whether such perceptions are shared across principals, teachers, MOE officials, and PTA members. This study addresses that gap

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by evaluating stakeholders' perceptions of compromise and negotiation and testing whether these perceptions differ significantly across stakeholder groups.

Literature Review

Compromise is generally defined as a middle-ground settlement in which each party surrenders part of its demands to reach a mutually tolerable agreement, operating on a "fixed-pie" assumption rather than seeking to expand the resources available (Robbins & Coulter, 2020). Sitting at the midpoint of assertiveness and cooperativeness on the Thomas-Kilmann model, compromise is often the fastest route to a workable decision and is especially useful between parties of roughly equal standing (Rahim, 2023). Mullins and Christy (2025) describe it as a "temporal stabiliser" that preserves working relationships even where it does not fully satisfy either side, though Tjosvold and Wong (2024) caution that habitual, "lazy compromise" can produce sub-optimal outcomes and "compromise fatigue" over time. Negotiation is treated in the literature as a more structured and voluntary process of dialogue and bargaining through which parties exchange concessions to reach agreement, without recourse to force or unilateral imposition (Lewicki et al., 2021). Scholars distinguish between distributive, "win-lose" bargaining over fixed resources and integrative, "win-win" bargaining aimed at expanding value for all sides, with Fisher and Ury's (2019) principled-negotiation model separating people from the problem, focusing on interests rather than positions, and applying objective criteria, widely cited as best practice for reaching durable, fair agreements. While both techniques are grounded in bargaining rather than authority, compromise is typically informal and rapid, whereas negotiation is more deliberate and often formalised into documented agreements with external parties such as unions or Ministry officials. Existing research has generally examined each technique in isolation; comparatively little empirical work has explored how stakeholders in Federal Unity Schools perceive them side by side, which is the gap this study addresses.

Empirical Studies

Owan, Agunwa, and Anyanwu (2020) investigated conflict management strategies and organizational effectiveness in secondary schools across the South-South geopolitical zone of Nigeria, using a correlational design with 1,200 principals and teachers sampled through multi-stage stratified random sampling. Using Pearson Product Moment Correlation and multiple regression analysis, they found that integrative and compromising strategies had a strong positive correlation with school effectiveness, while avoidance was linked to organisational stagnation, and recommended that school boards prioritise appointing principals with strong emotional intelligence and collaborative problem-solving skills. This study shares the present study's South-South setting and its focus on compromise, lending direct empirical support to the finding that compromise is positively perceived by stakeholders; however, while Owan et al. used a correlational design to link strategy choice to school effectiveness as an outcome, the present study instead compares stakeholders' perceptions of compromise and negotiation directly across the Federal Unity School hierarchy. Oyedeji and Mahmud (2025) examined the relationship between principals' conflict management skills including emotional intelligence and negotiation and teachers' effectiveness in public secondary schools in Ibadan North Local Government, Oyo State, Nigeria, using a correlational design with 280 respondents. Using Pearson Product Moment Correlation, they found a significant positive relationship between principals' conflict management skills and teachers' effectiveness, and recommended that skilled, negotiation-competent leadership be treated as a prerequisite for principal appointment. This finding directly supports the present study's expectation that negotiation would be strongly perceived by stakeholders as an effective conflict management approach; the key difference is that Oyedeji and Mahmud linked negotiation skill to a performance outcome at the local-government level, whereas the present study compares how negotiation is perceived across principals, teachers, MOE officials, and PTA members within the wider Federal Unity School system.

Objectives of the Study

The study was guided by the following objectives. The study sought to:

1. Ascertain stakeholders' perceptions on the application of compromise technique in resolving conflict in Federal Unity Schools in South-South, Nigeria
2. Determine the extent to which stakeholders perceive the application of negotiation technique in managing conflict in Federal Unity Schools in South-South, Nigeria.

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Research Questions

The following research questions guided the study:

1. To what extent do stakeholders perceive the application of compromise technique in resolving conflict in Federal Unity Schools in South-South, Nigeria?
2. To what extent does the perception of stakeholders support the application of negotiation technique in managing conflict in Federal Unity Schools in South-South, Nigeria?

Null Hypotheses

The following null hypotheses were tested at the 0.05 level of significance:

H_{O1}: There is no significant difference in the perceptions of stakeholders on the application of compromise technique in resolving conflict in Federal Unity Schools in South-South, Nigeria.

H_{O2}: There is no significant difference in the perceptions of stakeholders on the application of negotiation technique in managing conflict in Federal Unity Schools in South-South, Nigeria.

Research Methodology

The study adopted a descriptive survey design, appropriate for systematically capturing stakeholders' existing perceptions and views on conflict management practice within a natural school setting (Creswell & Creswell, 2022). The population comprised 2,566 stakeholders which includes 17 principals, 2,205 teachers, 269 MOE officials, and 75 PTA members, drawn from Federal Unity Schools in Akwa Ibom, Bayelsa, Cross River, Delta, Edo, and Rivers States. Using Research Advisors' (2006) sample-size table, a sample of 333 respondents (8 principals, 290 teachers, 28 MOE officials, and 7 PTA members) were drawn from three of the six states through simple random and proportionate cluster sampling. A structured, five-point Likert-scale questionnaire (Strongly Agree = 5 to Strongly Disagree = 1) was administered to all four stakeholder groups; the items relevant to this article are drawn from the sub-sections addressing the compromise and negotiation techniques. Content and face validity were established by experts in Educational Administration and Planning at Ahmadu Bello University, Zaria, and a pilot test at FGC Ibillo, Edo State, yielded a split-half reliability coefficient of 0.78. Of the 333 copies of the questionnaire administered, 315 were correctly completed and returned. Research questions were answered using frequency counts and mean scores, with a benchmark mean of 3.0 used to denote agreement; hypotheses were tested using One-way Analysis of Variance (ANOVA) at the 0.05 level of significance.

Table 1: Compromise as a Conflict Management Technique in Federal Unity Schools in South-South, Nigeria

S/N	Item Statements	Respondents	SA	A	UD	D	SD	Mean
11	The principal, teachers and PTA resolve disagreements by both parties making concessions to reach a middle ground.	Principals	3	4	1	0	0	4.25
		Teachers	96	148	25	6	1	4.20
		MOE Officials	6	17	3	1	0	4.04
		PTA Members	1	6	0	0	0	4.14
12	Compromise is used as a quick way to settle disputes so that academic activities are not disrupted.	Principals	2	5	1	0	0	4.12
		Teachers	95	149	26	6	0	4.21
		MOE Officials	6	16	5	0	0	4.04
		PTA Members	2	4	1	0	0	4.14
13	Conflict management involves a "give-and-take" approach where no single party gets everything it wants.	Principals	1	3	3	1	0	3.50
		Teachers	98	144	26	6	2	4.20
		MOE Officials	11	13	2	1	0	4.26
		PTA Members	4	2	1	0	0	4.43
14	The principal encourages compromise on minor issues to maintain school harmony.	Principals	1	5	2	0	0	3.88

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S/N	Item Statements	Respondents	SA	A	UD	D	SD	Mean
		Teachers	104	136	29	7	0	4.22
		MOE Officials	10	9	6	2	0	4.00
		PTA Members	1	5	1	0	0	4.00
15	When resources are limited, a compromise strategy is adopted to ensure every department gets a fair share.	Principals	1	5	2	0	0	3.88
		Teachers	100	138	26	12	0	4.18
		MOE Officials	9	16	2	0	0	4.26
		PTA Members	4	3	0	0	0	4.57
16	Disputing parties are encouraged to "split the difference" to end a conflict quickly through compromise.	Principals	3	5	0	0	0	4.38
		Teachers	104	133	28	11	0	4.20
		MOE Officials	7	18	1	1	0	4.15
		PTA Members	1	4	2	0	0	3.86
17	Compromise is frequently used in staff meetings to reconcile opposing views on school administrative policies.	Principals	3	2	3	0	0	4.00
		Teachers	97	142	30	7	0	4.19
		MOE Officials	10	13	2	2	0	4.15
		PTA Members	3	4	0	0	0	4.43
18	The school leadership facilitates compromise agreements that allow both sides to maintain their professional dignity.	Principals	4	3	0	1	0	4.25
		Teachers	103	130	32	10	1	4.17
		MOE Officials	9	17	0	1	0	4.26
		PTA Members	5	1	0	1	0	4.43
19	Mediation by senior staff, PTA, and SBMC focuses on finding a compromised solution that is acceptable to all stakeholders.	Principals	5	3	0	0	0	4.62
		Teachers	91	156	18	10	1	4.18
		MOE Officials	7	15	4	1	0	4.04
		PTA Members	4	3	0	0	0	4.57
20	Most professional conflicts in this school are settled through a negotiated compromise rather than a win-loss outcome.	Principals	3	5	0	0	0	4.38
		Teachers	110	131	21	13	1	4.22
		MOE Officials	8	15	1	3	0	4.04
		PTA Members	1	4	0	1	1	3.43
	Grand Mean							**4.00**

Research Question One: Perceptions on Compromise Technique

Ten questionnaire items examined stakeholders' perceptions of compromise, covering mutual concessions to reach a middle ground, the use of compromise to quickly settle disputes without disrupting academic activities, a "give-and-take" approach to sharing limited resources, and mediation by senior staff, PTA, and the SBMC. The analysis of data in Table 1 shows stakeholders' perception of compromise as a conflict management technique in Federal Unity Schools in South-South, Nigeria. The analysis of item 11 revealed mean scores of 4.25 for principals, 4.20 for teachers, 4.04 for MOE officials, and 4.14 for PTA members, all above the 3.0 benchmark. This indicates that the principal, teachers and PTA resolve disagreements by making concessions to reach a middle ground. For item 12, the mean scores were 4.12 for principals, 4.21 for teachers, 4.04 for MOE officials, and 4.14 for PTA members, all above the benchmark. This suggests that compromise is used as a quick means of settling disputes to prevent disruption of academic activities.

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The analysis of item 13 showed mean scores of 3.50 for principals, 4.20 for teachers, 4.26 for MOE officials, and 4.43 for PTA members. Since all the scores were above the 3.0 benchmark, the result indicates that conflict management involves a give-and-take approach in which no single party gets everything it wants. For item 14, mean scores of 3.88 for principals, 4.22 for teachers, 4.00 for MOE officials, and 4.00 for PTA members were recorded. These scores show that principals encourage compromise on minor issues in order to maintain harmony within the schools. For item 15, the mean scores were 3.88 for principals, 4.18 for teachers, 4.26 for MOE officials, and 4.57 for PTA members. The scores indicate that when resources are limited, compromise is adopted to ensure that departments receive a fair share. The analysis of item 16 revealed mean scores of 4.38 for principals, 4.20 for teachers, 4.15 for MOE officials, and 3.86 for PTA members. This indicates that disputing parties are encouraged to split the difference in order to bring conflicts to an early conclusion. The analysis of item 17 showed mean scores of 4.00 for principals, 4.19 for teachers, 4.15 for MOE officials, and 4.43 for PTA members. This suggests that compromise is frequently employed during staff meetings to reconcile opposing views concerning school administrative policies. For item 18, mean scores of 4.25 for principals, 4.17 for teachers, 4.26 for MOE officials, and 4.43 for PTA members were obtained. The result indicates that school leadership facilitates compromise agreements that enable conflicting parties to maintain their professional dignity. The analysis of item 19 revealed mean scores of 4.62 for principals, 4.18 for teachers, 4.04 for MOE officials, and 4.57 for PTA members. Since all the mean scores were above the benchmark, the result indicates that mediation by senior staff, PTA and SBMC focuses on achieving compromise solutions acceptable to the stakeholders. Finally, the analysis of item 20 showed mean scores of 4.38 for principals, 4.22 for teachers, 4.04 for MOE officials, and 3.43 for PTA members, all above the 3.0 benchmark. This indicates that most professional conflicts in the schools are settled through negotiated compromise rather than a win-loss approach. The grand mean score of 4.00, which is above the 3.0 benchmark, indicates that stakeholders have a positive perception of compromise as a conflict management technique in Federal Unity Schools in South-South, Nigeria. This implies that compromise is widely perceived as an effective approach for resolving disagreements, maintaining school harmony, preventing disruption of academic activities, and ensuring that conflicting parties reach mutually acceptable settlements.

Table 2: Negotiation as a Conflict Management Technique in Federal Unity Schools in South-South, Nigeria

S/N	Item Statements	Respondents	SA	A	UD	D	SD	Mean
61	The school management engages in formal negotiation with staff unions to resolve disputes over welfare and entitlements.	Principals	3	4	1	0	0	4.25
		Teachers	93	138	32	6	0	4.18
		MOE Officials	8	15	4	0	0	4.15
		PTA Members	2	3	2	0	0	4.00
62	Direct negotiation between the principal and Ministry officials is used to resolve administrative bottlenecks in the school.	Principals	2	5	1	0	0	4.13
		Teachers	98	133	32	6	0	4.22
		MOE Officials	9	14	4	0	0	4.19
		PTA Members	3	3	1	0	0	4.29
63	Conflict resolution in this school involves a structured bargaining process where parties present their terms for a settlement.	Principals	3	3	2	0	0	4.13
		Teachers	91	143	28	6	0	4.21
		MOE Officials	7	16	4	0	0	4.11
		PTA Members	2	4	1	0	0	4.14
64	The principal, PTA, and SBMC use negotiation to reconcile the demands of the Ministry and school staff.	Principals	2	6	0	0	0	4.25
		Teachers	103	128	39	6	0	4.24
		MOE Officials	10	13	4	0	0	4.22
		PTA Members	3	2	2	0	0	4.14

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S/N	Item Statements	Respondents	SA	A	UD	D	SD	Mean
65	Professional disagreements are settled through a "give-and-take" negotiation process to ensure stability in the school.	Principals	3	4	0	1	0	4.13
		Teachers	95	139	28	6	0	4.22
		MOE Officials	8	16	3	0	0	4.19
		PTA Members	2	3	1	1	0	4.00
66	The administration prefers negotiating settlement terms privately with aggrieved staff rather than using formal disciplinary panels.	Principals	2	4	2	0	0	4.00
		Teachers	88	148	34	6	0	4.15
		MOE Officials	7	17	3	0	0	4.15
		PTA Members	3	3	0	1	0	4.14
67	Negotiation is used to reach a consensus when there is a clash between government policy and the local needs of the school.	Principals	3	5	0	0	0	4.38
		Teachers	101	133	36	6	0	4.24
		MOE Officials	9	15	3	0	0	4.22
		PTA Members	2	4	1	0	0	4.14
68	Formal agreements reached through negotiation are documented and respected by both the school management and staff.	Principals	2	5	1	0	0	4.13
		Teachers	93	141	36	6	0	4.22
		MOE Officials	8	14	4	1	0	4.07
		PTA Members	3	3	1	0	0	4.29
69	The school leadership adopts negotiation strategies to manage disputes regarding the allocation of resources and facilities.	Principals	3	3	1	1	0	4.00
		Teachers	98	141	31	6	0	4.24
		MOE Officials	10	14	3	0	0	4.26
		PTA Members	2	3	2	0	0	4.00
70	Most industrial and administrative conflicts in this school are resolved through mutual negotiation rather than industrial action.	Principals	2	6	0	0	0	4.25
		Teachers	91	141	38	6	0	4.20
		MOE Officials	8	15	4	0	0	4.15
		PTA Members	3	2	1	1	0	4.00
	Grand Mean							**4.21**

Research Question Two: Perceptions on Negotiation Technique

A parallel set of ten items examined perceptions of negotiation covering formal negotiation with staff unions over welfare and entitlements, direct bargaining between principals and Ministry officials, structured settlement processes, and the use of negotiation to resolve resource-allocation disputes. The analysis of data in Table 2 shows stakeholders' perception of negotiation as a conflict management technique in Federal Unity Schools in South-South, Nigeria. The analysis of item 61 revealed mean scores of 4.25 for principals, 4.18 for teachers, 4.15 for MOE officials, and 4.00 for PTA members, all above the 3.0 benchmark. This indicates that school management engages in formal negotiation with staff unions to resolve disputes concerning welfare and entitlements. For item 62, the mean scores were 4.13 for principals, 4.22 for teachers, 4.19 for MOE officials, and 4.29 for PTA members, indicating that direct negotiation between principals and Ministry officials is used to resolve administrative bottlenecks. The analysis of item 63 showed mean scores of 4.13 for principals, 4.21 for teachers, 4.11 for MOE officials, and 4.14 for PTA members. Since all the scores were above the benchmark, the result indicates that conflict resolution involves a structured bargaining process in which parties present their terms for settlement. For item 64, mean scores of 4.25, 4.24, 4.22 and 4.14 were recorded for principals, teachers, MOE officials and PTA

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members respectively. This suggests that negotiation is used by the principal, PTA and SBMC to reconcile the demands of the Ministry and school staff. For item 65, the mean scores were 4.13 for principals, 4.22 for teachers, 4.19 for MOE officials, and 4.00 for PTA members. This indicates that professional disagreements are generally settled through a give-and-take negotiation process. Item 66 recorded mean scores of 4.00, 4.15, 4.15 and 4.14 respectively, indicating that school administrations negotiate settlement terms with aggrieved staff as an alternative to formal disciplinary panels. The analysis of item 67 revealed mean scores of 4.38 for principals, 4.24 for teachers, 4.22 for MOE officials, and 4.14 for PTA members. This indicates that negotiation is used to reach consensus when government policy conflicts with the local needs of the school. For item 68, the mean scores were 4.13, 4.22, 4.07 and 4.29 respectively, showing that formal agreements reached through negotiation are generally documented and respected by the parties involved. For item 69, mean scores of 4.00 for principals, 4.24 for teachers, 4.26 for MOE officials, and 4.00 for PTA members were obtained. This indicates that school leadership adopts negotiation strategies when managing disputes concerning the allocation of resources and facilities. Finally, item 70 recorded mean scores of 4.25, 4.20, 4.15 and 4.00 respectively. This suggests that most industrial and administrative conflicts in the schools are resolved through mutual negotiation rather than industrial action. The grand mean score of 4.21, which is above the 3.0 benchmark, indicates that stakeholders have a positive perception of negotiation as a conflict management technique in Federal Unity Schools in South-South, Nigeria. This implies that negotiation is widely perceived as an effective approach for managing disputes, reconciling differing interests, reaching consensus, and maintaining stability among school management, staff, Ministry officials, PTA and SBMC stakeholders.

Test of Hypotheses

Hypothesis One (HO_1): There is no significant difference in the perceptions of stakeholders on the application of compromise technique in resolving conflict in Federal Unity Schools in South-South, Nigeria.

Table 3: One-way ANOVA on Stakeholders' Perceptions of Compromise Technique

Source of Variation	Sum of Squares	Df	Mean Square	F	Sig.	Decision
Between Groups	0.238	3	0.079	0.654	0.347	Retained
Within Groups	38.990	315	0.121			
Total	39.228	318				

With a significance value of 0.347, well above the 0.05 threshold, HO_1 is retained: there is no statistically significant difference in how principals, teachers, MOE officials, and PTA members perceive the application of compromise technique.

Hypothesis Two (HO_2): There is no significant difference in the perceptions of stakeholders on the application of negotiation technique in managing conflict in Federal Unity Schools in South-South, Nigeria.

Table 4: One-way ANOVA on Stakeholders' Perceptions of Negotiation Technique

Source of Variation	Sum of Squares	Df	Mean Square	F	Sig.	Decision
Between Groups	0.236	3	0.073	0.638	0.392	Retained
Within Groups	40.324	315	0.114			
Total	40.560	318				

With a significance value of 0.392, also above 0.05, HO_2 is retained: perceptions of the negotiation technique likewise do not differ significantly across the four stakeholder groups.

Discussion of Findings

The finding that compromise is perceived as applied (grand mean = 4.00) is consistent with its established role as an "expedient" conflict management choice, faster than collaboration, which requires deep problem-solving, yet more constructive than avoidance (Robbins & Coulter, 2020; Rahim, 2023). Within Federal Unity Schools, the pattern of high agreement on quick, give-and-take settlement of disputes over minor issues and limited resources reflects what Mullins and Christy (2025) describe as a "temporal stabiliser": compromise may not fully satisfy either party, but it preserves working relationships and prevents escalation into open conflict. At the same time, Tjosvold and Wong (2024) caution against "lazy compromise," in which reliance on quick concessions produces sub-optimal decisions and "compromise fatigue" over time, a risk worth monitoring even where, as here, stakeholders broadly endorse the practice. Negotiation

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recorded the highest grand mean (4.21) of the two techniques, suggesting that stakeholders view it as a particularly effective and legitimate route to resolving disputes that extend beyond the school gate such as, welfare disputes with staff unions or administrative bottlenecks involving the Ministry of Education. This aligns with the view of negotiation as a structured, voluntary process of dialogue and mutual adjustment rather than an imposition of will (Lewicki et al., 2021), and with Fisher and Ury's (2019) principled-negotiation model, which emphasises separating people from the problem and focusing on interests rather than fixed positions. The strong perception of negotiation as effective for reconciling the demands of school management, staff, and external bodies is also consistent with the study's finding that formal agreements reached through negotiation are seen as generally documented and respected by the parties involved. That perceptions of both techniques did not differ significantly across principals, teachers, MOE officials, and PTA members suggests a shared institutional culture around bargaining-based conflict resolution in Federal Unity Schools: whether the dispute is a minor day-to-day disagreement calling for compromise, or a more complex, multi-party issue calling for structured negotiation, stakeholders across all categories appear to recognize and endorse these approaches similarly.

Conclusion

This study concludes that compromise and negotiation are both actively applied conflict management approaches in Federal Unity Schools in South-South, Nigeria and that stakeholders, principals, teachers, MOE officials, and PTA members alike hold broadly similar perceptions of each. Compromise functions as a fast, give-and-take mechanism for settling everyday disputes and preserving working relationships, while negotiation functions as a more structured, deliberate process for reconciling the demands of school management, staff, and external stakeholders such as unions and Ministry officials. Together, the two bargaining-based approaches contribute meaningfully to institutional stability within these schools.

Recommendations

Based on the findings, the study recommends that:

1. school administrators should continue to use compromise for time-sensitive, lower-stakes disputes, while guarding against "lazy compromise" by periodically revisiting unresolved underlying issues rather than treating a quick concession as a permanent solution
2. Federal Unity Schools should strengthen negotiation skills among administrators and staff representatives through regular training in structured bargaining and principled-negotiation techniques, to sustain the strong, positive perception negotiation currently enjoys in resolving disputes with unions, Ministry officials, and other external stakeholders.

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Correlation Between Blended Learning Strategy and Entrepreneurial Skills Acquisition among Business Education Students in University of Benin, Edo State, Nigeria

ISOKEN, Cynthia Edomwande[1]
isoken.edomwande@uniben.edu
08034691195

JUSTUS, Aghatise Osawaru[1]
Justus.osawaru@uniben.edu
07064282237

[1]Department of Business Education, Faculty of Vocational and Technical Education, University of Benin, Benin City

Abstract

This study examined blended learning technologies as correlates of entrepreneurial skills acquisition among Business Education students at the University of Benin. Specifically, it determined the level of entrepreneurial skills acquisition and examined the relationships between face-to-face classroom instruction, online learning platforms, digital collaboration tools, and entrepreneurial skills acquisition. A correlational survey research design was adopted. The population comprised 300- and 400-level Business Education students in the Department of Vocational and Technical Education, University of Benin. Because the population was manageable, a census sampling technique was used. Data were collected using a researcher-developed instrument titled Blended Learning Technologies and Entrepreneurial Skills Acquisition Questionnaire *(BLTESAQ), validated by three experts, with a Cronbach Alpha reliability coefficient of 0.70. Mean and standard deviation were used to answer the research questions, while Pearson Product Moment Correlation Coefficient (PPMCC) was used to test the hypotheses at 0.05 level of significance. Findings revealed a high level of entrepreneurial skills acquisition among students (cluster mean = 3.24). Significant positive relationships were found between face-to-face classroom instruction and entrepreneurial skills acquisition ($r = .489$, $p < .05$), online learning platforms and entrepreneurial skills acquisition ($r = .467$, $p < .05$), and digital collaboration tools and entrepreneurial skills acquisition ($r = .546$, $p < .05$). The study concluded that blended learning technologies significantly enhance entrepreneurial skills acquisition among Business Education students. It recommended that lecturers strengthen the integration of blended learning technologies into entrepreneurship instruction, while university management should provide digital infrastructure and capacity-building programmes to support effective implementation.*

Keywords: Blended learning technologies, entrepreneurial skills acquisition, Business Education.

Introduction

Background of the Study

The integration of digital technologies into higher education has fundamentally transformed teaching and learning processes across the world. Advances in information and communication technologies (ICTs), increased internet accessibility, and the growing demand for flexible learning environments have encouraged universities to adopt innovative instructional approaches that promote active learning and improve educational outcomes. Rather than relying solely on traditional face-to-face instruction, higher education institutions now increasingly incorporate digital technologies to facilitate teaching, learning, assessment, and academic interaction. This transformation has accelerated the adoption of blended learning, which combines conventional classroom instruction with technology-mediated learning experiences to create more flexible, interactive, and student-centred learning environments (Boelens et al., 2017; Rasheed et al., 2020). The widespread adoption of blended learning has been further stimulated by rapid digitalization and the educational disruptions occasioned by the COVID-19 pandemic. These developments compelled universities to rethink traditional instructional approaches and invest in technology-supported learning systems capable of sustaining quality education regardless of time and location. Consequently, blended learning has evolved from being an optional instructional innovation to becoming an integral component of higher education delivery in many countries. Recent empirical studies have shown that blended learning enhances students' engagement, encourages collaborative learning, promotes learner autonomy, and improves academic achievement when effectively implemented (Limniou et al., 2022; Müller & Mildenberger, 2021). Likewise, research indicates that the integration of digital technologies into classroom instruction

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provides students with greater flexibility to learn at their own pace while enabling instructors to diversify instructional strategies and monitor students' learning progress more effectively (Alammary, 2019; Rasheed et al., 2020). Blended learning refers to an instructional approach that deliberately integrates traditional face-to-face classroom instruction with online or technology-mediated learning activities in ways that complement and reinforce one another. Unlike fully online or conventional classroom instruction, blended learning allows students to participate in classroom interactions while simultaneously accessing digital learning resources through computers, mobile devices, learning management systems, and internet-based platforms. The combination of physical and virtual learning environments provides opportunities for students to engage with learning materials before, during, and after classroom sessions, thereby promoting active participation, self-directed learning, and continuous academic engagement (Hrastinski, 2019; Müller & Mildenberger, 2021). The effectiveness of blended learning depends largely on the availability and appropriate utilization of blended learning technologies that facilitate communication, collaboration, instructional delivery, assessment, and learner support. These technologies include learning management systems, virtual classrooms, online learning platforms, digital collaboration tools, multimedia instructional applications, and digital assessment systems. Together, these technological resources support both synchronous and asynchronous learning activities, improve access to educational resources, and strengthen interactions among lecturers and students regardless of geographical location (Bond et al., 2020; Rasheed et al., 2020). For the purpose of this study, emphasis is placed on three major blended learning technologies, namely face-to-face classroom learning management systems, online learning platforms, and digital collaboration tools.

Face-to-face classroom learning management systems serve as digital support mechanisms that enhance the planning, organization, and management of classroom instruction. They enable lecturers to coordinate instructional activities by managing attendance records, distributing learning materials, scheduling academic tasks, monitoring students' progress, administering assessments, and facilitating communication between lecturers and students. By integrating these digital management functions into conventional classroom teaching, learning management systems improve instructional efficiency and create more organized learning environments that support students' academic success (Almaiah et al., 2020; Turnbull et al., 2021). Closely related to learning management systems are virtual classrooms, which provide online environments where teaching and learning activities can occur synchronously despite geographical separation. Virtual classrooms incorporate technologies such as video conferencing, screen sharing, live chats, digital whiteboards, breakout rooms, and lecture recording to facilitate real-time interaction between lecturers and students. These features enable learners to participate actively in lectures, discussions, presentations, and collaborative activities irrespective of their physical locations. As a result, virtual classrooms enhance instructional continuity, increase learner participation, and provide flexible learning opportunities that complement traditional classroom experiences (Dhawan, 2020; Bond et al., 2020). Another important component of blended learning is the use of online learning platforms. These platforms are digital environments designed to deliver instructional content, facilitate learning activities, administer assessments, and support communication between instructors and learners. Online learning platforms provide students with continuous access to lecture notes, multimedia instructional resources, assignments, quizzes, discussion forums, and recorded lectures at their convenience. Common examples include Moodle, Google Classroom, Canvas, Blackboard, and Schoology, all of which enable students to learn beyond the boundaries of the conventional classroom. The flexibility offered by these platforms encourages self-directed learning, enables students to revisit learning materials whenever necessary, and supports individualized learning according to students' needs and learning pace. Furthermore, lecturers can monitor students' academic progress, provide timely feedback, and encourage meaningful participation through online discussions and digital assessments, thereby enhancing the quality and effectiveness of instructional delivery (Almaiah et al., 2020; Turnbull et al., 2021). Digital collaboration tools also play a vital role in blended learning environments.

Digital collaboration tools are technological applications that enable students and lecturers to communicate, interact, and work together effectively in both physical and virtual settings. They facilitate communication, interaction, teamwork, and knowledge sharing among students and lecturers. Tools such as Microsoft Teams, Zoom, Google Meet, Slack, and other collaborative platforms enable learners to participate in group discussions, share files, coordinate projects, exchange ideas,

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and receive feedback irrespective of their physical locations. Their use can promote active participation, peer learning, communication, teamwork, and problem-solving skills (Martin et al., 2022; Bond et al., 2020). The growing use of blended learning technologies in higher education has also increased provided opportunities for students to engage with digital resources, collaborate with peers, communicate with instructors, and participate in flexible learning activities. These experiences can support the development of creativity, innovation, communication, collaboration, and problem-solving skills that are relevant to employment and entrepreneurship (Ifenthaler & Schumacher, 2023; Chen et al., 2021). In developing economies such as Nigeria, entrepreneurship education is particularly important because of graduate unemployment and the need to prepare young people for self-employment and enterprise development. Nigerian universities are consequently expected to develop graduates who possess not only academic knowledge but also entrepreneurial competencies that can enhance their employability and capacity for venture creation (Okolie et al., 2021; OECD, 2023). This is known as Entrepreneurial skills acquisition.

Entrepreneurial skills acquisition refers to the development of competencies that enable individuals to identify opportunities, generate ideas, solve problems, make decisions, manage risks, communicate effectively, demonstrate creativity and innovation, and establish or manage business ventures. Contemporary entrepreneurship education increasingly emphasizes experiential and learner-centred approaches that enable students to apply knowledge through practical activities, projects, collaboration, and problem-solving rather than relying solely on theoretical instruction (Lackéus, 2020; Kuratko, 2020). Entrepreneurship education should recreate real-world business settings to effectively equip students for practical challenges of entrepreneurial ventures. In this regard, Business Education plays a crucial role in equipping students with both theoretical and practical knowledge and competencies required for employment, self-reliance, and entrepreneurial activities. The programme provides students with knowledge in areas such as management, marketing, accounting, information and communication technology, and business communication. Beyond theoretical knowledge, Business Education is increasingly expected to develop graduates' entrepreneurial and employability competencies needed to function effectively in changing economic and technological environments (Okoro, 2021; Ingwe et al., 2023). since contemporary entrepreneurship education therefore emphasizes practical and experiential approaches that allow students to apply knowledge rather than merely receive theoretical information (Tittel & Terzidis, 2020; Bell & Bell, 2020). Such approaches are particularly relevant to Business Education because students require opportunities to develop competencies that can be applied to real-life business situations. Blended learning technologies appears to be innovative instructional tools capable of enhancing active learning experiences. Thus, the integration of these technologies in Business Education may not only enhance students' engagement with learning content but also serve as a driving force for for entrepreneurial skills acquisition.

Statement of the Problem

Entrepreneurship education has been widely acknowledged as a key strategy for addressing youth unemployment and promoting economic development in Nigeria. Universities, particularly through Business Education programmes, are expected to equip students with entrepreneurial skills such as creativity, innovation, problem-solving, and business management skills that enable them to create employment and become self-reliant after graduation. However, many graduates appear to lack the practical entrepreneurial competencies needed for business creation, suggesting that current lecture-based instructional methods seem to be inadequate. In response to these challenges, universities have adopted blended learning technologies to enhance active learning and practical engagement. however, it seems unclear whether this adoption has improved entrepreneurial skills acquisition among Business Education students, especially given challenges of poor connectivity, unstable power, limited digital literacy, and weak integration into course objectives. If unaddressed, these gaps will perpetuate graduate unemployment and constrain economic development. This study therefore examines the influence of blended learning technologies on entrepreneurial skills acquisition among Business Education students.

Objectives of the Study

The primary objective of this study is to assess blended learning technologies as correlates of entrepreneurial skills acquisition among business education students in university of Benin. Specifically, the study examined:

1. The level of entrepreneurial skills acquisition among business education students in the University of Benin.

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2. The relationship between face-to-face classroom instruction and entrepreneurial skills acquisition among business education students in university of Benin.
3. The relationship between online learning and entrepreneurial skills acquisition among business education students in university of Benin.
4. The relationship between digital collaboration tools and entrepreneurial skills acquisition among business education students in university of Benin.

Research Questions

The following research questions have been raised to guide the study:

1. What is the level of entrepreneurial skills acquisition among business education students in the University of Benin?
2. What is the relationship between face-to-face classroom instruction and entrepreneurial skills acquisition among business education students in the University of Benin?
3. What is the relationship between online learning platforms and entrepreneurial skills acquisition among business education students in the University of Benin?
4. What is the relationship between digital collaborations tools and entrepreneurial skills acquisition among business education students in the University of Benin?

Null Hypotheses

The following hypotheses were formulated and tested at 0.05 level of significance:

1. There is no significant relationship between face-to-face classroom instruction and entrepreneurial skills acquisition among business education students in the University of Benin.
2. There is no significant relationship between online learning platforms and entrepreneurial skills acquisition among business education students in the University of Benin.
3. There is no significant relationship between digital collaborations tools and entrepreneurial skills acquisition among business education students in the University of Benin.

Significance of the Study

This finding of this study will be significant to business education students, business educators, curriculum developers and educational planners, educational policy maker, researchers and the broader society. For Business Education students, the findings will highlight digital tools and blended learning approaches that enhance creativity, business planning, teamwork, and problem-solving. This will improve their digital competence and readiness for self-employment. Business educators will benefit from evidence-based strategies for integrating blended learning into entrepreneurship instruction, enabling more practical and engaging teaching methods. Curriculum developers and educational planners will gain insights for designing more skill-oriented Business Education curricula that align technology with entrepreneurial objectives. Educational policymakers will be provided with data to support policies on digital learning and entrepreneurship education aimed at reducing graduate unemployment. Researchers will benefit from context-specific evidence on blended learning and skills acquisition, providing a basis for further studies. The broader society and Nigerian economy will benefit through the production of innovative, self-reliant graduates capable of creating jobs and driving economic growth.

Research Methodology

The study adopted a correlational survey research design. It determines the extent of the relationship between blended learning technologies and entrepreneurial skills acquisition among Business Education students without manipulating any variable. The design facilitates the collection of data from a representative sample of the population and provides information on the existing conditions and relationships among the variables under investigation.

Population of the Study

The population of this study comprises all Business Education students in 300 and 400 levels in the Department of Vocational and Technical Education, Faculty of Education, University of Benin. The total population consists of one hundred and thirty-eight (138) students. The population distribution is shown in the table below:

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Table 1: Population Distribution of Business Education Students in University of Benin

S/N	Level	Number of Students
1.	100 Level	110
2.	200 Level	160
3.	300 level	64
4.	400 level	46
	Total	**380**

Source: Office of the Heads of Department, Business Education, university of benin, (2026).

Sample and Sampling Technique

The entire population of 380 business education students was used for the study due to its relatively small and manageable size, hence a census.

Research Instrument

The instrument that employed for data collection in this study was a structured questionnaire designed by the researcher titled "Blended Learning Technologies and Entrepreneurial Skills Acquisition Questionnaire (BLTESAQ)". The questionnaire consisted two sections: A and B. Section A elicited demographic information of the respondents such as level of study. Section B contained item statements designed to gather information on blended learning technologies, while Section C contained item statements that measured the level of entrepreneurial skills acquisition among Business Education students. Responses to each item statement was scored on a four-point rating scale; Strongly Agree (SD), 4 points, agree (A), 3 points, Disagree (D), 2 points, Strongly Disagree (SD), a point.

Validity of the Instrument

The instrument was validated by three experts, from the University of Benin, Benin City. Two from the Faculty of Vocational and Technical Education, and an expert in Measurement and Evaluation form the Faculty of Education. Their observations, suggestions, and corrections regarding the relevance, clarity, and adequacy of the items was incorporated to produce the final version of the instrument.

Reliability of the Instrument

To ensure the reliability of the instrument, the Cronbach Alpha reliability technique was employed. A pilot test was conducted using twenty (20) Business Education students from Adeyemi university of education. The questionnaire was administered once, and the responses obtained was analyzed using Cronbach Alpha statistics to determine the internal consistency of the instrument. A reliability coefficient of 0.70 was obtained which was considered adequate for the study.

Method of Data Collection

The questionnaire was administered personally by the researcher with the help of a research assistant to facilitate easy distribution and retrieval of the instrument. The researcher made use of the departmental lecture timetable to identify periods when students were free from lectures. This enabled the respondents to complete the questionnaire conveniently and enhanced the rate of return.

Method of Data Analysis

The data collected from the respondents was analyzed using Mean ($\bar{x}$) and Standard Deviation (SD) to answer the research questions. The mean was used to determine the respondents' level of agreement or disagreement with each questionnaire item, while the standard deviation indicated the degree of dispersion of responses. Pearson Product Moment Correlation Coefficient (PPMCC) was used to test the hypothesis at a 0.05 level of significance in order to determine the relationship between blended learning technologies and entrepreneurial skills acquisition among business education students. The decision rule for the research questions will be based on a criterion mean of 2.50 such that the Mean score of 2.50 and above is Agree while Mean score of less than 2.50 is Disagree. For the hypothesis, the null hypothesis will be rejected if the p-value is less than 0.05, and accepted if the p-value is greater than 0.05

Presentation of Results

Research Question One

What is the level of entrepreneurial skills acquisition among business education students in the University of Benin?

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Table 2: Mean and standard deviation showing the level of business educators' job performance in colleges of education

S/N	Item	N	Mean	SD	Remarks
1	I can prepare simple financial records such as cash books and income statements for a business.	380	3.17	.707	Agreed
2	I have acquired effective communication and negotiation skills needed for business success.	380	3.21	.692	Agreed
3	I can apply problem-solving and decision-making skills in entrepreneurial activities.	380	3.12	.672	Agreed
4	I have acquired marketing skills needed to promote business products and services.	380	3.41	.671	Agreed
5	I can use digital technologies and social media platforms to market business products and services.	380	3.17	.654	Agreed
6	I have acquired customer relations skills necessary for building and maintaining customer loyalty.	380	3.61	.624	Agreed
7	I have developed creativity and innovation skills for generating new business ideas.	380	3.21	.630	Agreed
8	I have acquired leadership and teamwork skills needed to manage entrepreneurial activities.	380	3.45	.608	Agreed
9	I can effectively assess business risks and make appropriate entrepreneurial decisions.	380	3.26	.627	Agreed
10	I have acquired the confidence required to establish and manage my own business after graduation.	380	3.24	.668	Agreed
	Cluster Mean			**3.29**	

Note: SD = Standard Deviation; N = Sample Size.

In response to research question one, Table 2 shows the level of entrepreneurial skills acquisition among business education students in the University of Benin. The respondents rated item 1 to 15 as agreed with a mean rating ranging from 3.11 to 3.61 while the standard deviation also ranges from .608 to .717. The cluster mean showed a mean of 3.24. With these results, the above mean score shows that the level of entrepreneurial skills acquisition among business education students in the University of Benin is high.

Hypothesis One

There is no significant relationship between face-to-face classroom instruction and entrepreneurial skills acquisition among business education students in the University of Benin.

Table 2: Pearson r showing the relationship between face-to-face classroom instruction and entrepreneurial skills acquisition among business education students in the University of Benin

Variables	N	$\bar{x}$	SD	r	p-value	Decision
Face-to-face classroom instruction	380	3.24	0.69	.498	.000	Significant
Entrepreneurial skills acquisition		3.20	0.53			

The data presented in Table 2 depicts significant relationship between between face-to-face classroom instruction and entrepreneurial skills acquisition among business education students in the University of Benin. The Table shows that the correlation coefficient between classroom instruction and entrepreneurial skills acquisition among business education students is .489 and it is positive and moderate. The data analysis also shows that mean of 3.24 and 3.32 as well as standard deviation of 0.69 and 0.53 were obtained for classroom instruction and entrepreneurial skills acquisition among business education students respectively. Since the p-value of .000 is less than 0.05, hence the null hypothesis was rejected. Consequently, there is a significant relationship between classroom instruction and entrepreneurial skills acquisition among business education students in the University of Benin

Hypothesis Two

There is no significant relationship between online learning platforms and entrepreneurial skills acquisition among business education students in the University of Benin.

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Table 3: Pearson r showing the relationship between online learning platform and entrepreneurial skills acquisition among business education students in the University of Benin

Variables	N	$\bar{x}$	SD	r	p-value	Decision
Online learning platform	380	3.18	0.68	.467	.000	Significant
Entrepreneurial skills acquisition		3.20	0.53			

Table 3 shows the significant relationship between online learning platform and entrepreneurial skills acquisition among business education students in the University of Benin. The Table shows a mean of 3.18 and 3.20, as well as standard deviation of 0.68 and 0.53 for online learning platform and entrepreneurial skills acquisition among business education students respectively. The correlation coefficient between online learning platform and entrepreneurial skills acquisition among business education students is .467 which is positive and moderate. Since the p-value of .000 is less than 0.05, hence the null hypothesis was rejected. This therefore connotes that there is a relationship between online learning platform and entrepreneurial skills acquisition among business education students **in** the University of Benin

Hypothesis Three

There is no significant relationship between digital collaborations tools and entrepreneurial skills acquisition among business education students in the University of Benin.

Table 4: Pearson r showing the relationship between digital collaborations tools and entrepreneurial skills acquisition among business education students in the University of Benin

Variables	N	$\bar{x}$	SD	R	p-value	Decision
Digital collaborations tools	380	3.25	0.69	.546	.000	Significant
Entrepreneurial skills acquisition		3.20	0.53			

Table 8 shows the significant relationship between digital collaborations tools and entrepreneurial skills acquisition among business education students in the University of Benin. The Table shows a mean of 3.25 and 3.20, as well as standard deviation of 0.69 and 0.53 for digital collaborations tools and entrepreneurial skills acquisition among business education students respectively. The correlation coefficient between digital collaborations tools and entrepreneurial skills acquisition among business education students is .546 which is positive and moderate. Since the p-value of .000 is less than 0.05, hence the null hypothesis was rejected. This therefore connotes that there is a significant relationship between digital collaborations tools and entrepreneurial skills acquisition among business education students in the University of Benin

Discussion of Findings

The findings of the study generally revealed that blended learning technologies have significant relationships with entrepreneurial skills acquisition among Business Education students in the University of Benin. Specifically, the study revealed that the level of entrepreneurial skills acquisition among Business Education students was high. This suggests that the students had developed competencies such as creativity, innovation, communication, collaboration, problem-solving, and decision-making. This finding agrees with Ifenthaler and Schumacher (2023) and Chen et al. (2021), who noted that digital learning experiences can promote creativity, communication, collaboration, and problem-solving skills relevant to entrepreneurship. It also supports Lackéus (2020) and Kuratko (2020), who emphasized practical, experiential, and learner-centred approaches to entrepreneurship education. The study further found a significant positive relationship between face-to-face classroom instruction and entrepreneurial skills acquisition. This indicates that classroom interaction, discussions, practical activities, and immediate feedback can support the development of entrepreneurial competencies. The finding agrees with Boelens et al. (2017) and Müller and Mildenberger (2021), who reported that blended learning combines classroom instruction with technology-supported learning to promote active participation and effective learning. The study also established a significant positive relationship between online learning platforms and entrepreneurial skills acquisition. This suggests that access to online learning materials, assignments, discussions, and assessments enhances students' opportunities for independent and continuous learning. This finding is consistent with Almaiah et al. (2020), Turnbull et al. (2021), and Rasheed et al. (2020), who noted that online platforms provide flexible access to learning resources and support students' learning progress. Finally, the study revealed a significant positive relationship between digital

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collaboration tools and entrepreneurial skills acquisition. This implies that digital tools that facilitate communication, teamwork, knowledge sharing, and collaborative problem-solving can enhance entrepreneurial competencies. The finding supports Martin et al. (2022) and Bond et al. (2020), who emphasized the contribution of digital collaboration tools to communication, teamwork, and knowledge sharing. It also agrees with Ifenthaler and Schumacher (2023), who linked digital learning experiences with the development of competencies relevant to entrepreneurship.

Conclusion

Based on the findings of the study, it was concluded that blended learning technologies are significant correlates of entrepreneurial skills acquisition among Business Education students in the University of Benin. The study established that the students possess a high level of entrepreneurial skills acquisition and that face-to-face classroom instruction, online learning platforms, and digital collaboration tools each have significant positive relationships with entrepreneurial skills acquisition. This suggests that the effective integration of blended learning technologies into Business Education enhances students' engagement, collaboration, independent learning, and practical entrepreneurial competencies.

Recommendations

Based on the findings of the study, the following recommendations were made:

1. Business Education lecturers should continue to adopt practical and learner-centred instructional approaches that combine face-to-face classroom teaching with experiential learning activities to sustain and further improve the high level of entrepreneurial skills acquisition among students.
2. The University management and Business Education lecturers should strengthen the integration of face-to-face classroom instruction with blended learning strategies by encouraging interactive teaching methods such as demonstrations, case studies, business simulations, and classroom discussions that promote entrepreneurial thinking and practical skill development.
3. The University should provide adequate support for the effective use of online learning platforms by improving internet connectivity, ensuring access to digital learning resources, and training both lecturers and students on the effective utilization of online learning technologies for entrepreneurship education.
4. Business Education lecturers should increase the use of digital collaboration tools such as Microsoft Teams, Google Meet, Zoom, and Google Workspace for group projects, virtual discussions, collaborative problem-solving, and business simulations to further enhance students' teamwork, communication, creativity, and entrepreneurial competencies.

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Effect of Multisensory Approach on Handwriting Skill of Pre-School Pupils in Uyo Education Zone, Akwa Ibom State, Nigeria

Olota, Philip O. [1]
Nkanu, Faith U. [1]
Email: philipoolota@gmail.com
Phone: 08060690742, 09043806361
[1]Early Childhood and Special Education Department, University of Uyo, Uyo, Akwa Ibom State, Nigeria.

Abstract
The current study aimed at investigating the effect of the use of multisensory methods on the handwriting ability of the preschoolers in Uyo Educational Zone of Akwa Ibom State. A quasi-experimental pretest-posttest control group design was used in this research. The participants in the study included 346 nursery two children from twelve intact classes of six private pre-primary schools, with the experimental group receiving six weeks of instruction through the use of multisensory methods, and the control group receiving six weeks of teaching through the conventional approach. The Handwriting Achievement Test (HAT) was developed by the researcher as the instrument for data collection. The analysis of the data was done using mean, standard deviation, and analysis of covariance (ANCOVA) at 0.05 level of significance. It was discovered that there was a significant difference between the left to right writing pattern and in number and letter formation of the preschoolers taught through the multisensory methods and those taught through the conventional method. The mean scores in the posttest were much higher among those who were exposed to the experimental method. There was no noticeable difference in the handwriting ability of the preschoolers in terms of gender. This shows that multisensory methods are an effective means of developing handwriting skills.
Keywords: multisensory techniques; handwriting skills; preschool children; early childhood education

Introduction
Handwriting refers to the process of writing letters and numbers in an understandable manner. It entails the proper coordination of fine motor skills and visual skills in order to produce writing that is clear and fluent (Rosenblum, 2018). The value of handwriting lies not only in its physical appearance but in other areas such as literacy. Abidogun and Olagunju (2024) observed that there is a strong connection between primary school children's handwriting quality and literacy scores in Ojo Local Government Area, Lagos State, while the meta-analysis of interventions in handwriting research proved that structured handwriting lessons can significantly enhance children's writing fluency (López-Escribano et al., 2022). Handwriting is among those specific skills that need to be developed during the early childhood education in Nigeria. This period of development in Nigeria is considered to be the basis on which literacy, numeracy, social skills and character development are constructed before going to primary school (Federal Ministry of Education, 2022). Despite its significance, however, many preschool learners exhibit poor handwriting. They find it hard to move from left to right and from top to bottom, to make forward, backward, upward and downward curves, and to trace letters and numbers properly. The reasons for this include low development of fine motor and self-regulation skills (Chandler et al., 2021), and lack of proper and inadequate practice, since true progress usually requires two to three years of tuition (Duiser et al., 2020). Traditional handwriting learning in Nigerian early childhood education classrooms is largely teacher-led. The teacher models the way the letters are written, their strokes and spacing, on the board, while students mostly engage in observation and imitation. This method of teaching involves primarily the visual channel, and to some extent the auditory one, provides no tactile or kinesthetic movement and is common, owing to the fact that it does not require any specialized teaching aids. Since the motor skills depend on different sensory practice (Overvelde & Hulstijn, 2011; López-Escribano et al., 2022), traditional teaching leaves less sensory channels for learners to acquire letter and number writing. Multisensory techniques present another option. They involve the simultaneous use of the visual, auditory, tactile and kinesthetic sensory channels (Birsh & Carreker, 2021; Diaudin et al., 2024). There are three theories explaining the benefit of using such techniques to teach handwriting. According to the theory of multisensory learning, which is based on Orton-Gillingham's approach, when a person looks at a letter, says its name and sound, and writes it, he encodes the letter through multiple senses (Ritchey & Goeke, 2006). According to the motor learning theory, with repeated performance of an action and receiving feedback through seeing and feeling how he is doing this, the movement becomes more accurate and eventually automatic (Adams,

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1971). Finally, according to the behavioral learning theory, the discrete components of a multisensory lesson provide the teacher with many more possibilities to reinforce the action because he can detect whether the learner performed the task correctly right away (Skinner, 1953). It should be emphasized, though, that what makes the difference is not the name of the teaching technique but the way of its implementation. While empirical studies are promising, they are not conclusive as well. Haptic training using a multisensory approach enhanced perceptual and visuo-motor skills for handwriting (Bara & Gentaz, 2011), while a multisensory tracing method increased the letter-formation scores of kindergarten children (Lumor et al., 2025). Another empirical study shows that an intensive multisensory intervention increased the legibility of pupils' handwriting (Smith-Bell, 2024). A sensorimotor intervention (Denton et al., 2006) and explicit letter-formation training (Lavoie et al., 2020) have also proved to enhance handwriting. However, according to the findings of Zwicker and Hadwin (2009), who carried out a randomized controlled experiment, multisensory intervention did not perform better than cognitive approach. Locally, Olota and Udo (2019) observed that a multisensory approach to teaching increased the phonological awareness of preschoolers in Uyo, and Olota and Olekanma (2025) found out that a multisensory intervention programme increased the computation skills of primary two students in the same locality. As regards gender, the efficiency of handwriting favours girls (McCarney et al., 2012). Gender differences have also been observed in preschool motor competence (Navarro-Patón et al., 2021). None of the studies in the review of literature investigated the relationship between the use of multisensory teaching and handwriting skills of preschool children in Uyo Educational Zone. It is against this background that this research work aims at filling this gap by investigating the impact of multisensory approach on handwriting skills of preschool children in the educational zone. More specifically, it will compare preschool children taught with multisensory teaching approach with those taught using conventional teaching approach with regard to left to right writing and number-letter writing.

Research Questions

1. What would be the mean difference between the writing style from left to right for the preschoolers using multisensory methods and those using traditional methods?
2. What is the mean difference between the number and letter formation of the preschoolers who used the multisensory approach versus those who used the traditional approach?
3. What is the average difference in handwriting skills between boys and girls who have been taught using multisensory techniques?

Research Hypotheses

Ho_1: There is no considerable mean difference between the left-to-right orientation of writing among preschoolers taught through multisensory approaches and preschoolers taught through traditional approaches.

Ho_2: No considerable mean difference exists in the number of letters and their formations among preschool children who were introduced to multisensory approaches and conventional approaches.

Ho_3: There is no meaningful mean difference in the penmanship skills of the males and females who use the multisensory approach.

Research Methodology

In this study, a quasi-experimental pretest-posttest nonequivalent control group design was employed. Quasi-experimental design is one in which it is impossible to have random assignment of the subjects to the experimental and control groups. This type of design was employed since it was impossible to have random assignment of the subjects to experimental and control groups; rather, intact classes were used as experimental and control groups. The independent variable in this experiment was the kind of instruction (multisensory instruction and conventional instruction), and the dependent variable was handwriting ability of the pupils. Target Population All the pupils from the Nursery Two classes in private pre-primary schools in Uyo Local Government Area, Akwa Ibom State, Nigeria. Population There were 6,706 Nursery Two pupils from 197 private pre-primary schools (Source: Ministry of Education, Uyo, 2025). Sampling Technique Simple Random Sampling method was adopted and six private pre-primary schools were randomly selected. Sample Size There was a sample size of 346 pupils in twelve intact classes from the six schools. The primary tool for the collection of data was the Handwriting Achievement Test (HAT) designed by the researcher himself. This HAT had two parts where part A was used to collect the personal data of the participants while part B included the handwriting exercises of the test which scored a

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maximum of 100 marks. The same test was used for pretest and posttest as well. Introductory letters were sent to the headmasters of the sampled schools, and necessary permission was granted. The researcher informed research assistants about the study. Pre-test was conducted on all subjects from both groups using the Handwriting Achievement Test (HAT). For six weeks, the experimental group was instructed in handwriting using the multisensory approach, while the control group was instructed using the traditional approach (discussions and copying). Finally, post-test was done on both groups using the HAT.

Data Analysis

The mean and standard deviation were the statistical tools employed in answering the research questions whereas the analysis of covariance (ANCOVA) was used in testing the hypotheses at the 0.05 level of significance. The pretest scores acted as the covariates for the posttest scores. ANCOVA was chosen due to the fact that it is capable of controlling for the effects of the initial group differences when the randomization procedure cannot be achieved since intact groups have been used. Higher mean gain indicated a difference for the research questions.

Presentation of Results

Research questions were addressed using mean and standard deviation while the null hypotheses were tested using Analysis of Covariance (ANCOVA) at a significance level of 0.05.

Research Question One

Mean difference between the left to right writing direction of preschoolers using multisensory techniques versus those using conventional techniques?

Table 1: Mean and Standard Deviation for Differences in Left-to-Right Writing Pattern between Preschoolers who were Exposed to Multisensory Method and Conventional Method

Group	**N**	**Pretest**		**Posttest**		**Mean**
		X̄	**SD**	**X̄**	**SD**	**Difference**
Multisensory Method	175	4.85	4.23	15.91	3.86	11.06
Conventional Method	171	4.76	4.29	4.94	4.56	0.18

The results for the pretest and posttest means and standard deviations of the Multisensory Method (Experimental Group) are 4.85 and 15.91, and 4.23 and 3.86 respectively as shown in Table 1. The means and standard deviations for the Conventional Method (Control Group) are 4.76 and 4.94, and 4.29 and 4.56 respectively. The difference is very obvious when comparing the left to right pattern of writing between children who have been taught through the multisensory method and the conventional method respectively. Children who were taught through the multisensory method gained the most out of all the other methods.

Research Question Two

What is the average difference in the number of letters and their shapes among preschool children using multisensory approaches compared to traditional ones?

Table 2: Mean and Standard Deviation on Difference in Number of Letters and Letter Forming between Preschoolers using Multisensory Method and Conventional Method

Group	N	Pretest		Posttest		Mean
		X̄	SD	X̄	SD	Difference
Multisensory Method	175	4.80	4.06	16.31	3.75	11.51
Conventional Method	171	4.82	4.02	4.94	4.47	0.12

Table 2 reveals that the means of the experimental group (Multisensory Method) are 4.80 and 16.31, with the standard deviations being 4.06 and 3.75, respectively. On the other hand, the control group (Conventional Method) had the means of 4.82 and 4.94, with the standard deviations of 4.02 and 4.47, respectively. From the analysis, there is a definite difference in numbers and letters among preschoolers who learn using multisensory and preschoolers who learn using the traditional approach. The preschoolers who learned using the multisensory method had the highest mean gain.

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Research Question Three

What is the mean difference between the penmanship of boys and girls that use multisensory techniques?

Table 3: Average, Standard Deviation and Differences in the Handwriting Skill of Boys and Girls Under Multisensory Approach

Gender	N	Pretest		Posttest		Mean
		$\bar{X}$	SD	$\bar{X}$	SD	Difference
Boys	83	25.84	8.03	79.75	8.33	53.91
Girls	92	25.27	9.67	81.30	8.89	56.03

The following table gives the comparison between the writing skills of boys and girls when taught using the multisensory approach. The pretest mean score for boys was 25.84 (SD = 8.03) while the posttest mean was 79.75 (SD = 8.33) with a mean gain of 53.91. On the other hand, the pretest mean for girls was 25.27 (SD = 9.67) while the posttest mean was 81.30 (SD = 8.89). For both groups, post-test means were greater than pre-test means. The girls had greater mean improvement in their handwriting skills than did the boys.

Null Hypothesis One

The left to right writing pattern between children who were taught through the use of multisensory approaches and the conventional approaches show no notable mean differences.

Table 4: Result of ANCOVA for the Significant Difference of the Left to Right Writing Pattern between Preschoolers Exposed to Multi-sensory Approach and Preschoolers Exposed to Conventional Approach

Source	Type III Sum of Squares	Df	Mean Square	F	Sig.
Corrected Model	13091.894a	2	6545.947	646.196	.000
Intercept	8047.323	1	8047.323	794.407	.000
Pretest	2678.549	1	2678.549	264.418	.000
Method of Instruction	10299.433	1	10299.433	1016.729	.000
Error	3474.580	343	10.130		
Total	54650.000	346			
Corrected Total	16566.474	345			

a. R Squared = .790 (Adjusted R Squared = .789)

The table below gives the F-ratio and p-value of the difference in the left-to-right writing pattern between preschoolers who are taught using the multisensory approach and those who are taught using the traditional approach. F-ratio = 1016.729, p-value = 0.000 Since $p = 0.000 < 0.05$, the null hypothesis is rejected. This means that there exists a significant difference in the left-to-right writing pattern where the multisensory approach works better.

Hypothesis Two

There is no statistically significant difference between the mean numbers of letters and their formations in preschool children taught through multisensory techniques compared to traditional techniques.

Table 5: Outcome of the Analysis of Covariance (ANCOVA) of the Significant Difference between the Number and Letter Formation of Preschool Children who were Exposed to Multisensory Technique and Conventional Technique

Source	Type III Sum of Squares	Df	Mean Square	F	Sig.
Corrected Model	11201.822a	2	5600.911	329.426	.000
Intercept	15342.819	1	15342.819	902.410	.000
Pretest	15.426	1	15.426	.907	.342
Method of Instruction	11188.826	1	11188.826	658.087	.000
Error	5831.704	343	17.002		

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Source	Type III Sum of Squares	Df	Mean Square	F	Sig.
Total	56600.000	346			
Corrected Total	17033.526	345			

a. R Squared = .658 (Adjusted R Squared = .656)

The values of F-ratio and p-value in Table 5 are 658.087 and 0.000 respectively in relation to the difference in the formation of numbers and letters between the preschool children educated by multisensory and conventional methods. The null hypothesis is rejected as $p < 0.05$. Therefore, there exists a significant difference in the formation of numbers and letters where multisensory method has been found to be superior.

Hypothesis Three

The average handwriting capability between the boys and the girls subjected to multisensory techniques is not significantly different.

Table 6: Results of Analysis of Covariance (ANCOVA) Showing Significantly Different Handwriting Skill of Boys and Girls who were Taught Using Multisensory Approach

Source	Type III Sum of Squares	Df	Mean Square	F	Sig.
Corrected Model	1341.933a	2	670.967	9.905	.000
Intercept	100159.590	1	100159.590	1478.634	.000
Pretest	1237.735	1	1237.735	18.272	.000
Gender	128.423	1	128.423	1.896	.170
Error	11650.924	172	67.738		
Total	1149050.000	175			
Corrected Total	12992.857	174			

a. R Squared = .103 (Adjusted R Squared = .093)

In Table 6, the F-ratio is 1.896 and the probability level of the F-ratio is 0.170 for the difference in the handwriting ability of boys and girls using the multisensory approach. Since the value of p is greater than 0.05 (i.e., $p = 0.170 > 0.05$), the null hypothesis is accepted.

Discussion of Findings

From the results obtained, it is evident that the multisensory strategy had significantly better achievement compared to the traditional teaching strategy in the writing patterns from left to right and in the forming of letters and numbers. It is because of the involvement of more than one sense in the learning process. The simultaneous perception of the letter while seeing, saying and tracing it gives the learner more ways through which the information will be stored and retrieved (Ritchey & Goeke, 2006), while the continuous practice in the activity and feedback through the senses of vision and touch make the action precise and automatic (Adams, 1971). These results correlate with those obtained by Bara and Gentaz (2011) in their multisensory haptic training, Lumor et al. (2025) and Smith-Bell (2024). However, there is some variation in the data. According to Zwicker & Hadwin (2009), for example, a multisensory intervention was not superior to a cognitive one, and older children in the latter group achieved better results. It seems likely, therefore, that the success of multisensory instruction depends on the age and previous skills of the child receiving it. The current sample consisted of preschoolers who were just beginning to learn how to write. The fact that there was no statistically significant gender difference means that the multisensory approach works just as well with boys as it does with girls. While girls showed a slightly better increase (56.03 versus 53.91), this may happen by chance rather than being a result of gender-specific responses to the approach. It agrees with the findings of Olota & Udo (2019), who discovered that gender was not a significant factor in preschoolers' phonological awareness in their study of the effects of the multisensory approach. It does not go against those studies where girls have an insignificant but still slightly greater handwriting ability (McCarney et al., 2012). Instead, it

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implies that when both genders are given equal exposure to the structured multisensory approach, any possible gender-based fine motor advantage (Navarro-Patón et al., 2021) will not be reflected in results.

Conclusion

Findings from the research showed that the multisensory approach led to significant improvement in handwriting skills among the preschoolers in Uyo Educational Zone, both in the left-to-right writing skill and number and letter formation, when compared to the traditional approach. The pupils who were subjected to the multisensory approach made more progress than those who did not. Moreover, gender had no effect on the efficiency of the multisensory approach since both males and females benefited from it equally.

Recommendation

1. The early childhood educators must apply the multisensory approach in their everyday teaching of handwriting and engage themselves in professional development in this regard.
2. School administrators, the government and policymakers should ensure that the necessary materials and training are available to conduct a multisensory approach to teaching.
3. The inclusion of multisensory handwriting should be part of the curriculum for early childhood development.

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MUSA, Abubakar[1]
abubakarbube1972@gmail.com
09133935392
MUHAMMAD, Ahmad Alwali[2]
NASIRU, Abubakar[3]
[1]Department of Physics, Abdullahi Fodio University of Science and Technology Aliero, Kebbi State
[2]Department of Physics, Ahmadu Bello University Zaria, Kaduna State
[3]Department of Science Laboratory Technology, Federal Polytechnic Kauran-Namoda, Zamfara State

Abstract
Gold mineralization within the Zuru Schist Belt of northwestern Nigeria is structurally controlled, but detailed delineation of subsurface structures and prospective mineralization zones in the Donko area remains limited. This study aimed to delineate geological structures and identify zones potentially favourable for gold mineralization using aeromagnetic data covering the Donko, Gwashi, Zuru and Wasagu map sheets. High-resolution aeromagnetic data obtained from the Nigerian Geological Survey Agency were processed using Oasis montaj. Total Magnetic Intensity, residual magnetic field, upward continuation, First Vertical Derivative, analytical signal, Source Parameter Imaging and Euler deconvolution techniques were applied to enhance magnetic anomalies, delineate structural features and estimate magnetic-source depths. The results revealed heterogeneous magnetic responses characterized by a dominant NE–SW structural trend, with subordinate NW–SE and N–S orientations. Source Parameter Imaging produced depth estimates ranging from approximately 94 to 554 m, while Euler deconvolution yielded depths of 177–509 m for structural index 1 and 356.6–803.8 m for structural index 2. Prominent magnetic lineaments and clustered magnetic-source solutions occur around the Donko mining area and extend toward the northeastern, central and southern parts of the study area. Areas characterized by intersecting lineaments, pronounced magnetic gradients and shallow-to-moderate magnetic sources were identified as prospective zones for gold mineralization. The study demonstrates that integrated aeromagnetic interpretation provides an effective approach for delineating structurally controlled mineralization targets and offers a basis for detailed exploration and field verification within the study area.

Keywords: Aeromagnetic data; Gold mineralization; Zuru Schist Belt; Structural lineaments; Source Parameter Imaging; Euler deconvolution.

Introduction
Gold mineralization in Precambrian terrains is commonly associated with faults, fractures, shear zones and other structures that control hydrothermal-fluid migration and ore deposition (Groves et al., 1998, 2000, 2018; Goldfarb et al., 2001; Bierlein et al., 2006). The Nigerian Basement Complex contains several gold-bearing schist belts, including the Zuru Schist Belt (ZSB), where gold occurs mainly within metasedimentary rocks and quartz- and quartz-tourmaline-bearing veins (Wright, 1985; Garba, 2000, 2003; Danbatta & Garba, 2007). The structural complexity of the ZSB, involving faults, folds and shear zones, has been linked to the distribution of gold occurrences (Garba, 2000, 2003; Fagbohun et al., 2024). Recent studies indicate that gold mineralization in the ZSB is preferentially associated with NNE–NE, E–W and NE–SW structures, with subsidiary NW-trending structures providing additional local controls (Salawu et al., 2023; Fagbohun et al., 2024). Aeromagnetic data are particularly useful for mapping concealed structures where weathering and limited exposure restrict surface observations. Techniques such as regional–residual separation, upward continuation, first vertical derivative and analytical signal enhance magnetic anomalies and structural boundaries (Blakely, 1995; Gunn et al., 1997; Reeves, 2005). Source Parameter Imaging and Euler deconvolution further provide estimates of magnetic-source depths and geometries (Thompson, 1982; Reid et al., 1990; Thurston & Smith, 1997). However, the detailed orientation, continuity and depth of magnetic structures within the Donko area remain poorly constrained. This study therefore uses high-resolution aeromagnetic data covering Donko, Gwashi, Zuru and Wasagu to investigate the subsurface structural framework. Regional–residual separation, upward continuation, first vertical derivative, analytical signal, SPI and Euler deconvolution are integrated to delineate structural features, estimate source depths and evaluate their significance for gold mineralization. The results provide a basis for identifying structurally favourable zones for subsequent geological, geochemical and ground-geophysical investigation.

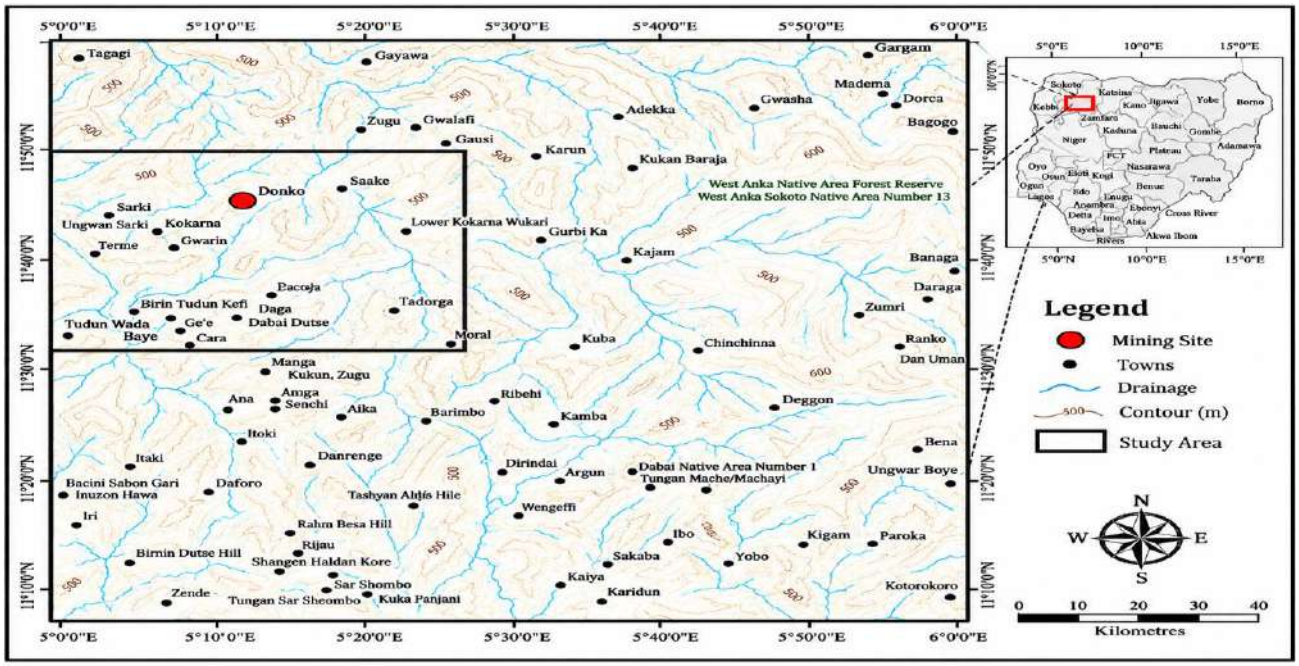
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Study Area Description

Location of the Study Area

The study area is located within the Donko (Sheet 74), Gwashi (Sheet 75), Zuru (Sheet 97) and Wasagu (Sheet 98) map sheets in Kebbi State, northwestern Nigeria. It extends approximately from latitude 11°00′N to 12°00′N and longitude 5°00′E to 6°00′E, covering an area of about 12,100 km² (Fig. 1).

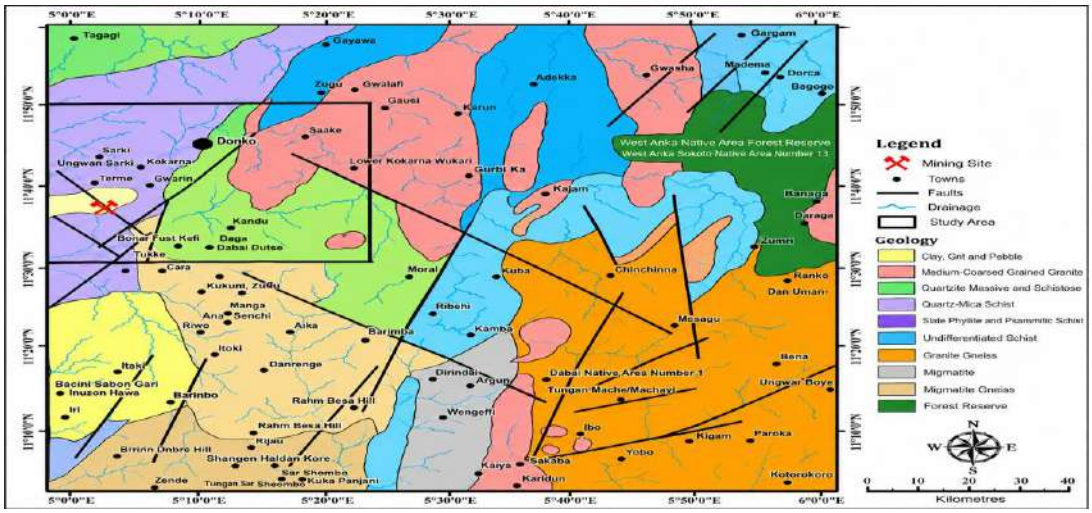
Fig. 1: Map of Nigeria showing location of the study (Adopted from WHO/UNEP, 1997)



Geology of the Study Area

The study area lies within the Zuru Schist Belt of the northern Nigerian Basement Complex and comprises medium-grained granite, quartzite, quartz–mica schist, schist–phyllite, psammitic schist, granite–gneiss, migmatite and migmatite–gneiss (Fig. 2). The basement rocks are Precambrian in age and consist mainly of migmatite–gneiss, Older Granite and schist, with associated quartz veins and pegmatites (Obaje, 2009).

Fig. 2: Geological map of the study area showing Donkoarea (adopted from NGSA 2009).



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Aeromagnetic Data Acquisition and Processing

The study used secondary airborne magnetic data from the Nigerian Geological Survey Agency (NGSA) covering the Donko (74), Gwashi (75), Zuru (97) and Wasagu (98) map sheets. The data were acquired by Fugro-Airborne Surveys (FAS) at a mean terrain clearance of approximately 0.08 km, with 0.5 km flight-line spacing and 5 km tie-line spacing, and were processed in Geosoft Oasis montaj. Regional–residual separation, upward continuation, first vertical derivative (FVD), analytical signal (AS), Source Parameter Imaging (SPI) and Euler deconvolution were applied to enhance magnetic structures and estimate source depths. The resulting products were integrated to delineate the subsurface structural framework and identify zones potentially favourable for gold mineralization (Figs. 3 and 4).

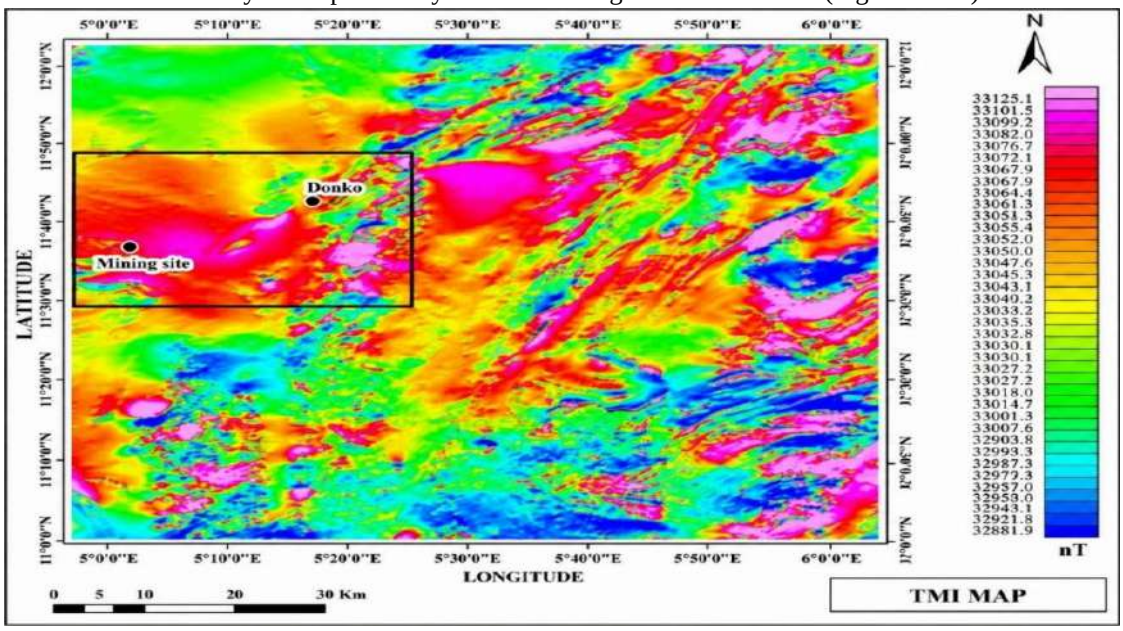


Fig. 3: Total Magnetic Intensity Map of the study area.

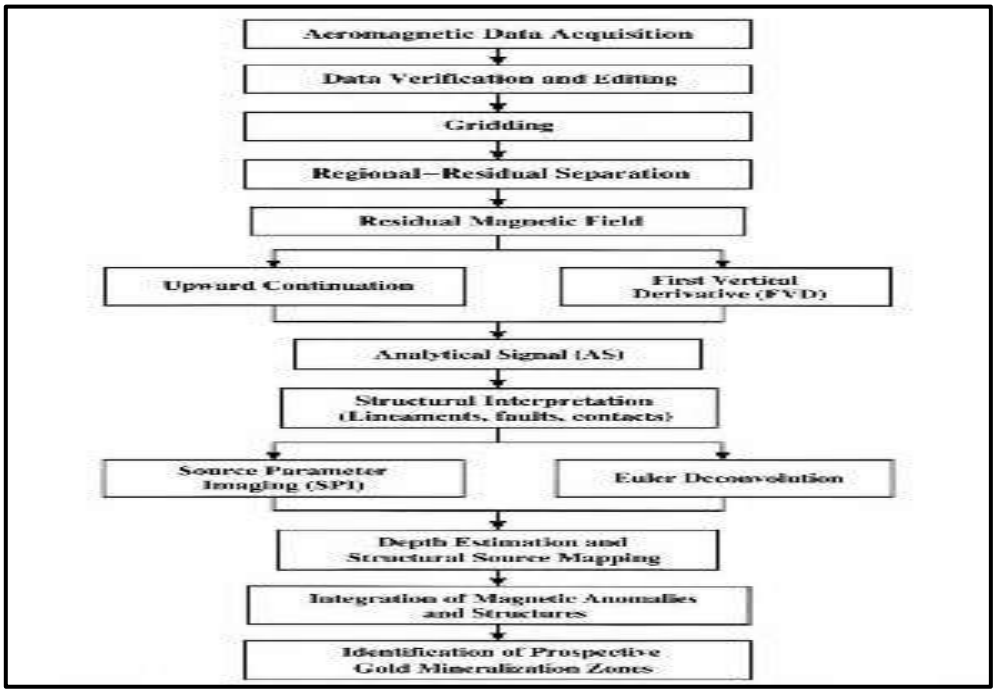


Fig. 4 Methodological Workflow

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Presentation of Results and Discussion

The TMI and residual magnetic maps reveal heterogeneous magnetic responses dominated by elongated NE–SW anomalies, with stronger responses mainly in the central, northern and northeastern sectors (Figures 3 and 4). The residual values range from −140.3 to 102.1 nT, while the 200-m upward continuation preserves the major NE–SW trends, suggesting that some structures extend to depth (Figure 5). The FVD further enhances shallow contacts and structural discontinuities, revealing prominent linear and curvilinear features whose intersections indicate structurally complex zones (Figure 6). Such magnetic patterns are consistent with the use of derivative transformations for mapping basement structures and lithological contacts (Blakely, 1995; Gunn et al., 1997; Reeves, 2005).

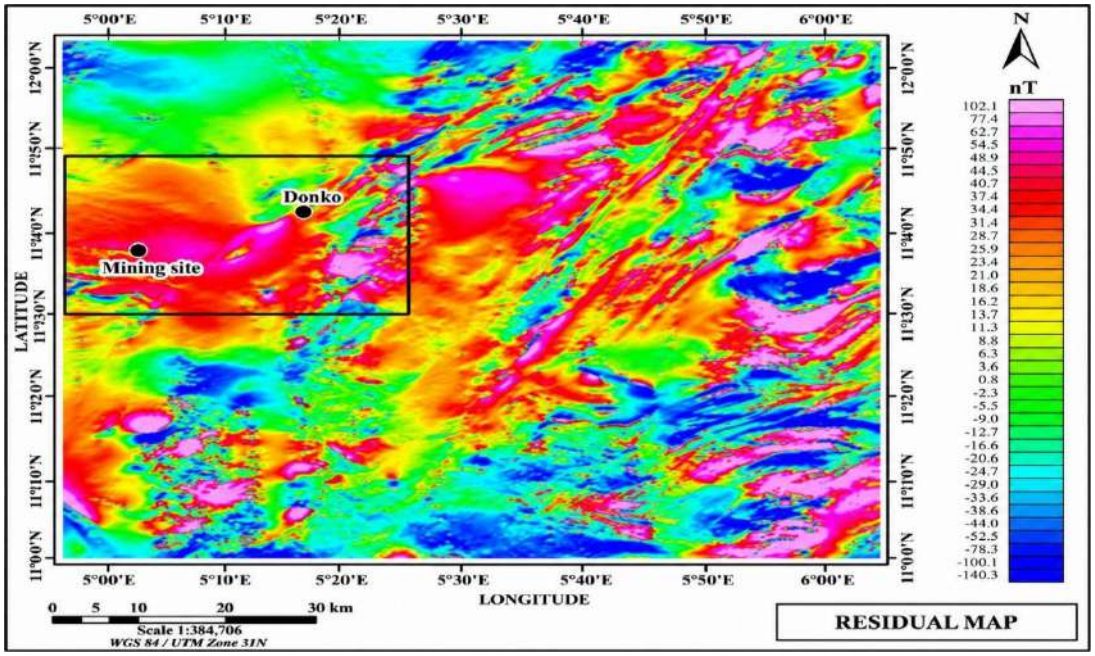


Fig. 4. Residual magnetic field map of the study area.

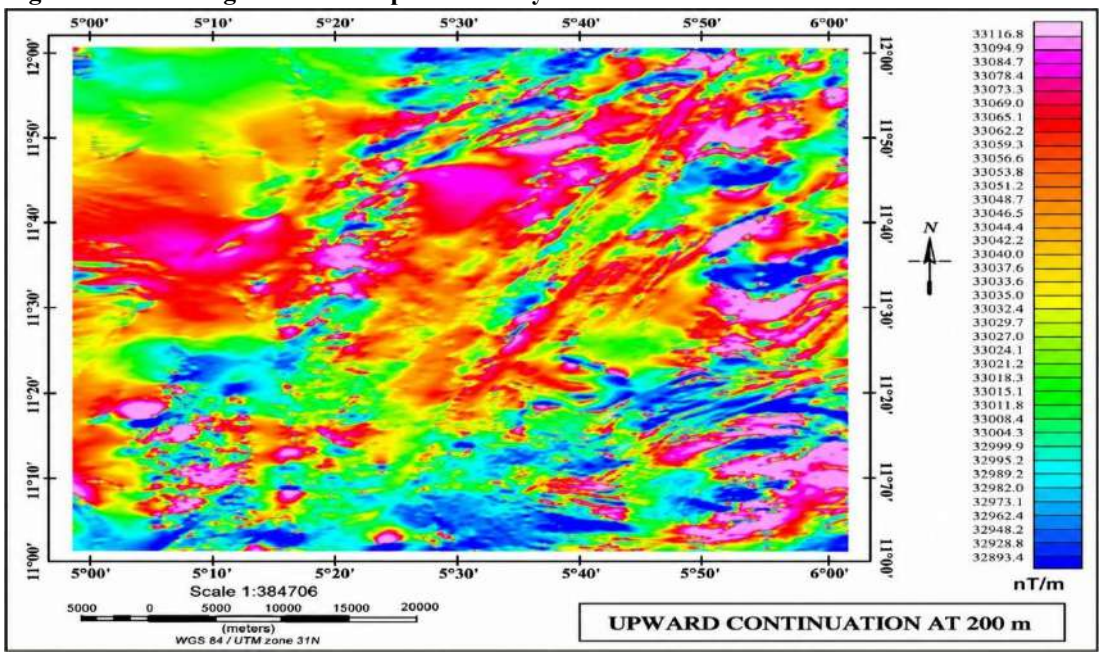


Fig. 5. Upward continuation map of the study area at 200 m.

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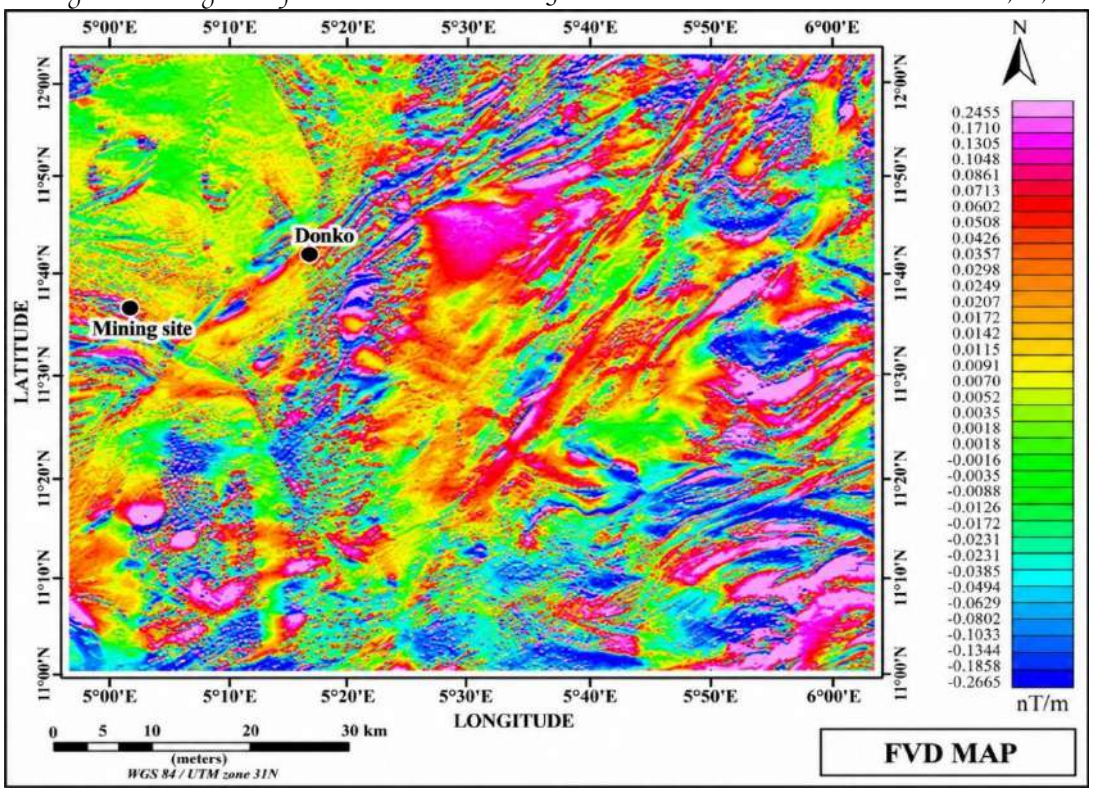
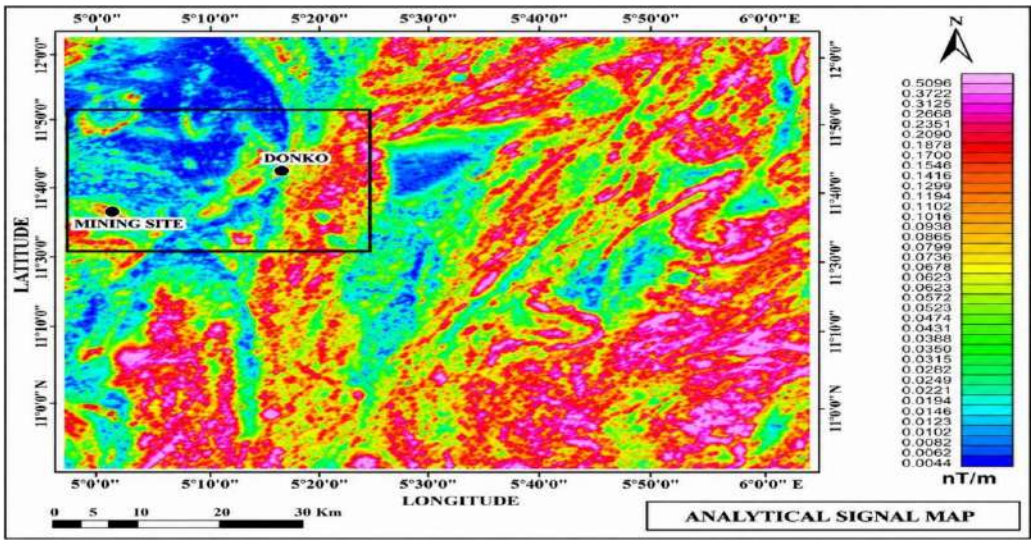


Fig. 6. First Vertical Derivative (FVD) map of the study area.

The analytical signal map highlights magnetic-source boundaries, with amplitudes of approximately 0.0044–0.5096 nT/m and prominent NE–SW-oriented anomalies around the Donko mining area (Figure 9). These responses are consistent with the capability of analytical signal techniques to enhance magnetic contacts and structural boundaries (Nabighian, 1972; Roest et al., 1992). SPI estimates indicate source depths of about 94–554 m (Figure 10), while Euler deconvolution gives depths of 177–509 m for SI = 1 and 356.6–803.8 m for SI = 2 (Figures 11 and 12). The correspondence between SPI and Euler SI = 1 supports the identification of the principal magnetic-source zones, while the deeper SI = 2 solutions reflect different assumed source geometries (Thurston & Smith, 1997; Thompson, 1982; Reid et al., 1990; Hsu, 2002).



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Fig. 9. Analytical Signal (AS) map of the study area.

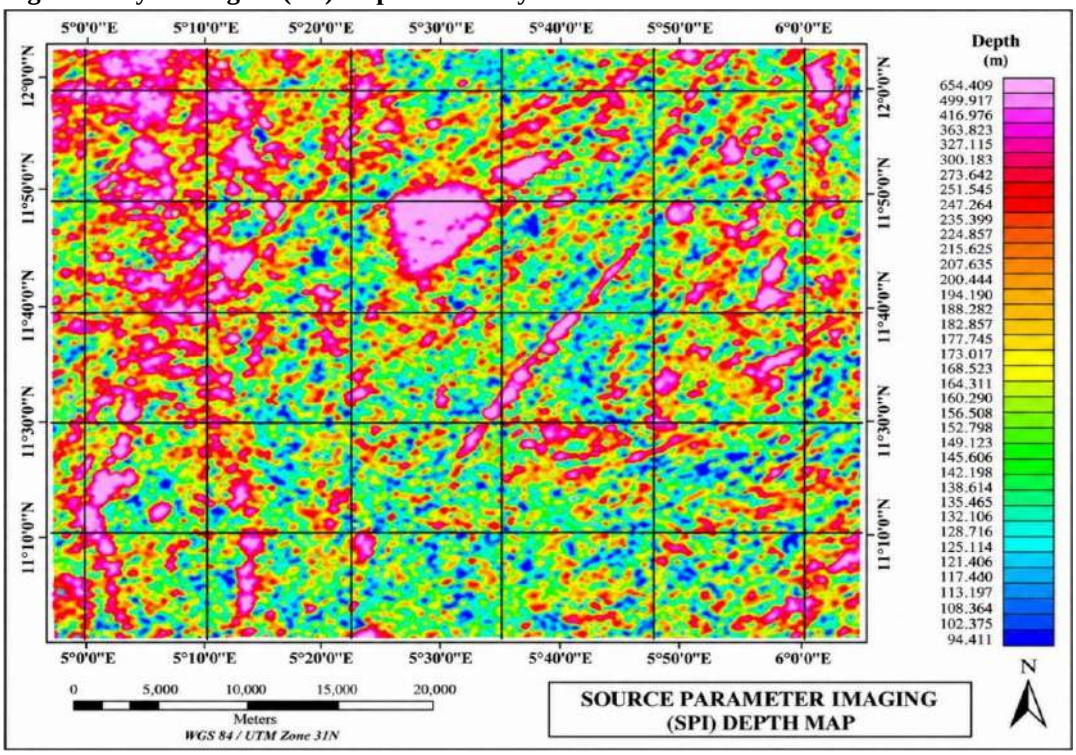


Fig. 10. Source Parameter Imaging Map showing mining site and Donko area

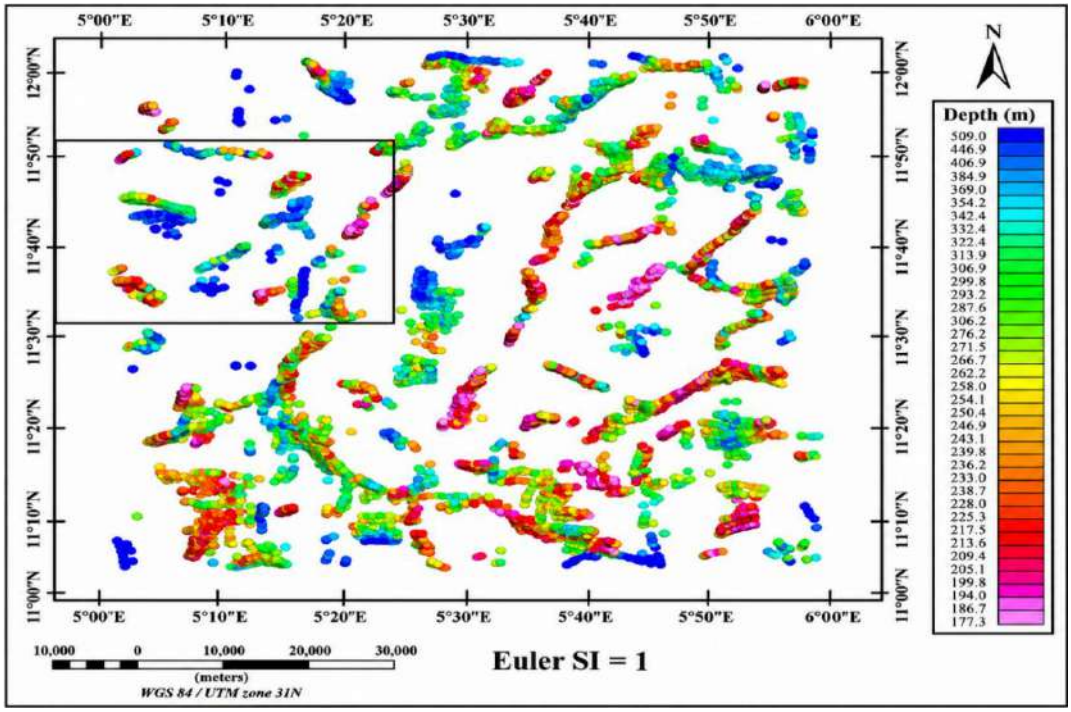


Fig. 11. Standard Euler Solutions Obtained from Aeromagnetic Data (SI=1)

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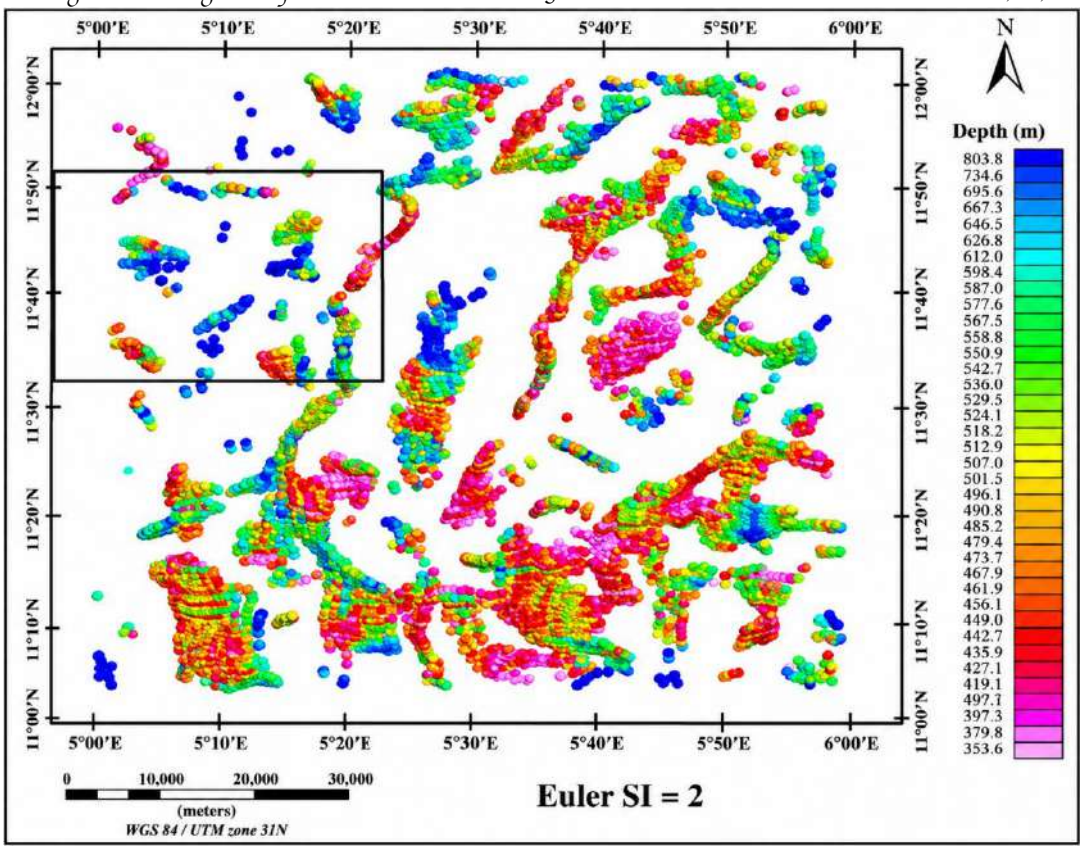


Fig. 12. Standard Euler Solutions Obtained from Aeromagnetic Data (SI=2)

Integration of the magnetic derivatives, analytical signal and source-depth estimates indicates a dominant NE–SW structural framework with subordinate NW–SE and N–S trends (Figures 6–12). Structurally complex zones around the Donko mining area and extending toward the northeastern, central and southern sectors are characterized by intersecting lineaments and shallow-to-moderate magnetic sources. These features are considered favourable for structurally controlled gold mineralization because faults and fractures may provide pathways for mineralizing fluids, consistent with previous interpretations of structural control within the Zuru Schist Belt (Olasunkanmi et al., 2020; Salawu et al., 2023; Fagbohun et al., 2024). Nevertheless, the identified zones represent exploration targets rather than direct confirmation of mineralization and require geological and geochemical validation.

Conclusion

The study successfully applied aeromagnetic data processing and interpretation techniques to investigate the structural framework and delineate prospective gold mineralization zones within the Donko area of the Zuru Schist Belt, northwestern Nigeria. The TMI, residual magnetic field, upward continuation, FVD and analytical signal maps revealed pronounced magnetic variations and a dominant NE–SW structural trend, with subordinate NW–SE and N–S orientations. The SPI results indicated magnetic-source depths of approximately 94–554 m, while Euler deconvolution produced source depths of 177–509 m for SI = 1 and 356.6–803.8 m for SI = 2. The close correspondence between the major magnetic lineaments, source-depth distributions and the Donko mining area indicates that the mineralization is likely associated with structurally complex zones. The most prospective areas occur around the mining site and extend toward the northeastern, central and southern parts of the study area, particularly where prominent structures intersect and coincide with shallow-to-moderate magnetic sources. These results demonstrate the effectiveness of integrated aeromagnetic interpretation for defining structural targets and provide useful targets for detailed ground-based exploration and future verification of gold mineralization in the study area.

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Influence of Artificial Intelligence Overdependence on Critical Thinking and Problem-Solving Skills among University Students in Abia State, Nigeria

JUDE, Uche Onwuhanze[1]
onwuhanze.jude@mouau.edu.ng
CHUKWU, Blessing Uche[1]
Blessingjoechukwu@gmail.com
[1]Department of Educational Management, College of Education, Michael Okpara University of Agriculture, Umudike.

Abstract

This study examined the influence of overdependence on artificial intelligence (AI) on critical thinking and problem-solving skills among university students in Abia State. The study adopted an ex post facto research design. The population comprised 14,649 undergraduate students in Michael Okpara University of Agriculture, Umudike, and Abia State University, Uturu, from which a sample of 389 students was selected. Data were collected using the Artificial Intelligence Overdependence, Critical Thinking and Problem-Solving Skills Questionnaire with a Cronbach alpha reliability coefficient of 0.78. Data were analyzed using multivariate analysis of variance, with Pillai's Trace used to test the multivariate effects. The findings showed significant differences in critical thinking and problem-solving skills of students with low, moderate and high levels of reliance on AI for answers without independent reasoning, acceptance of AI-generated responses without verification, and delegation of academic problem-solving tasks to AI. In each case, students with low levels of AI overdependence recorded higher critical thinking and problem-solving skills than those with moderate and high levels. The study concludes that excessive reliance on AI may be associated with reduced opportunities for students to engage independently in critical thinking and problem-solving. It recommends that universities promote responsible AI use by encouraging independent reasoning, verification of AI-generated information, and the use of AI as a supportive rather than substitutive learning tool.

Keywords: Artificial intelligence, AI overdependence, critical thinking skill, problem-solving skill, university students

Introduction

Artificial intelligence (AI) has emerged as a transformative technology in higher education, reshaping how students access information, engage with academic content, complete assignments and solve educational problems. AI-powered tools, including generative AI applications, intelligent tutoring systems and automated writing assistants, provide students with opportunities for personalized learning, immediate feedback and efficient information processing. The integration of these technologies into university education reflects broader efforts to enhance learning outcomes and develop digital competencies required in contemporary society (Umobong & Tommy, 2019). However, the increasing reliance on AI for academic tasks has raised questions about whether students' frequent and uncritical use of these technologies may weaken their independent cognitive engagement, particularly critical thinking and problem-solving skills. The educational significance of this concern lies in the need to ensure that technological advancement supports, rather than undermines, the intellectual abilities that university education is expected to cultivate. Critical thinking is a fundamental higher-order cognitive skill involving the analysis, interpretation, evaluation and synthesis of information to arrive at reasoned judgments (Tommy & Asukwo, 2018). It enables students to examine evidence, identify assumptions, assess the credibility of information and develop logical conclusions rather than accepting information without scrutiny. Problem-solving skills, closely related to critical thinking, involve identifying problems, generating possible solutions, applying appropriate strategies and evaluating the effectiveness of decisions. These competencies are essential for academic achievement, professional practice and lifelong learning because university graduates are expected to address complex and unfamiliar challenges independently. The development of these skills requires meaningful cognitive engagement, opportunities for inquiry and active participation in learning processes. Consequently, the use of AI in education should be examined not only in terms of its efficiency and convenience but also in relation to how it influences students' engagement in the thinking processes underlying learning. The growing availability of generative AI has intensified discussions about the relationship between technological assistance and students' cognitive development (Tommy et al., 2026). While AI tools can support learning by explaining difficult concepts, generating examples and providing alternative perspectives, excessive dependence may encourage students to delegate tasks that would otherwise require independent reasoning. Overdependence on AI in this study refers to the excessive reliance on AI tools for academic information processing,

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decision-making, generating answers and completing learning tasks, with insufficient independent cognitive engagement. This concept is distinct from ordinary or purposeful AI use because its concern is not merely how frequently students use AI, but the extent to which they rely on AI instead of developing and exercising their own reasoning and problem-solving abilities. The potential consequences of such dependence warrant empirical investigation, particularly within university contexts where students are expected to progressively develop autonomy, intellectual judgment and transferable cognitive skills. This study is anchored on cognitive load theory, developed by Sweller (1988) and subsequently expanded through research on instructional design and learning. Cognitive load theory explains how the limited capacity of working memory influences learning and problem-solving. The theory distinguishes between intrinsic cognitive load, which arises from the complexity of learning materials; extraneous cognitive load, which results from the way information or learning activities are presented; and germane cognitive processing, which involves mental effort directed towards understanding and constructing knowledge schemas (Sweller et al., 2019). Within the context of AI-assisted learning, AI tools can reduce unnecessary cognitive demands by providing explanations, organizing information and offering support in complex academic tasks. However, when students become over dependent on AI, they may transfer essential cognitive activities, such as analysis, evaluation and solution generation, to the technology rather than engaging in these processes themselves. The relevance of cognitive load theory to the present study lies in its explanation of the relationship between cognitive effort, learning and independent reasoning. Although reducing unnecessary cognitive load can support learning, reducing the mental effort required for essential intellectual activities may limit opportunities for students to develop robust knowledge structures and problem-solving strategies. For instance, a student who consistently obtains AI-generated solutions without examining the reasoning behind them may complete academic tasks efficiently but have fewer opportunities to practice independent analysis and evaluate alternative solutions. This theoretical perspective provides a basis for examining whether overdependence on AI is associated with students' critical thinking and problem-solving skills. Nevertheless, the theory does not imply that all AI-supported learning is harmful; the educational effect depends on how the technology is used, the nature of the task and the cognitive engagement encouraged by instruction.

Overdependence on artificial intelligence in higher education describes a pattern in which students rely excessively on AI tools to perform academic and cognitive activities that require personal engagement, judgment and independent reasoning. Unlike constructive AI use, which may support exploration, feedback and knowledge development, overdependence occurs when students accept AI-generated information without adequate verification, delegate essential thinking tasks to AI or use AI as a substitute for personal effort. This distinction is important because AI reliance is not necessarily harmful in every circumstance. The educational implications depend on whether students engage critically with AI-generated outputs or use them unreflectively. Recent research has increasingly examined the nature and measurement of students' reliance on generative AI. Hou et al. (2025a) developed and validated a scale for measuring undergraduate students' reliance on generative AI during problem-solving. Their study identified four dimensions of reliance: reflective use, cautious use, thoughtless use and collaborative use. This classification demonstrates that AI reliance is multidimensional and should not automatically be equated with overdependence. In particular, thoughtless use is relevant to the present study because it captures reliance patterns that may involve inadequate cognitive evaluation of AI-generated responses. The study provides a foundation for distinguishing productive human–AI collaboration from reliance that may undermine independent engagement. Similarly, Hou et al. (2025b) investigated the relationship between critical thinking and undergraduate students' reliance behaviours when using generative AI for problem-solving. Drawing on 808 undergraduate responses, the study found that critical thinking was positively associated with reflective, cautious and collaborative AI use, whereas trust in AI positively predicted thoughtless use. The findings suggest that students' cognitive dispositions and skills influence how they depend on AI. This is relevant to the present research because overdependence may be associated with the extent to which students evaluate AI outputs and retain responsibility for their own reasoning. However, the study focused on reliance behaviours and critical thinking rather than establishing the effect of AI overdependence on students, thereby leaving room for further contextual investigation. Critical thinking is the ability to engage in purposeful and self-regulated judgment through processes such as interpretation, analysis, evaluation, inference and explanation. As stated by Udofia and Tommy (2021), in university education, critical thinking skill enables students to examine academic claims, question

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assumptions, assess evidence and develop conclusions based on reasoned judgment. Critical thinking is particularly important in an AI-supported educational environment because students encounter information that may be incomplete, inaccurate or generated without transparent evidence. Consequently, students require the ability to independently assess the validity and relevance of AI-generated information instead of accepting it solely because it appears authoritative or well formulated. The relationship between AI use and critical thinking has received attention in recent higher education research. For example, a 2024 study by [authors to be verified before final submission] examined the mediating role of generative AI self-regulation in students' critical thinking and problem-solving. The study's focus on self-regulation is relevant because the benefits of AI use may depend on students' ability to manage their engagement with AI and retain active responsibility for learning. However, the complete author details and findings should be verified from the original publication before this study is cited in a final manuscript. Further, Hou et al. (2025b) investigated critical thinking as a factor associated with how undergraduates rely on generative AI during problem-solving. Their findings showed that critical thinking was associated with reflective, cautious and collaborative reliance, while also helping to offset the influence of trust on reliance behaviours. This evidence suggests that critical thinking plays a role in determining whether students use AI thoughtfully or uncritically. Nevertheless, the study examined critical thinking in relation to AI reliance behaviours rather than directly establishing that overdependence causes lower critical thinking performance.

Problem-solving skills refer to the capacity to identify problems, understand their underlying conditions, generate alternative solutions, apply appropriate strategies and evaluate outcomes. According to Tommy and Obioesio (2019), in higher education, these skills support students' ability to transfer knowledge to unfamiliar situations and respond to academic and practical challenges. Problem-solving is not limited to obtaining correct answers; it involves the reasoning processes through which students understand problems, consider alternatives and justify their decisions. The use of AI may facilitate these processes by providing suggestions and explanations, but excessive reliance on AI-generated solutions could reduce students' opportunities to independently practice them. An experimental study by Urban et al. (2024) investigated the effect of ChatGPT on creative problem-solving among university students. The study compared 77 students who used ChatGPT with 68 students who completed the task without it. The findings indicated that ChatGPT-assisted students demonstrated improvements in the quality, elaboration and originality of solutions, while also reporting lower perceived mental effort. However, the researchers found that students using ChatGPT had difficulties accurately evaluating the quality of their own answers. These findings illustrate that AI assistance may improve some problem-solving outcomes while raising questions about students' independent evaluation and metacognitive judgment. The study did not specifically examine overdependence. In another recent investigation, Du et al. (2025) examined the impact of AI on higher-order thinking skills in complex problem-solving among university students. The study addressed the possibility that AI could function as either a facilitator or a hindrance to independent thinking. Its focus on complex problem-solving is relevant to the present study because it emphasizes the importance of students' cognitive engagement when using AI. However, the relationship between AI assistance and problem-solving outcomes should be distinguished from the specific phenomenon of overdependence. Students may use AI to support their reasoning without surrendering responsibility for generating and evaluating solutions. The present study consequently focuses on whether excessive reliance on AI is associated with university students' problem-solving skills. The reviewed literature indicates that artificial intelligence has the potential to influence university students' cognitive development in both supportive and potentially limiting ways. The findings from recent studies do not establish a uniform negative effect of AI use on critical thinking or problem-solving. Instead, they suggest that the nature of AI engagement, students' critical evaluation of AI outputs and the instructional context are important considerations. For example, Urban et al. (2024) found that ChatGPT improved the quality and originality of solutions in a creative problem-solving experiment, while Hou et al. (2025b) reported that critical thinking was associated with more reflective and cautious AI reliance. These findings illustrate why the present study should distinguish between AI use generally and overdependence specifically. Evidence that AI can support performance does not, by itself, demonstrate that excessive reliance improves or reduces students' independent cognitive abilities. Although recent studies have contributed to understanding AI reliance, critical thinking and problem-solving, a contextual and empirical gap remains concerning the association between overdependence on AI and these skills among university students in Abia

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State. Much of the available evidence identified in this review comes from international university settings, and several studies examine AI assistance, reliance behaviours or perceived outcomes rather than the combined relationship between excessive AI dependence and independently assessed cognitive skills. In addition, research that simultaneously examines critical thinking and problem-solving within the same study may provide a more comprehensive understanding of the cognitive implications of AI overdependence. The present study seeks to address this gap by investigating the influence of overdependence on artificial intelligence on critical thinking and problem-solving skills among university students in Abia State.

Statement of the Problem

Artificial intelligence has become increasingly accessible to university students and is now used for searching for information, generating answers, explaining concepts, completing assignments and solving academic problems. While these applications can support learning and improve efficiency, concerns arise when students rely on AI to perform cognitive tasks that they should ordinarily undertake themselves. The problem, therefore, is not simply students' use of AI, but the possibility that excessive reliance on AI may reduce their engagement in independent reasoning, evaluation and solution generation. This concern is particularly important because critical thinking and problem-solving are core outcomes of university education. Students are expected to analyse information, evaluate evidence, question assumptions, generate alternative solutions and make reasoned decisions. However, when students routinely obtain answers from AI without independently reasoning through problems, accept AI-generated responses without verification, or delegate academic problem-solving tasks to AI, they may have fewer opportunities to practise these essential cognitive processes. Although AI can also support critical thinking and problem-solving when used reflectively and collaboratively, excessive dependence may shift students from active cognitive engagement to passive acceptance of technologically generated solutions. Existing empirical evidence presents a mixed picture. Urban et al. (2024) found that ChatGPT-assisted students demonstrated improvements in aspects of creative problem-solving, while also identifying concerns about students' ability to accurately judge the quality of their own outputs. Du et al. (2025) similarly showed that AI can facilitate higher-order thinking during complex problem-solving when students remain actively engaged. Hou et al. (2025b) found that critical thinking was associated with more reflective and cautious patterns of AI reliance, whereas trust in AI was associated with thoughtless reliance. These findings suggest that the consequences of AI use may depend substantially on how students engage with the technology rather than on AI use itself. Despite these emerging findings, there remains limited empirical evidence on whether different levels of AI overdependence are associated with differences in university students' critical thinking and problem-solving skills in Abia State. In particular, insufficient attention has been given to students who rely on AI for answers without independent reasoning, accept AI-generated responses without verification, and delegate academic problem-solving tasks to AI. This creates a contextual and empirical gap, especially within the university environment in Abia State, where students are increasingly exposed to AI-supported learning. The problem addressed by this study, therefore, is the need to determine whether varying levels of overdependence on AI are associated with differences in students' critical thinking and problem-solving skills.

Purpose of the Study

This study examined the influence of overdependence on artificial intelligence and critical thinking and problem-solving skills among university students in Abia State. Specifically, the study sought to determine whether students' levels of reliance on AI for answers without independent reasoning, acceptance of AI-generated responses without verification, and delegation of academic problem-solving tasks to AI are associated with differences in their critical thinking and problem-solving skills.

Research Hypotheses

1. There is no significant difference in critical thinking and problem-solving skills among university students with low, moderate and high levels of reliance on AI for answers without independent reasoning.
2. There is no significant difference in critical thinking and problem-solving skills among university students with low, moderate and high levels of acceptance of AI-generated responses without verification.
3. There is no significant difference in critical thinking and problem-solving skills among university students with low, moderate and high levels of delegation of academic problem-solving tasks to AI.

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Research Methodology

The study adopted the ex-post facto research design because the variables of interest had already occurred and could not be manipulated by the researcher. The design was considered appropriate for examining differences in students' critical thinking and problem-solving skills across different levels of overdependence on artificial intelligence. The study was carried out in Abia State, Nigeria, specifically in the two public universities, Michael Okpara University of Agriculture, Umudike and Abia State University, Uturu. Abia State is located in the South-East geopolitical zone of Nigeria and has an established university education system. The two universities provide an appropriate setting for examining students' use and overdependence on artificial intelligence in academic activities because of their substantial student populations and increasing use of digital technologies in teaching and learning. The population of the study comprised 14,649 university students in the two selected public universities in Abia State. Specifically, 7,884 students were from Michael Okpara University of Agriculture, while 6,765 students were from Abia State University. The population figures were obtained from the Academic Planning Units of the two universities in 2026. The sample size for the study was determined using the Taro Yamane (1967) formula. With a population of 14,649 students, the formula yielded a sample size of 389 students**.** The sample was proportionately allocated to the two universities based on their respective population sizes. Thus, 209 students were selected from Michael Okpara University of Agriculture, while 180 students were selected from Abia State University. Convenience sampling was used to select eligible students from the two universities. The instrument for data collection was a researcher-developed questionnaire titled Artificial Intelligence Overdependence, Critical Thinking and Problem-Solving Skills Questionnaire. The questionnaire was designed to obtain information on students' overdependence on artificial intelligence and their critical thinking and problem-solving skills. It consisted of four sections measuring the three dimensions of AI overdependence and the two dependent variables. The first section contained 10 items measuring reliance on AI for answers without independent reasoning. The items assessed the extent to which students depend on AI-generated answers without first attempting to reason through academic questions independently, use AI to provide answers to tasks they could attempt themselves, and accept AI assistance in place of their own reasoning processes. The second section contained 10 items measuring acceptance of AI-generated responses without verification. The items assessed the extent to which students accept AI-generated information as accurate without checking its correctness, comparing responses with textbooks or other reliable sources, examining supporting evidence, or questioning potentially inaccurate AI-generated information.

The third section contained 10 items measuring delegation of academic problem-solving tasks to AI. The items assessed the extent to which students depend on AI to solve academic problems, complete difficult assignments, generate solutions, provide step-by-step answers, and perform problem-solving activities that they would otherwise undertake themselves. The fourth section measured the dependent variables. Critical thinking skills were measured using items assessing students' abilities to analyze information, evaluate evidence, identify assumptions, compare alternative explanations, draw logical conclusions, and make reasoned judgments. Problem-solving skills were measured using items assessing students' abilities to identify problems, analyze relevant information, generate alternative solutions, apply appropriate strategies, evaluate solutions, and arrive at appropriate conclusions. The items measuring AI overdependence were structured on a four-point rating scale of Very Often (4), Often (3), Sometimes (2), and Never (1)**.** Higher scores indicated higher levels of AI overdependence. The scores obtained for each AI-overdependence dimension were used to classify students into low, moderate and high levels of overdependence. The critical thinking and problem-solving items were also scored using the four-point scale, with higher scores indicating higher levels of the respective skills. The instrument was validated by experts in Measurement and Evaluation. The experts examined the items for clarity, relevance, appropriateness, adequacy of coverage of the constructs, and suitability for university students. Their observations and recommendations were used to modify the instrument before its final administration. A trial test was conducted using students from a public university outside the selected universities but with characteristics similar to those of the study population. The reliability of the instrument was determined using Cronbach's alpha, which was considered appropriate because the instrument employed a Likert-type response scale. A reliability coefficient of 0.78 was obtained for the instrument, indicating acceptable internal consistency for the study. Data were collected through the administration of the questionnaire to the 389 sampled students

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in the two selected public universities. The researchers administered the instrument to the respondents and retrieved the completed questionnaires for analysis. Informed consent was obtained from all participants before participation. Confidentiality and anonymity were maintained by excluding personal identifiers from the questionnaire and ensuring that the information provided was used strictly for academic purposes. The data collected were coded and analyzed using appropriate descriptive and inferential statistics. Descriptive statistics, including means and standard deviations, were used to summarize the responses on the study variables. For inferential analysis, multivariate analysis of variance (MANOVA) was used to test the three null hypotheses at the .05 level of significance. For each hypothesis, the relevant dimension of AI overdependence was classified into low, moderate, and high groups, while critical thinking skills and problem-solving skills served as the two continuous dependent variables. MANOVA was used to determine whether statistically significant differences existed in critical thinking and problem-solving skills of students across the three levels of each AI-overdependence dimension. The Pillai's Trace statistic was used as the principal multivariate test because of its relative robustness in assessing differences across groups.

Presentation of Results

Hypothesis 1

There is no significant difference in critical thinking and problem-solving skills among university students with low, moderate, and high levels of reliance on AI for answers without independent reasoning.

Table 1: MANOVA of critical thinking and problem-solving skills by level of reliance on AI for answers without independent reasoning

Level of reliance on AI	n	Critical thinking M	SD	Problem-Solving M		SD
Low	128	34.18	2.71	33.76		2.84
Moderate	151	29.47	3.12	28.91		3.26
High	110	23.16	3.35	22.48		3.51
Multivariate Effect	Pillai's Trace	F	Hypothesis df	Error df	Sig.	Partial η^2
Reliance on AI	0.421	46.38	4	772	.001	.194

Significant at $p \leq .05$

The result in Table 1 shows that students with low reliance on AI for answers without independent reasoning recorded the highest mean scores in critical thinking (M = 34.18) and problem-solving (M = 33.76). Students with moderate reliance recorded lower mean scores in critical thinking (M = 29.47) and problem-solving (M = 28.91), while those with high reliance recorded the lowest mean scores in critical thinking (M = 23.16) and problem-solving (M = 22.48). The result indicates a statistically significant difference in critical thinking and problem-solving skills of students across the low, moderate, and high reliance groups, Pillai's Trace = .421, $F(4, 772) = 46.38$, $p < .001$. Therefore, the null hypothesis is rejected, which means that there is a significant difference in critical thinking and problem-solving skills among university students with low, moderate, and high levels of reliance on AI for answers without independent reasoning.

Hypothesis 2

There is no significant difference in critical thinking and problem-solving skills among university students with low, moderate, and high levels of acceptance of AI-generated responses without verification.

Table 2: MANOVA of critical thinking and problem-solving skills by level of acceptance of AI-generated responses without verification

Level of acceptance without verification	n	Critical thinking M	SD		Problem-solving M	SD
Low	134	34.52	2.64		33.94	2.79
Moderate	143	29.76	3.18		29.21	3.14
High	112	23.71	3.41		22.83	3.47
Multivariate effect	Pillai's Trace	F	Hypothesis df	Error df	Sig.	Partial η^2

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Level of acceptance without verification	n	Critical thinking M	SD		Problem-solving M	SD
Acceptance without verification	0.397	42.15	4	772	.001	.179

Significant at $p \leq .05$

The result in Table 2 indicates that students with low acceptance of AI-generated responses without verification obtained the highest mean scores in critical thinking (M = 34.52) and problem-solving (M = 33.94). The moderate group recorded intermediate scores in critical thinking (M = 29.76) and problem-solving (M = 29.21), while the high group recorded the lowest scores in critical thinking (M = 23.71) and problem-solving (M = 22.83). The result shows a statistically significant difference in the combined critical thinking and problem-solving skills across students with low, moderate, and high levels of acceptance of AI-generated responses without verification, Pillai's Trace = .397, $F(4, 772) = 42.15$, $p < .001$. Thus, the null hypothesis is rejected, which means that there is a significant difference in critical thinking and problem-solving skills among university students with low, moderate, and high levels of acceptance of AI-generated responses without verification.

Hypothesis 3

There is no significant difference in critical thinking and problem-solving skills among university students with low, moderate, and high levels of delegation of academic problem-solving tasks to AI.

Table 3: MANOVA of critical thinking and problem-solving skills by level of delegation of academic problem-solving tasks to AI

Level of delegation to AI	n	Critical thinking M	SD		Problem-solving M	SD
Low	126	34.36	2.77		33.82	2.91
Moderate	156	29.61	3.15		28.97	3.23
High	107	22.98	3.48		22.21	3.57
Multivariate effect	Pillai's Trace	F	Hypothesis df	Error df	Sig.	Partial η^2
Delegation to AI	0.438	49.21	4	772	.001	.203

Significant at $p \leq .05$

The result in Table 3 shows that students with low levels of delegation of academic problem-solving tasks to AI had the highest mean scores in critical thinking (M = 34.36) and problem-solving (M = 33.82). Students with moderate levels recorded intermediate scores in in critical thinking (M = 29.61) and problem-solving (M = 28.97), while those with high levels of delegation recorded the lowest scores in critical thinking (M = 22.98) and problem-solving (M = 22.91). The MANOVA result indicates a statistically significant difference in the combined critical thinking and problem-solving skills of students across the low, moderate, and high delegation groups, Pillai's Trace = .438, $F(4, 772) = 49.21$, $p < .001$. Therefore, the null hypothesis is rejected, which means that there is a significant difference in critical thinking and problem-solving skills among university students with low, moderate, and high levels of delegation of academic problem-solving tasks to AI.

Discussion of Findings

The finding from the first hypothesis showed a significant multivariate difference in the combined critical thinking and problem-solving skills of university students across the low, moderate and high levels of reliance on AI for answers without independent reasoning. The descriptive results indicated that students with low reliance on AI recorded the highest mean scores in critical thinking and problem-solving, followed by students with moderate reliance, whereas students with high reliance recorded the lowest mean scores. The MANOVA result further indicated that the combined dependent variables differed significantly across the three levels of reliance. Consequently, the null hypothesis was rejected. The finding suggests that the manner in which students rely on AI may be more important than simply whether they use AI. Students who use AI while retaining responsibility for reasoning, evaluating information and developing their own answers may have different cognitive outcomes from students who depend on AI to provide answers without first engaging

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independently with academic problems. This interpretation is consistent with Hou, Zhu, and Sudarshan (2025), who examined 808 undergraduate students and found that critical thinking skills were positively associated with reflective, cautious and collaborative forms of generative-AI use, whereas trust in AI positively predicted thoughtless use. The authors argued that critical thinking can counterbalance tendencies toward uncritical reliance by encouraging students to scrutinize AI outputs and engage more deliberately with them. The present finding extends this evidence by showing that students characterized by greater reliance on AI without independent reasoning had lower combined critical-thinking and problem-solving scores. Whereas Hou et al. (2025) examined critical thinking as a factor associated with different patterns of AI reliance, the present study approaches the relationship from the opposite direction by comparing students with different levels of reliance and examining their cognitive skills. The convergence of the findings suggests that independent cognitive engagement is important in determining how students benefit from AI. However, the present ex-post facto design does not establish that reliance on AI caused the lower scores; the finding should therefore be interpreted as a significant difference associated with levels of reliance. The finding also needs to be considered alongside the experimental evidence of Du et al. (2025). Their study of university students found that AI involvement in complex design problem-solving increased the frequency and interconnectedness of higher-order thinking skills, and students who were more influenced by AI incorporated more personal thinking and demonstrated greater use of higher-order thinking. This finding may appear different from the present finding, but the difference can be explained by the nature of AI engagement. Du et al. examined students working interactively with AI during structured complex problem-solving activities, whereas the present study specifically examined reliance on AI for answers without independent reasoning. Thus, AI involvement does not necessarily diminish critical thinking; rather, the present finding suggests that reliance that substitutes for independent reasoning may be associated with weaker critical-thinking and problem-solving outcomes. Therefore, the finding supports the view that university students should not merely be encouraged to use or avoid AI, but should be guided toward reflective and independent use of AI. The educational concern is particularly relevant where students allow AI to perform the initial reasoning process instead of using it to challenge, extend or refine their own thinking.

The finding from the second hypothesis showed a significant multivariate difference in the combined critical thinking and problem-solving skills of university students across the low, moderate and high levels of acceptance of AI-generated responses without verification. Students with low levels of accepting AI-generated responses without verification recorded the highest mean scores in both critical thinking and problem-solving, while students with high levels recorded the lowest scores. The MANOVA result demonstrated that the differences in the combined dependent variables were statistically significant. Consequently, the null hypothesis was rejected. This finding suggests that uncritical acceptance of AI-generated information is associated with poorer cognitive outcomes. Critical thinking requires students to examine evidence, question assumptions, compare information and determine whether conclusions are justified. When students routinely accept AI-generated responses without verification, these cognitive processes may receive less attention. Similarly, problem-solving requires students to examine the conditions of a problem, consider alternative solutions and evaluate the adequacy of a proposed answer. Accepting an AI response without verification may reduce students' opportunities to practise these processes. This finding is strongly related to Hou et al. (2025), whose study demonstrated that critical thinking was positively related to cautious, reflective and collaborative use of generative AI. In contrast, trust in AI was positively associated with thoughtless use, indicating a tendency toward less critical engagement with AI outputs. Their findings also showed that critical thinking could offset the influence of trust on less desirable reliance behaviour. The present finding is consistent with this pattern because students who demonstrated lower levels of uncritical acceptance of AI responses also demonstrated higher critical-thinking and problem-solving scores. The finding is further supported by Urban et al. (2024), who experimentally examined ChatGPT-assisted creative problem-solving among 145 university students. Students using ChatGPT produced solutions with greater quality, elaboration and originality and perceived the task as requiring less mental effort. However, the study also found problems with students' metacognitive monitoring: students using ChatGPT struggled to accurately evaluate the quality of their own answers, and perceived usefulness of ChatGPT was associated with greater overestimation of answer quality and originality. This aspect of Urban et al.'s findings is particularly relevant to the present result. AI can improve aspects of task performance while simultaneously creating difficulties in judging whether an AI-

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supported answer is actually adequate. Thus, the ability to verify and critically evaluate AI-generated responses remains important even when AI assistance produces apparently successful solutions. This finding also differs somewhat from the positive effects reported by Du et al. (2025), who found increased use of higher-order thinking during AI-supported complex problem-solving. The difference again appears to lie in how students engage with AI. In Du et al.'s experimental setting, students interacted with AI while analysing, evaluating and redesigning solutions. In the present study, the relevant behaviour was acceptance of AI-generated responses without verification. The latter represents a more passive form of engagement and therefore provides fewer opportunities for students to exercise independent evaluation. The finding therefore implies that the educational value of AI may depend substantially on students' capacity to question, verify and evaluate AI-generated information. University students may benefit from AI-generated explanations and solutions, but such benefits are less likely to translate into stronger critical-thinking and problem-solving skills when AI outputs are accepted without independent scrutiny. The finding from the third hypothesis revealed a significant multivariate difference in the combined critical thinking and problem-solving skills of university students across the low, moderate and high levels of delegation of academic problem-solving tasks to AI. Students with low levels of delegation recorded the highest mean scores in critical thinking and problem-solving, students with moderate levels recorded intermediate scores, while students with high levels of delegation recorded the lowest scores. The MANOVA result showed that the combined dependent variables differed significantly across the three levels of delegation. Therefore, the null hypothesis was rejected. The finding suggests that frequently transferring responsibility for academic problem-solving to AI is associated with lower levels of students' own critical-thinking and problem-solving skills. Problem-solving competence develops through repeated engagement with problems, including identifying the nature of a problem, generating possible solutions, selecting strategies, testing alternatives and evaluating outcomes. When students routinely delegate these cognitive activities to AI, they may have fewer opportunities to practice the underlying processes independently.

The finding is supported by Urban et al. (2024), although their results also demonstrate why the relationship between AI and problem-solving should not be interpreted as uniformly negative. Their experimental study found that ChatGPT improved the quality, elaboration and originality of students' creative solutions and reduced perceived mental effort. At the same time, students using ChatGPT showed difficulties with accurate self-evaluation, suggesting that AI assistance can improve the immediate product while creating challenges for students' metacognitive monitoring. The present finding extends this concern to delegation: when students move beyond using AI as a support tool and instead allow AI to perform substantial portions of the problem-solving process, their opportunities for independent cognitive practice may be reduced. The finding is also relevant to Du et al. (2025), who found that AI-supported complex problem-solving could increase students' use of higher-order thinking skills. Their experimental results showed that AI involvement increased the frequency of several higher-order thinking processes, although the study involved structured design tasks in which students continued to participate actively in analyzing and developing solutions. This distinction is important. The present finding does not imply that using AI to assist problem-solving is inherently detrimental. Rather, it suggests that higher levels of delegating problem-solving responsibility to AI are associated with lower critical-thinking and problem-solving scores. The finding is further consistent with Hou et al. (2025), who demonstrated that critical thinking was associated with reflective, cautious and collaborative AI use, while thoughtless use was positively associated with trust in AI. Delegating academic problem-solving tasks to AI can represent a shift from collaborative or reflective use toward a more passive form of reliance when students allow the technology to undertake cognitive activities that they would otherwise perform themselves. The present finding therefore reinforces the importance of maintaining students' cognitive agency during AI-supported learning.

Conclusion

The findings of the study indicate that overdependence on artificial intelligence is significantly associated with university students' critical thinking and problem-solving skills. Students with low levels of reliance on AI without independent reasoning, acceptance of AI-generated responses without verification, and delegation of academic problem-solving tasks to AI demonstrated higher levels of critical thinking and problem-solving skills than those with moderate and high levels of overdependence. The findings suggest that while AI can support learning and enhance problem-solving when used appropriately, excessive reliance on it may reduce opportunities for students to independently analyze information, evaluate

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alternatives, and develop solutions. Therefore, the educational value of AI may depend largely on how students engage with it, particularly their ability to maintain independent reasoning, verify AI-generated information, and use AI as a supportive rather than substitute cognitive tool.

Implications of Findings

The findings have several implications for university teaching, learning and educational policy. First, the observed differences in critical thinking and problem-solving skills across levels of AI overdependence suggest that universities should promote responsible and purposeful use of AI rather than unrestricted reliance on AI-generated answers. Lecturers should design learning activities that require students to demonstrate independent reasoning, verify AI-generated information, explain their solutions, and critically evaluate alternative answers. Second, students should be guided to use AI as a learning support tool rather than as a substitute for their own thinking and problem-solving efforts. This may require integrating AI literacy, verification skills and critical evaluation into relevant courses and student orientation programmes. Third, assessment practices may need to place greater emphasis on authentic and process-oriented tasks through which students demonstrate how they arrived at their answers, rather than relying solely on final responses that can easily be generated by AI. Finally, university management and curriculum planners should provide clear guidelines for responsible AI use in academic work while supporting lecturers in developing assessment strategies that preserve students' opportunities to practise critical thinking and problem-solving. Overall, the findings imply that the educational benefits of AI are more likely to be realised when its use complements, rather than replaces, students' independent cognitive engagement.

Recommendations

1. Universities should discourage excessive reliance on AI-generated answers without independent reasoning by requiring students to explain their reasoning processes, justify their answers, and demonstrate their own understanding when completing AI-supported academic tasks.
2. Lecturers should require students to verify AI-generated information before accepting or using it by checking AI responses against credible academic sources, course materials, and other evidence. This can strengthen students' critical evaluation skills and reduce uncritical acceptance of inaccurate AI-generated content.
3. Universities should establish guidelines that encourage the use of AI as a support for, rather than a replacement for, students' problem-solving efforts. Lecturers should design assignments that require students to attempt problems independently before using AI and to reflect on how AI contributions were evaluated and integrated into their final solutions.

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Correlationship Between Pre-School Teachers' Grit and Work Engagement among Nursery Schools in Benin City, Edo State, Nigeria

AIDEYAN, Chioma Maryjane[1]
maryjane.aideyan@uniben.edu
08062454156
ORCID ID: 0009-0002-9787-139X

OBAZEE, F.A.[1]
favobazee82@gmail.com
07081280655
[1]Early Childhood Education, Institute of Education, University of Benin, Edo State, Nigeria

Abstract
The psychological characteristics of preschool teachers may shape their capacity to sustain effective involvement in the demanding work of educating and caring for young children. This study investigated preschool teachers' grit as a correlate of work engagement in nursery schools in Benin City, Edo State, Nigeria. Specifically, it examined the relationship between teachers' grit and work engagement and determined whether age and years of teaching experience moderated this relationship. A correlational research design was adopted. The population comprised 284 preschool teachers in registered public and private nursery schools in Benin City, from which 98 teachers were selected using a multistage sampling procedure. Data were collected using a structured questionnaire measuring grit, specifically perseverance of effort and consistency of interests, and work engagement, comprising vigour, dedication and absorption. The instrument was validated by experts and yielded a Cronbach's alpha reliability coefficient of 0.79. Data were analysed using Pearson Product-Moment Correlation and moderation analysis at the 0.05 level of significance. Findings revealed a positive and statistically significant relationship between preschool teachers' grit and work engagement ($r = 0.61$, $p = .001$). However, age did not significantly moderate the relationship ($\beta = 0.07$, $p = .455$), and neither did years of teaching experience ($\beta = 0.06$, $p = .504$). The study concludes that grit is an important personal correlate of preschool teachers' work engagement, with the relationship not significantly varying by age or teaching experience. It recommends integrating psychological resource development, particularly perseverance and sustained commitment, into teacher professional development programmes.

Keywords: Preschool Teachers; Grit; Work Engagement; Age; Teaching Experience; Nursery Schools

Introduction
Early childhood education occupies a foundational position in the educational development of every child. The preschool years represent a particularly important period during which children develop basic cognitive abilities, language and communication skills, social competence, emotional regulation, physical coordination, curiosity and attitudes towards learning. Experiences provided during these formative years can influence children's subsequent adjustment to formal schooling and their capacity to participate meaningfully in learning activities. Consequently, the quality of early childhood education cannot be separated from the quality, disposition and professional functioning of the teachers who work directly with young children. Preschool teachers are not merely transmitters of academic knowledge; they serve simultaneously as caregivers, facilitators, role models, classroom managers, observers of children's development and significant adults in children's early social environments. Their psychological readiness and willingness to invest sustained effort in their work are therefore important considerations in achieving quality early childhood education. The centrality of the teacher in early childhood education is particularly pronounced because young children require continuous attention, patience, encouragement, supervision and emotional responsiveness. Unlike older learners who may be expected to demonstrate relatively greater independence, preschool children often require teachers to provide repeated instructions, redirect their attention, respond to individual differences, manage emotional outbursts, facilitate peer interactions and create opportunities for learning through play and exploration. Teachers are consequently required to expend considerable physical, cognitive and emotional resources during the school day. They must simultaneously attend to the developmental needs of individual children while meeting curriculum expectations, maintaining classroom order, communicating with parents and complying with school policies. The demanding nature of these responsibilities makes teachers' psychological resources an important area of educational inquiry. In Nigeria, and Edo state in particular, the importance of early childhood

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education is recognised within the broader national educational system. Nevertheless, the sector continues to experience challenges that can affect the quality and effectiveness of educational provision. Literature on early childhood education in Nigeria has identified concerns including inadequate infrastructure and instructional resources, insufficient funding, uneven implementation of curriculum provisions, insufficiently qualified personnel and weaknesses in regulation and quality assurance. Such challenges may place considerable demands on teachers and may influence how they perceive and perform their occupational responsibilities. In this environment, attention to teachers' individual psychological strengths becomes important because teachers may differ considerably in their capacity to sustain effort, remain committed to professional goals and continue functioning effectively when confronted with difficulties.

The concept of grit has emerged as an important construct within the field of positive psychology and educational research. Grit generally refers to sustained passion and perseverance towards long-term goals, particularly the willingness to maintain effort and commitment despite obstacles, setbacks or periods of difficulty (Boyle, Hood, & Bradley, 2017). Unlike temporary motivation, grit concerns persistence over time (Babiera, & Quirap, 2024). It therefore provides a useful lens through which individual differences in teachers' responses to occupational challenges can be understood. A teacher may encounter a difficult class, inadequate teaching resources, demanding parents, heavy workload, limited administrative support or repeated behavioural challenges. While such experiences may reduce motivation for some individuals, a teacher with a stronger disposition towards perseverance may continue to pursue professional goals and maintain effort despite these difficulties. Datu (2021) explained that grit is commonly conceptualised around two related dimensions: perseverance of effort and consistency of interests. Perseverance of effort concerns the tendency to continue working towards an objective even when progress is difficult or setbacks occur. Consistency of interests concerns the capacity to maintain commitment to important goals rather than frequently abandoning them for new pursuits. In the context of preschool teaching, both dimensions may have practical relevance. Teaching young children requires teachers to repeatedly engage in activities that may not produce immediate results. A teacher may need to teach the same concept several times, modify an activity for a child who is experiencing difficulty, develop alternative strategies for managing behaviour or repeatedly encourage a child who is reluctant to participate. The willingness to continue such efforts may be associated with the teacher's level of grit. The relevance of grit to teaching becomes clearer when the nature of preschool education is considered (Duckworth et al., 2007). Effective preschool teaching requires patience and sustained commitment because children's developmental progress is often gradual and heterogeneous. Two children exposed to the same learning experience may respond differently because of differences in language development, cognitive ability, temperament, family background and previous experiences. Teachers therefore have to adjust their approaches and persist until children receive appropriate support. A teacher who expects immediate results may become frustrated when children do not respond as anticipated. In contrast, a teacher with a stronger capacity for perseverance may interpret difficulties as challenges requiring additional effort, adaptation and professional reflection. Grit may therefore constitute a personal resource that helps teachers maintain goal-directed behaviour in demanding educational environments. Fabelico, and Afalla, (2020) explained that grit represents one individual-level characteristic that may interact with the conditions under which teachers work. A high level of grit may help a teacher persist in challenging circumstances, but the availability of supportive organisational resources remains essential for sustainable professional functioning. Closely related to the issue of teachers' psychological functioning is the concept of work engagement.

Kim, and Kim (2023) expressed that work engagement refers to a positive, fulfilling and work-related psychological state generally characterised by vigour, dedication and absorption. Vigour involves high levels of energy and mental resilience while working; dedication reflects a sense of significance, enthusiasm, inspiration, pride and challenge; while absorption involves being fully concentrated and deeply engrossed in one's work. In educational settings, an engaged teacher is therefore expected to demonstrate energy in carrying out teaching responsibilities, enthusiasm for the profession and sustained psychological involvement in classroom activities. Work engagement is particularly important in nursery schools because teaching young children requires more than the mechanical delivery of lessons. Teachers have to be emotionally present and responsive to children's needs. They need to listen, observe, encourage, comfort, stimulate curiosity and

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participate actively in children's learning experiences. A teacher who is physically present but psychologically disengaged may fulfil basic duties without demonstrating the level of enthusiasm, creativity and responsiveness required for high-quality early childhood practice. Conversely, an engaged teacher is more likely to approach classroom responsibilities with energy, demonstrate commitment to children's development and become immersed in activities that support learning. The importance of teacher work engagement extends beyond the teacher as an individual (Hodge, Wright, & Bennett, 2020). Teachers' engagement may influence the quality of the classroom environment and the experiences children receive. The relationship between grit and work engagement can also be understood from the perspective of teachers' capacity to sustain effort towards meaningful professional goals (Suzuki, Tamesue, Asahi, & Ishikawa, 2015). Work engagement involves energy, dedication and absorption in current work activities, while grit concerns sustained effort and commitment towards longer-term goals. Although the two constructs are conceptually distinct, they share an important emphasis on persistence and goal-directed behaviour (Biglete, 2025). A gritty preschool teacher may remain committed to improving children's learning and development even when classroom experiences are demanding. Such persistence may help the teacher maintain vigour and dedication in daily work activities. In turn, sustained engagement may reinforce the teacher's sense of purpose and commitment to teaching. Also, a teacher can be present in the classroom without being genuinely engaged. Work engagement concerns the quality of the teacher's psychological involvement in work. An engaged preschool teacher is likely to invest energy in lesson preparation, interact actively with children, respond thoughtfully to individual needs, collaborate with colleagues, reflect on teaching experiences and demonstrate dedication to the educational development of children. Therefore, identifying personal characteristics associated with engagement may help educational administrators understand how teachers can be better supported.

Grit may be particularly relevant because preschool teaching requires persistence in the face of repeated and sometimes unpredictable challenges. Consider, for example, a teacher working with a child who has difficulty communicating, following instructions or interacting appropriately with peers. The teacher may need to observe the child carefully, communicate with parents, modify classroom activities, employ alternative instructional strategies and monitor progress over an extended period. Similar persistence may be required when managing classroom behaviour, introducing new teaching approaches or addressing learning difficulties. The capacity to continue pursuing meaningful educational goals despite temporary setbacks is consistent with the core idea of grit. Nevertheless, it is important to distinguish grit from mere endurance or compliance. A teacher who remains in a job because of economic necessity is not necessarily gritty in the psychological sense. Similarly, a teacher who completes routine duties without enthusiasm cannot automatically be described as highly engaged. Grit concerns sustained effort and commitment towards valued long-term goals, whereas work engagement concerns the positive quality of one's psychological relationship with current work (Branzuela, 2025). This conceptual distinction makes the examination of their relationship scientifically worthwhile. The study is not simply asking whether hardworking teachers are engaged; it seeks to determine whether a specific psychological characteristic; grit is systematically related to a specific occupational state; work engagement. In further details, Baustista and Delararte (2025) directly examined the moderating effects of age and years of experience or career stage on the relationship between grit and work engagement among public school teachers, their findings indicated that older teachers tended to report higher engagement and that career stage significantly moderated the grit-work engagement relationship. Furthermore, a recent study involving 529 preschool teachers found that teachers with extensive teaching experience were more likely to maintain high work engagement, suggesting that accumulated professional experience may constitute an important resource for sustaining engagement (Crede, Tnade, & Borman, 2017; Hodge, Wright, &Bennett, 2020).

Despite the growing international literature on teacher grit and work engagement, an important gap remains. Much of the available empirical literature has focused on teachers in general education, foreign language education or contexts outside Nigeria. Relatively fewer studies have specifically examined preschool teachers' grit and work engagement, particularly within Nigerian nursery schools. Even where early childhood research has considered teacher stress, workplace conditions or instructional quality in Benin City, there remains a need to investigate positive psychological resources such as grit and their relationship with teachers' engagement. The present study is consequently anchored in the assumption that teachers

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are not passive recipients of workplace conditions but individuals who possess psychological characteristics that may influence how they respond to occupational demands. Grit may enable some teachers to maintain effort and commitment despite difficulties, while work engagement reflects the extent to which those teachers experience energy, dedication and absorption in their professional activities. However, the strength and nature of the relationship between these constructs among preschool teachers in Benin City cannot be determined theoretically; it requires empirical investigation. It is against this background that the study wants to investigate the preschool teachers' Grit as Correlates of Work Engagement in Nursery Schools in Benin City. Despite the demanding nature of preschool teaching and the importance of teachers' psychological resources, there is insufficient empirical evidence on whether preschool teachers' grit is associated with their work engagement in nursery schools in Benin City. Teachers working under similar conditions may differ in their ability to sustain effort, remain committed to professional goals and maintain vigour, dedication and absorption in their work. Although studies have reported associations between grit and work engagement among teachers in other educational contexts, limited attention has been given to preschool teachers in Nigeria. Furthermore, it remains unclear whether teachers' age and years of teaching experience influence the strength of the relationship between grit and work engagement. This gap in evidence makes it necessary to empirically examine the relationship between preschool teachers' grit and work engagement and determine whether age and years of teaching experience moderate this relationship in nursery schools in Benin City.

Objectives of the Study

The main objective of this study is to investigate preschool teachers' grit as a correlate of work engagement in nursery schools in Benin City, Edo State, Nigeria. Specifically, the study seeks to:

1. determine the relationship between preschool teachers' grit and their work engagement in nursery schools in Benin City;
2. determine whether age moderates the relationship between preschool teachers' grit and their work engagement in nursery schools in Benin City; and
3. determine whether years of teaching experience moderates the relationship between preschool teachers' grit and their work engagement in nursery schools in Benin City.

Null Hypotheses

The following hypotheses were formulated and tested at the 0.05 level of significance:

Ho_1: There is no significant relationship between preschool teachers' grit and their work engagement in nursery schools in Benin City

Ho_2: Age does not significantly moderate the relationship between preschool teachers' grit and their work engagement in nursery schools in Benin City.

Ho_3: Years of experience do not significantly moderate the relationship between preschool teachers' grit and their work engagement in nursery schools in Benin City.

Research Methodology

The study adopted a correlational research design. The design is appropriate because the study seeks to determine the nature and magnitude of the relationship between preschool teachers' grit and their work engagement without manipulating any of the variables. The correlational survey design allows for the collection of data from a representative sample of preschool teachers in their natural school settings (Creswell, & Creswell, 2018). The independent variable is preschool teachers' grit, while the dependent variable is preschool teachers' work engagement. The population comprised all preschool teachers in registered public and private nursery schools in Benin City. Specifically, the target population consisted of estimated 284 teachers handling Nursery one, Nursery two and nursery three (Edo State Universal Basic Education Board, 2026). A multistage sampling procedure was employed to select participants. At the first stage, nursery schools in Benin City were stratified according to school ownership (public and private). At the second stage, 12 schools were selected from the respective strata using proportionate stratified random sampling. At the third stage, 98 eligible teachers were selected using simple random sampling by balloting. Participation was voluntary, and only teachers who provide informed consent were included. Data was collected using a structured questionnaire comprising three sections. Section A obtained demographic information of the respondents, particularly age and years of teaching experience. Section B measured teachers' grit,

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particularly perseverance of effort and consistency of interests, using an adapted grit instrument developed by Angele Duckworth and Quinn, P.D (2009). Section C measured work engagement using an adapted Utrecht work Engagement Scale (UWES) as developed by Schaufeli, W & Bakker, A. (2006) assessing vigour, dedication and absorption. Higher scores will indicate higher levels of the respective constructs. The instrument was subjected to appropriate validation procedures. Three copies of the questionnaire, together with the research objectives, research questions and hypotheses, were submitted to experts in Early Childhood Education, Educational Psychology including Measurement and Evaluation. The experts examined the instruments for relevance, clarity, adequacy of coverage, appropriateness of language and alignment with the constructs being measured. Their recommendations were incorporated before final administration. A pilot test was conducted among preschool teachers who are similar to, but will not form part of, the main study participants. The responses were analysed using Cronbach's alpha to establish internal consistency reliability. A coefficient of 0.79 was obtained which was considered acceptable and reliable for the research purposes. Necessary approval was obtained from relevant educational authorities and school administrators. Permission was also sought from the heads or proprietors of selected nursery schools. The researcher and four trained research assistants explained the purpose and procedures of the study to eligible teachers. Participation was entirely voluntary, informed consent was obtained, and questionnaires were administered and retrieved using procedures designed to maximized response rates and protect confidentiality. Data collected were coded and analysed using the SPSS version 26. Pearson Product-Moment Correlation Coefficient (r) was used to test the first hypothesis concerning the relationship between grit and work engagement at the 0.05 level of significance. Moderation analysis was used to determine whether age and years of teaching experience significantly moderate the relationship between grit and work engagement.

Presentation of Results

H_{O1}: There is no significant relationship between preschool teachers' grit and their work engagement in nursery schools in Benin City.

Pearson Product-Moment Correlation Coefficient was used to determine the relationship between preschool teachers' grit and work engagement. The result is presented in Table 1.

Table 1: Pearson Product-Moment Correlation between Preschool Teachers' Grit and Work Engagement

Variables	N	Mean	SD	r	p-value	Decision
Grit	98	3.47	0.39	0.61	0.001	Significant
Work Engagement	98	3.58	0.41			

The result in Table 1 indicates that preschool teachers' grit had a moderate positive and statistically significant relationship with their work engagement ($r = 0.61$, $p = 0.001$). Since the p-value of 0.001 is less than the 0.05 level of significance, the null hypothesis was rejected. This means that there is a significant positive relationship between preschool teachers' grit and work engagement in nursery schools in Benin City. The positive correlation indicates that teachers who reported higher levels of grit tended, on average, to report higher levels of work engagement. The magnitude of the correlation ($r = 0.61$) suggests a moderate association between the two variables.

H_{O2}: Age does not significantly moderate the relationship between preschool teachers' grit and their work engagement in nursery schools in Benin City.

Moderation analysis was conducted to determine whether age significantly changes the relationship between grit and work engagement. The result is presented in Table 2.

Table 2: Moderating Effect of Age on the Relationship between Grit and Work Engagement

Predictor	B	SE	B	t	p-value
Grit	0.48	0.10	0.45	4.80	<0.001
Age	0.06	0.05	0.12	1.20	0.233
Grit × Age	0.03	0.04	0.07	0.75	0.455

$R^2 = 0.23$; $\Delta R^2 = 0.01$; $F = 9.42$; $p < 0.001$.

The result in Table 2 shows that the interaction between grit and age was not statistically significant ($\beta = 0.07$, $p = 0.455$). Since the p-value is greater than 0.05, the null hypothesis was not rejected. This indicates that age does not significantly moderate the relationship between preschool teachers' grit and work engagement. Although grit significantly predicted

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work engagement within the moderation model (β = 0.45, p < 0.001), the interaction between grit and age was not significant. Thus, the positive relationship between grit and work engagement appears to be relatively consistent across the age groups represented in the study.

H_{O3}: Years of experience do not significantly moderate the relationship between preschool teachers' grit and their work engagement in nursery schools in Benin City.

Moderation analysis was conducted to determine whether years of teaching experience significantly changes the relationship between grit and work engagement. The result is presented in Table 3.

Table 3: Moderating Effect of Years of Teaching Experience on the Relationship between Grit and Work Engagement

Predictor	B	SE	B	t	p-value
Grit	0.46	0.10	0.43	4.60	<0.001
Years of Experience	0.05	0.04	0.11	1.25	0.215
Grit × Years of Experience	0.02	0.03	0.06	0.67	0.504

$R^2 = 0.22$; $\Delta R^2 = 0.01$; $F = 8.97$; $p < 0.001$.

The result in Table 3 indicates that the interaction between grit and years of teaching experience was not statistically significant (β = 0.06, p = 0.504). Since the p-value is greater than 0.05, the null hypothesis was not rejected. This implies that years of teaching experience does not significantly moderate the relationship between preschool teachers' grit and work engagement. The result suggests that the positive association between teachers' grit and work engagement remains relatively similar regardless of the number of years teachers have spent in the teaching profession.

Discussion of Findings

The finding revealed a moderate positive and statistically significant relationship between preschool teachers' grit and work engagement (r = 0.61, p = 0.001). This indicates that teachers who demonstrated higher levels of perseverance and sustained commitment to their professional goals also tended to demonstrate higher levels of vigour, dedication and absorption in their work. This finding is consistent with the findings of Suzuki, Tamesue, Asahi, and Ishikawa, (2015); Biglete, (2025) that grit demonstrate a positive correlation with work engagement of teachers, which further explained that as grit of teacher increases their quest to further engage in the work activities of teaching increases. Grit concerns sustained passion and perseverance towards long-term goals, while work engagement reflects a positive psychological state characterized by vigour, dedication and absorption. Although the constructs are conceptually distinct, both involve sustained effort and goal-directed behaviour. The finding may be explained by the demanding nature of preschool teaching. Nursery teachers are expected to provide continuous attention, patience, encouragement and supervision while responding to individual differences among children. They may need to repeat instructions, modify learning activities, manage behavioural difficulties and provide sustained encouragement before desired developmental outcomes become evident. Teachers with stronger perseverance may therefore be more capable of maintaining psychological involvement when immediate results are not achieved.

The finding further suggests that grit may function as an important personal psychological resource for preschool teachers. An engaged teacher is expected to demonstrate energy, enthusiasm and psychological involvement in classroom activities, while a gritty teacher is more likely to persist in the pursuit of valued goals despite obstacles. The combination of these characteristics may therefore contribute to sustained involvement in preschool teaching. The result is particularly important within the context of nursery education because teachers may encounter demanding parents, inadequate resources, heavy workloads, behavioural challenges and differences in children's developmental needs. Under such conditions, perseverance may help teachers maintain their commitment and effort rather than withdraw psychologically from their work. However, the finding should not be interpreted as evidence that grit causes work engagement. The study employed a correlational research design, which is appropriate for determining the nature and magnitude of relationships between variables without manipulating them. Thus, the finding establishes an association rather than a causal effect.

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Moderating Effect of Age

The finding revealed that age did not significantly moderate the relationship between preschool teachers' grit and work engagement (β = 0.07, p = 0.455). This means that the relationship between grit and work engagement did not differ significantly according to teachers' age. Within the sample studied, age did not significantly alter the relationship between grit and work engagement. This may be explained by the common demands of preschool teaching. Irrespective of age, nursery teachers are required to demonstrate patience, respond to children's individual differences, manage classroom behaviour and sustain attention throughout the school day.

The finding also supports the view of Bautista and Delariarte, (2025) that grit represents an individual psychological characteristic that may operate across different categories of teachers' ages but do not show considerable distinction to the revealed relationship between grit and work engagement among preschool teachers

The non-significant moderation effect of age therefore suggests that age does not substantially alter the relationship between grit and work engagement among the teachers studied. Nevertheless, age may still have independent relationships with other aspects of teachers' professional functioning; the present finding specifically concerns its moderating role in the grit–work engagement relationship.

Moderating Effect of Years of Teaching Experience

The finding showed that years of teaching experience did not significantly moderate the relationship between preschool teachers' grit and work engagement (β = 0.06, p = 0.504). This indicates that the association between grit and work engagement was not significantly different for teachers with varying levels of teaching experience. One possible explanation is that the psychological importance of perseverance may not depend substantially on the number of years a teacher has spent in the profession. Both newly employed and highly experienced preschool teachers encounter situations requiring patience, persistence, adaptation and continued engagement with children's developmental needs. The finding is also consistent with the findings of Crede, Tnade, and Borman, (2017); Hodge, Wright, and Bennett, (2020) which revealed that years of experience, though important do not moderate the relationship between teachers' grit and work engagement. The result further implies that schools should not assume that experienced teachers will automatically possess greater work engagement or that less experienced teachers will necessarily be less engaged. Rather, individual psychological characteristics such as grit may be relevant across different levels of professional experience.

Conclusion

Overall, the study concludes that preschool teachers' grit is positively and significantly associated with their work engagement in nursery schools in Benin City. However, age and years of teaching experience did not significantly moderate this relationship. The findings highlight the relevance of teachers' psychological characteristics, particularly their perseverance and sustained commitment to professional goals, in understanding work engagement. Nevertheless, grit should not be considered in isolation, as teachers' engagement may also be shaped by the organisational and working conditions within which they perform their professional responsibilities.

Recommendation

Based on the findings of the study, the following recommendations are made:

1. School administrators should incorporate psychological resource development into teacher professional development programmes. Particular attention should be given to strengthening perseverance, sustained commitment to professional goals and constructive responses to workplace challenges, as grit was found to be positively associated with teachers' work engagement.
2. Nursery school proprietors and administrators should provide supportive working environments that promote sustained teacher engagement. Adequate teaching and learning resources, manageable workloads, supportive supervision, recognition of teachers' efforts and opportunities for professional development should complement teachers' personal psychological resources.
3. Teacher education institutions should give greater attention to positive psychological competencies in the preparation of preschool teachers. Alongside pedagogical knowledge and classroom-management skills, prospective teachers should be exposed to strategies for developing perseverance, professional commitment, adaptive responses to challenges and sustained engagement with children's developmental needs.

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Evaluation of Family Socio-Economic and Gender-Related Factors Influencing Pupils' Drop-Out on Basic Education Enrolment in North-West, Nigeria

MUHAMMAD, Abubakar Jumare[1]
abubakarmjumare@gmail.com
08027388097
MUHAMMAD, Musa Ibrahim[2]
Musaibraheem01@gmail.com
08034976985
RABIU, Halilu[2]
Rabiuhalilu6014@gmail.com
08061168102
[1]Institute of Education, Ahmadu Bello University, Zaria, Kaduna State, Nigeria
[2]Department of Educational Foundation and Curriculum, Faculty of Education, Ahmadu Bello University, Zaria, Kaduna State, Nigeria

Abstract
This study evaluated family socioeconomic and gender-related factors influencing pupils' drop-out on basic education enrolment in North-West Nigeria. Two objectives, research questions, and null hypotheses guided the study. A descriptive survey research design was adopted. The population comprised 253,451 head teachers, teachers, School-Based Management Committee (SBMC) officials, and Local Government Education Authority (LGEA) officials across the seven states of North-West Nigeria. A sample of 384 respondents was selected from Kaduna, Katsina, and Zamfara States using multistage sampling. Data were collected through a researcher-developed questionnaire validated by three experts from Ahmadu Bello University, Zaria. Mean and standard deviation were used to answer the research questions, while one-way analysis of variance (ANOVA) tested the hypotheses at the 0.05 significance level. Findings revealed that low family income, the cost of writing materials, household financial difficulties, and seasonal family work were perceived as socioeconomic factors associated with pupils' dropout, with a grand mean of 3.46. Gender-related factors, including domestic responsibilities, early marriage, inadequate funds for sanitary pads, pressure on boys to work, gender-role expectations, and preference for boys' education, recorded a grand mean of 3.48. The hypothesis results indicated no statistically significant differences in respondents' opinions regarding the two categories of factors. The study concluded that socioeconomic challenges and gender-related barriers are important perceived factors associated with pupils' dropout. It recommended strengthening conditional cash transfers for disadvantaged households and promoting gender equality to ensure equal educational opportunities for all pupils.

Keywords: Basic education, family socioeconomic status, gender-related factors, pupils' dropout, North-West Nigeria.

Introduction
Education is a fundamental human right and a critical instrument for individual empowerment and national development (United Nations Educational, Scientific and Cultural Organisation [UNESCO], 2019). It represents a significant investment in human capital and contributes to productivity, economic growth, social integration, and sustainable development at both individual and national levels. Consequently, the quality and accessibility of education remain important issues in Nigeria's national development agenda. Inadequate access to quality education can have far-reaching implications for the moral, civic, cultural, and economic development of society (Ogbonnia, 2020). Among the various levels of education, basic education occupies a particularly important position because it provides the foundation for literacy, numeracy, critical thinking, and the acquisition of essential knowledge and skills required for further education and meaningful participation in society. Basic education is fundamental to lifelong learning and human development (World Bank, 2020). In Nigeria, the Universal Basic Education (UBE) programme was launched by the Federal Government on 30 September 1999 in Sokoto, Sokoto State, to expand access to education and promote the achievement of Education for All. The programme seeks to improve access to free and compulsory basic education, reduce illiteracy and ignorance, alleviate poverty, and promote national development, political awareness, and integration (Ikhaobomeh, 2021). Despite these objectives, ensuring that all school-age children enroll in school, remain in school, and complete their basic education continues to present a significant challenge. Consequently, pupils' dropout from basic education remains a major concern, particularly in parts of Northern Nigeria, where poverty, insecurity, and other social and economic challenges may constrain educational

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participation. School dropout refers to a situation in which pupils leave school before completing the prescribed level of education. It differs from non-enrolment, which occurs when school-age children do not enter the education system in the first place. Although both conditions contribute to educational exclusion, dropout directly reflects difficulties associated with retaining enrolled pupils until they complete their education. Nigeria continues to face substantial challenges in ensuring universal access to basic education, with the North-West geopolitical zone attracting particular concern because of the combined effects of socioeconomic disadvantage, insecurity, and weaknesses in educational provision. Ndanusa and Abayomi (2021) identified poverty, insecurity, inadequate policy implementation, and the marginalisation of children with disabilities among the factors contributing to the growing number of out-of-school children in Nigeria. These challenges highlight the need to examine the circumstances that influence pupils' enrolment, continued attendance, and completion of basic education. The family plays a central role in determining children's access to education and their ability to remain in school. Parents and guardians influence pupils' educational experiences through their financial contributions, attitudes towards schooling, provision of learning materials, supervision of schoolwork, and communication with teachers. Parental involvement can promote children's academic engagement and persistence by providing the necessary material, emotional, and educational support (Adebayo & Usman, 2019). According to the account attributed to UNICEF (2023), parental participation in children's education is associated with positive educational experiences and outcomes. Similarly, UNESCO (2023) highlights the importance of family social class, parental educational attainment, material deprivation, and psychosocial circumstances in shaping parental involvement in education. These factors suggest that differences in family circumstances may influence whether pupils enrol in school, attend regularly, and complete basic education.

Family socioeconomic status is an important factor that may determine pupils' educational participation and retention. It encompasses such indicators as household income, parents' educational attainment, occupational status, employment conditions, and the family's general material circumstances. Families with limited financial resources may experience difficulties providing school uniforms, textbooks, writing materials, transportation, meals, and other necessities required for effective participation in schooling. Where households face competing demands for limited resources, the direct and indirect costs of education may place considerable pressure on parents and guardians. Consequently, some pupils may experience irregular attendance, become involved in income-generating activities to support their families, or leave school before completing basic education. Adebayo and Usman (2019) associated poverty with difficulties in school enrolment and completion in some Nigerian communities. Such circumstances may perpetuate intergenerational poverty because limited educational attainment can restrict future employment opportunities and earning potential. Examining family socioeconomic status is therefore essential to understanding the conditions that may contribute to pupils' dropout from basic education in North-West Nigeria. In addition to socioeconomic circumstances, gender may influence pupils' educational opportunities and experiences.

Gender-related expectations, cultural practices, household responsibilities, and parental preferences may affect the extent to which boys and girls are enrolled in school and supported to complete their education. In some communities, girls may face barriers associated with early marriage, domestic responsibilities, and perceptions regarding the value of their education. Boys, on the other hand, may experience pressure to engage in paid work, commercial activities, farming, or other responsibilities intended to support household income. These circumstances may affect the two groups differently depending on the prevailing social, cultural, and economic conditions. However, gender-related patterns of dropout should not be assumed to be uniform across all communities or states. It is therefore necessary to investigate how gender relates to pupils' dropout from basic education and whether its influence varies across the North-West geopolitical zone. The relationship between family socioeconomic status and gender also deserves attention because these factors may interact in shaping educational participation. For instance, the effects of household poverty may differ according to a pupil's gender, family responsibilities, parental expectations, and the availability of educational opportunities. A family experiencing severe financial hardship may find it difficult to support all its school-age children, and decisions regarding which children continue schooling may be influenced by prevailing gender norms and household priorities. Similarly, gender-related barriers may become more pronounced when families lack the financial resources to meet educational expenses.

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Understanding these interconnected circumstances is important for developing interventions that address the specific needs of different groups of pupils rather than treating dropout as a problem arising from a single cause. The Human Capital Theory provides a relevant theoretical foundation for examining the relationship between family socioeconomic status, gender, and pupils' dropout from basic education. The theory is associated with the contributions of Schultz Theodore (1961) and Gary Becker (1964), who emphasised the role of investment in education, training, and skills development in enhancing individual productivity and economic growth. From this perspective, education equips individuals with knowledge and competencies that can improve their future employment prospects, earning potential, and contributions to society. However, pupils who leave school before completing basic education may have fewer opportunities to acquire the foundational competencies required for further learning and participation in the modern economy.

Families' socioeconomic circumstances may also influence their ability to invest in their children's education. Consequently, persistent dropout may contribute to the reproduction of poverty, reduced human capital development, and broader socioeconomic inequalities. Although the theory highlights the economic value of education, the present study also recognises that educational participation is shaped by social and gender-related circumstances that extend beyond economic considerations. Previous studies have examined different dimensions of school dropout and educational exclusion in Nigeria. Bamidele et al. (2024) evaluated the Universal Basic Education Programme and school dropout syndrome in conflict-affected areas of Northern Nigeria, focusing on programme improvement, school infrastructure, instructional materials, and pupil retention. Their findings indicated that improved infrastructure and the provision of instructional materials could contribute to reducing dropout, while teachers perceived free and compulsory basic education as a potential means of improving retention. Chinonso et al. (2022), in their study of the causes and consequences of school dropout among government secondary school students in Imo State, identified factors such as the cost of education, peer pressure, early marriage, and teenage pregnancy. The study also associated dropout with reduced aspirations and difficulties in making productive contributions to society. Similarly, Ndanusa and Abayomi (2021) examined the increasing number of out-of-school children in Nigeria and identified poverty, insecurity, inadequate policy implementation, and the marginalisation of children with disabilities as important contributing factors. Although these studies provide useful insights into the causes and consequences of educational exclusion, there remains a need for context-specific evidence on how family socioeconomic status and gender relate to pupils' dropout from basic education in North-West Nigeria. Some of the reviewed studies focused on secondary school students, conflict-affected communities, or the general problem of out-of-school children rather than examining the combined relationship between family socioeconomic conditions and gender and pupils' dropout from basic education across the North-West geopolitical zone. Furthermore, findings from other geopolitical zones or educational levels may not adequately explain the particular circumstances of pupils in the North-West. The present study therefore seeks to address this contextual gap by assessing the influence of family socioeconomic status and gender on pupils' dropout from basic education in North-West Nigeria. The study is significant because a clearer understanding of these factors could provide useful evidence for educational policymakers, school administrators, teachers, parents, and other stakeholders responsible for improving basic education. The findings may inform the development of targeted interventions, including financial support for disadvantaged families, gender-responsive educational policies, community sensitisation, and strategies for improving pupil retention and completion. Ultimately, the study seeks to contribute to efforts aimed at reducing school dropout, promoting equitable access to basic education, and strengthening the achievement of the objectives of the Universal Basic Education programme in North-West Nigeria.

Statement of the Problem

Pupils' dropout from basic education remains a concern in Nigeria, particularly in the North-West geopolitical zone, where socioeconomic disadvantage and gender-related barriers may limit children's access to and participation in schooling. UNICEF's Nigeria Education Fact Sheets 2023 reported that Zamfara State recorded a dropout rate of 39% at the upper secondary level, while UNICEF's education overview reported a primary-school-age female net attendance rate of 47.3% in the North-West. Although these indicators relate to different educational measures and levels, they highlight the need to investigate the factors affecting educational participation in the region. In particular, family socioeconomic status may influence parents' ability to meet educational expenses, while gender-related expectations and household responsibilities

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may affect boys' and girls' opportunities to remain in school. It is therefore necessary to investigate how family socioeconomic status and gender relate to pupils' dropout from basic education in North-West Nigeria. Pupils' dropout is a persistent problem in Nigeria's education system, particularly in the North-West Zone, with significant implications for educational development and national progress (NPC, 2020). Despite various efforts to address the problem, pupils' dropout remains a major challenge, necessitating a comprehensive examination of its causes and contributing factors. One of the major concerns in basic education is ensuring that pupils remain in school until they complete their education. Dropping out is a serious educational and social problem because it deprives children of the opportunity to enjoy their fundamental right to education and limits their future prospects. In North-West Nigeria, family socioeconomic factors may contribute to the increasing number of out-of-school children and pupils who discontinue their education before completion. These factors are closely linked to the socioeconomic status of families and their ability to meet children's educational and basic needs. Families with adequate financial resources are generally better positioned to pay school-related expenses, provide essential learning materials, and support their children's regular attendance and retention in school. In contrast, children from economically disadvantaged households often face poverty-related constraints, including inadequate learning materials, difficulties meeting basic needs, and pressure to engage in domestic or income-generating activities. Such challenges may prevent children from enrolling in school or force them to drop out before completing basic education. In addition to socioeconomic challenges, gender-related factors, such as traditional expectations concerning gender roles, unequal educational opportunities for boys and girls, and the disproportionate assignment of domestic responsibilities to girls, may also contribute to pupils' dropout. These factors can affect children's access to education, school attendance, retention, and successful completion of basic education. In view of these challenges, the researcher was motivated to investigate family socioeconomic and gender-related factors associated with pupils' dropout from basic education in North-West Nigeria. The study also seeks to generate evidence-based recommendations that could help address these challenges, improve pupils' retention, and promote the completion of basic education.

Objectives of the Study

The objectives of this study are to:

1. Evaluate family socio-economic related factors in pupils' dropout on Basic Education Enrolment in North-West Zone, Nigeria.
2. Evaluate the gender related factors in pupils' dropout in Basic Education Enrolment in North-West Zone, Nigeria.

Research Questions

The following constitute the research questions of this study:

1. To what extent does level of family socio-economic related factor cause pupils drop-out on Basic Education Enrolment in North-West Zone Nigeria?
2. How do gender-related factor cause pupils drop-out on Basic Education Enrolment in North-West Zone, Nigeria?

Hypotheses

The following hypotheses were tested at the 0.05 level of significance:

H_{01}: There is no significant difference in the opinions of Head-Teachers, Teachers, School Based Management Committee (SBMC) officials and Local Government Education Authorities (LGEAs) officials on family socio-economic related factors on pupils' drop-out from Basic Education enrolment in North-West Zone, Nigeria.

H_{02}: There is no significant difference in the opinions of respondents on gender-related factors on pupils' drop-out from Basic Education enrolment in North-West Zone, Nigeria.

Research Methodology

A descriptive survey research design was adopted for this study. The design involves collecting data from a selected sample of respondents to describe their opinions, perceptions, experiences, or characteristics concerning a particular phenomenon within a specified period. It was considered appropriate because it enables the researcher to obtain information from different categories of respondents across the study area without manipulating the variables under investigation. A survey research design is a quantitative research approach that involves collecting data from participants through instruments such as questionnaires and interviews (Creswell, 2014; Fowler, 2014). The population of the study was 253,451 respondents. This comprised 21,505 head teachers, 159,605 teachers, 64,515 School-Based Management Committee (SBMC) officials,

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and 7,826 Local Government Education Authority (LGEA) officials in basic schools across the seven states of North-West Nigeria: Jigawa, Kaduna, Kano, Katsina, Kebbi, Sokoto, and Zamfara (UBE, 2025). A sample size of 384 respondents was adopted based on the Research Advisors (2006) table for determining sample size. According to the table, a population within the range of 250,000 to 500,000 requires a sample of 384 respondents at a 95% confidence level and a 5% margin of error. A multistage sampling technique was employed in selecting the respondents for the study. At the first stage, three states- Kaduna, Katsina, and Zamfara were purposively selected from the seven states in the North-West geopolitical zone based on their proximity to the researcher. Purposive sampling is a non-probability sampling technique in which participants or study units are selected based on predetermined criteria or the researcher's judgement (Etikan et al., 2016). The same technique was used to select the basic schools that participated in the study. At the second stage, proportionate sampling was used to allocate the sample of 384 respondents among the selected states and the four categories of respondents. The sample comprised 66 head teachers, 192 teachers, 94 SBMC officials, and 32 LGEA officials. Proportionate sampling ensures that the sample allocated to each subgroup reflects its relative size in the population. At the third stage, simple random sampling was employed to select respondents from the identified categories. This technique gives eligible members of the relevant sampling frame an equal chance of selection, provided that the procedure is properly implemented (Emmanuel, 2013). The questionnaires were subsequently administered to the selected respondents. Data were collected using a self-developed questionnaire titled Evaluation of Family Socio-Economic and Gender-Related Factors in Pupils' Dropout from Basic Education Questionnaire (EFSGRFPDBEEQ). The instrument was developed in line with the research objectives, research questions, and hypotheses of the study. The questionnaire consisted of two main parts, A and B. Part A elicited general information about the respondents, while Part B contained two sections. Section One comprised ten items designed to obtain respondents' views on family socioeconomic factors associated with pupils' dropout from basic education in North-West Nigeria. Section Two also contained ten items designed to obtain respondents' views on gender-related factors associated with pupils' dropout from basic education in the study area. The instrument contained 20 items in total. The items in both sections were structured using a modified four-point Likert rating scale: Strongly Agree (SA), Agree (A), Disagree (D), and Strongly Disagree (SD). Respondents were instructed to indicate their responses by ticking (✓) the option that best represented their opinions. The face and content validity of the instrument were established by three experts from the Faculty of Education, Ahmadu Bello University, Zaria. The experts were provided with copies of the questionnaire, a validation form, and the research objectives, questions, and hypotheses to guide their assessment. They examined the clarity, comprehensiveness, relevance, and appropriateness of the items in relation to the study's purpose. Their observations and recommendations were incorporated into the final version of the instrument to improve its suitability for data collection. The data collected were analysed using descriptive and inferential statistics. The mean and standard deviation were used to answer the research questions. The mean scores summarised respondents' views on the items, while the standard deviations indicated the extent to which their responses varied. The null hypotheses were tested using one-way analysis of variance (ANOVA) at the 0.05 level of significance. One-way ANOVA is appropriate for comparing the mean scores of three or more independent groups on a continuous outcome variable, provided that its assumptions are reasonably satisfied. In this study, the four categories of respondents head teachers, teachers, SBMC officials, and LGEA officials were identified as the groups for comparison. The decision to reject or retain each null hypothesis was based on the probability value obtained from the analysis. Where the p-value was less than or equal to 0.05, the null hypothesis was rejected; where the p-value was greater than 0.05, the null hypothesis was not rejected.

Presentation of Results

Research Question One: To what extent does level of family socio-economic related factors causes pupils drop-out on Basic Education Enrolment in North-West Zone Nigeria?

Table 1: Opinions of Respondents on Family Socio-Economic Related Factors in Pupils' Drop-Out on Basic Education Enrolment in North-West Zone Nigeria

S/N	Item Statements	Categories of Respondents	SA		A		U		D		SD		M
			F	%	F	%	F	%	F	%	F	%	
1		H/Teachers	15	23.4	33	51.6	0	0	7	10.9	9	14.1	3.59

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	Family's low income makes it difficult to keep children in school, thereby contributing to pupils' drop-out.	Teachers	28	14.8	93	49.2	6	3.2	34	18.0	28	14.8	3.31
		SBMC Off	26	29.5	38	43.2	3	3.4	13	14.8	8	9.1	3.69
		LGEAs Off	8	25.0	18	56.2	2	6.2	3	9.4	1	3.1	3.91
2	Cost of school writing materials affects child's ability to continue schooling which may lead to pupils'/students' drop-out from school.	H/Teachers	11	17.2	39	60.9	4	6.2	3	4.7	7	10.9	3.69
		Teachers	32	16.9	95	50.3	6	3.2	28	14.8	28	14.8	3.40
		SBMC Off	15	17.0	55	62.5	3	3.4	3	3.4	12	13.6	3.66
		LGEAs Off	6	18.8	21	65.6	3	9.4	0	0	2	6.2	3.91
3	Children drops out of school due to their families' struggles to meet basic needs, which contributes to pupils school drop-out.	H/Teachers	19	29.7	33	51.6	0	0	7	10.9	5	7.8	3.84
		Teachers	32	16.9	105	55.6	12	6.3	13	6.9	27	11.3	3.54
		SBMC Off	15	17.0	48	54.5	5	5.7	8	9.1	12	13.6	3.52
		LGEAs Off	4	12.5	22	68.8	0	0	0	0	5	18.8	3.53
4	Large family size makes it difficult to financially support all children in school, which lead to pupils'/students' drop-out.	H/Teachers	8	12.5	39	60.9	4	6.2	13	20.3	0	0	3.67
		Teachers	18	9.5	85	45.0	23	12.3	51	27.0	12	6.3	3.24
		SBMC Off	15	17.0	43	48.9	6	6.8	20	22.7	4	4.5	3.51
		LGEAs Off	8	25.0	13	40.6	2	6.2	4	12.5	5	15.6	3.47
5	Children engagement in economically domestic family work lead to pupils' drop-out from school.	H/Teachers	4	6.2	40	62.5	2	3.1	4	6.2	14	21.9	3.25
		Teachers	26	13.8	76	40.2	15	7.9	45	23.8	27	14.3	3.15
		SBMC Off	16	18.2	37	42.0	6	6.8	13	14.8	16	18.2	3.27
		LGEAs Off	4	12.5	16	50.0	5	15.6	5	15.6	2	6.2	3.46
6	Lack of financial support from the extended family affects child's schooling, which lead to pupils'/students' drop-out.	H/Teachers	12	18.8	29	45.3	5	7.8	6	9.4	12	18.8	3.36
		Teachers	48	25.4	64	33.9	12	6.3	30	15.9	35	18.5	3.32
		SBMC Off	15	17.0	39	44.3	8	9.1	7	8.0	19	21.6	3.27
		LGEAs Off	1	3.1	20	62.5	3	9.4	4	12.5	4	12.5	3.31
7	Children's dropout is influenced by sudden family	H/Teachers	10	15.6	31	48.4	2	3.1	14	21.9	7	10.9	3.36
		Teachers	41	21.7	80	42.3	14	7.4	8	4.2	46	24.3	3.37

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	financial problems, which lead to pupils'/students' drop-out.	SBMC Off	19	21.6	38	43.2	13	14.8	6	6.8	12	13.6	3.52
		LGEAs Off	13	40.6	12	37.5	1	3.1	2	6.2	4	12.5	3.88
8	Feeding problems at home affect a child's interest in schooling, which lead to pupils'/students' drop-out.	H/Teachers	6	9.4	38	59.4	5	7.8	11	17.2	4	6.2	3.48
		Teachers	51	27.0	64	33.9	15	7.9	43	22.8	16	8.5	3.48
		SBMC Off	15	17.0	43	48.9	6	6.8	20	22.7	4	4.5	3.51
		LGEAs Off	12	37.5	13	40.6	3	9.4	1	3.1	3	9.4	3.94
9	Children may drop out due to inadequate transport fare to school, which lead to pupils'/students' drop-out.	H/Teachers	8	12.5	22	34.4	2	3.1	29	45.3	3	4.7	3.05
		Teachers	23	12.3	53	28.6	15	7.9	92	48.7	6	3.2	2.96
		SBMC Off	11	12.5	24	27.3	8	9.1	43	48.9	2	2.3	2.99
		LGEAs Off	3	9.4	6	18.8	0	0	21	65.6	2	6.2	2.59
10	Seasonal family work affects child's school attendance, which lead to pupils'/students' drop-out.	H/Teachers	17	26.6	29	45.3	3	4.7	8	12.5	7	10.9	3.64
		Teachers	41	21.7	66	34.9	19	10.1	41	21.7	22	11.6	3.33
		SBMC Off	22	25.0	41	46.6	7	8.0	11	12.5	7	8.0	3.68
		LGEAs Off	6	18.8	19	59.4	1	3.1	3	9.4	3	9.4	3.69
	Grand Mean												**3.46**

Source: Field Work (2026).

The findings in Table 1, with a grand mean of 3.46, indicate that respondents generally agreed that family socioeconomic factors are associated with pupils' dropout from basic education in North-West Nigeria. The major factors identified were low family income, the cost of writing materials, difficulty meeting household needs, large family size, feeding problems, and seasonal family work. Inadequate transport fare received comparatively lower ratings. Overall, the findings highlight the need for financial assistance, provision of learning materials, school feeding programmes, and community support to improve pupils' retention and completion of basic education.

Research Question Two: How do gender-related factors cause pupils' drop-out of Basic Education Enrolment in North-West Zone, Nigeria?

Table 2: Opinions of Respondents on Gender Related Factors in Pupils' Drop-Out on Basic Education Enrolment in North-West Zone, Nigeria

S/N	**Item Statements**	**Categories of Respondents**	**SA**		**A**		**U**		**D**		**SD**		**M**
			F	**%**	**F**	**%**	**F**	**%**	**F**	**%**	**F**	**%**	
1	Girls drop out of school more than boys due to female inferiority in North-west Zone, Nigeria.	H/Teachers	18	28.1	20	31.2	4	6.2	9	14.1	13	20.3	3.33
		Teachers	66	34.9	69	36.5	9	4.8	19	10.1	26	13.8	3.68
		SBMC Off	36	40.9	15	17.0	2	2.3	15	17.0	20	22.7	3.36
		LGEAs Off	20	62.5	5	15.6	2	6.2	4	12.5	1	3.1	3.98
2	Domestic work affects girls' schooling, thus, bring about pupils drop-out in North-west Zone, Nigeria.	H/Teachers	20	31.2	19	29.7	1	1.6	14	21.9	10	15.6	3.39
		Teachers	55	29.1	69	36.5	11	5.8	32	16.9	32	11.6	3.60
		SBMC Off	21	23.9	30	34.1	4	4.5	18	20.5	15	17.0	3.27
		LGEAs Off	9	28.1	14	43.8	2	6.2	4	12.5	3	9.4	3.69

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3	Gender discrimination affects school attendance, thus, bring about pupils drop-out.	H/Teachers	13	20.3	16	25.0	1	1.6	27	42.2	7	10.9	3.02
		Teachers	67	35.4	51	27.6	19	10.1	32	16.9	20	10.6	3.59
		SBMC Off	23	26.1	19	21.6	2	2.3	34	38.6	10	11.4	3.13
		LGEAs Off	8	25.0	11	34.4	4	12.5	6	18.8	3	9.4	3.47
4	Girls' early marriage may lead to pupils/students drop-out of school in North west Zone, Nigeria.	H/Teachers	21	32.8	11	17.2	2	3.1	25	39.1	5	7.8	3.28
		Teachers	82	43.4	52	28.0	7	3.7	36	19.0	11	5.8	3.82
		SBMC Off	31	35.2	15	17.0	5	7.5	27	30.7	10	11.4	3.34
		LGEAs Off	5	15.6	12	37.5	3	9.4	11	34.4	1	3.1	3.28
5	Sexual harassments from teachers and students' counterpart, lead to girl child dropout from basic education.	H/Teachers	18	28.1	20	31.2	3	4.7	20	31.2	3	4.7	3.47
		Teachers	72	38.1	50	26.5	23	12.2	36	19.0	8	4.2	3.75
		SBMC Off	33	37.5	16	18.2	2	2.3	28	31.8	9	10.2	3.41
		LGEAs Off	10	31.2	7	21.9	3	9.4	10	31.2	2	6.2	3.41
6	Boys are not allowed to go to school because they are expected to provide for the family, thus, bring about pupils drop-out.	H/Teachers	0	0	50	78.1	0	0	7	10.9	7	10.9	3.45
		Teachers	10	5.3	134	70.9	2	1.1	38	20.1	5	2.6	3.56
		SBMC Off	1	1.1	59	67.0	0	0	19	21.6	9	10.2	3.27
		LGEAs Off	1	3.1	25	78.1	0	0	6	18.8	0	0	3.67
7	Lack of money to buy sanitary pads during menstruation lead to girl child dropout of school in North-west Zone, Nigeria.	H/Teachers	8	12.5	47	73.4	0	0	5	7.8	4	6.2	3.85
		Teachers	22	11.6	126	66.7	2	1.1	33	17.5	6	3.2	3.66
		SBMC Off	16	18.2	54	61.4	0	0	16	18.2	2	2.3	3.75
		LGEAs Off	8	25.0	18	56.2	1	3.1	5	15.6	0	0	3.91
8	Boys are sometimes forced into work instead of schooling, thus, bring about pupils drop-out in North-west Zone, Nigeria.	H/Teachers	8	12.5	47	73.4	0	0	5	7.8	4	6.2	3.78
		Teachers	26	13.8	122	64.6	8	4.2	28	14.8	5	2.6	4.03
		SBMC Off	16	18.2	50	56.8	0	0	15	17.0	7	8.0	3.69
		LGEAs Off	7	21.9	17	53.1	3	9.4	5	15.6	0	0	3.81
9	The community's expectations concerning gender roles affected child's education in North-west Zone, Nigeria.	H/Teachers	4	6.2	49	76.6	5	7.8	5	7.8	1	1.6	3.78
		Teachers	29	15.3	120	63.5	4	2.1	28	14.8	8	4.2	3.71
		SBMC Off	7	8.0	65	73.9	6	6.8	7	8.0	3	3.4	3.75
		LGEAs Off	6	18.8	17	53.1	3	9.4	6	18.8	0	0	3.72
10	Preferential treatment of boy child education over girl brings about pupils drop-out in	H/Teachers	9	14.1	51	79.7	1	1.6	3	4.7	0	0	4.03
		Teachers	28	14.8	131	69.3	4	2.1	22	11.6	4	2.1	3.83
		SBMC Off	19	21.6	61	69.3	4	4.5	4	4.5	0	0	4.08
		LGEAs Off	4	12.5	23	71.9	1	3.1	4	4.5	0	0	3.84

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North-west Zone, Nigeria.	
Grand Mean	**3.48**

Source: Field Work (2026).

The findings in Table 2, with a grand mean of 3.48, indicate that respondents generally agreed that gender-related factors are associated with pupils' dropout from basic education in North-West Nigeria. The major factors identified include inadequate money for sanitary pads, boys being forced into work to support their families, domestic responsibilities, early marriage, sexual harassment, and preferential treatment of boys' education over girls'. The highest mean scores were recorded for preferential treatment of boys' education (3.84–4.08) and boys' involvement in work instead of schooling (3.69–4.03). Overall, the findings suggest that gender expectations, financial constraints, and unequal educational opportunities may contribute to pupils' dropout. However, the results reflect respondents' opinions and do not independently establish causal effects.

Hypothesis One: There is no significant difference in the opinions of Head-Teachers, Teachers, SBMC officials and LGEAs Officials in family socio-economic related factor on pupils' drop-out from Basic Education enrolment in North-West Zone, Nigeria.

Table 3: Summary of One-Way ANOVA on the Family Socio-Economic Related Factors in Pupils' Drop-Out on Basic Education Enrolment in North-West Zone, Nigeria

Variation	Sum of Squares	Df	Mean Square	F-ratio	P-Value
Between Groups	3.372	3	1.124		
				1.259	0.29
Within Groups	329.298	369	.892		
Total	**332.670**				

P<0.05

The result in Table 3 shows that the calculated F-ratio of 1.259 has a p-value of 0.29, which is greater than the 0.05 level of significance. Therefore, the null hypothesis is not rejected. This indicates that there is no statistically significant difference in the opinions of head teachers, teachers, SBMC officials, and LGEA officials regarding family socioeconomic factors associated with pupils' dropout from basic education in North-West Nigeria. Thus, the four categories of respondents held statistically similar opinions on the issue.

Hypothesis Two: There is no significant difference in the opinions of Head-Teachers, Teachers, SBMC officials and LGEA officials on gender-related factors on pupils' drop-out from Basic Education enrolment in North-West Zone, Nigeria

Table 4: Summary of One-Way ANOVA on Gender Related Factors in Pupils Drop- Out on Basic Education Enrolment in North-West Zone, Nigeria

Variation	Sum of Squares	Df	Mean Square	F-ratio	P-Value
Between Groups	.495	3	1.124		
				1.259	0.29
Within Groups	103.319	369	.892		
Total	**103.814**				

P<0.05

Table 4 indicates that the p-value of 0.29 is greater than the 0.05 level of significance. Therefore, the null hypothesis is not rejected, indicating that there is no statistically significant difference in the opinions of head teachers, teachers, SBMC officials, and LGEA officials regarding gender-related factors associated with pupils' dropout from basic education in North-West Nigeria. This suggests that the four categories of respondents held statistically similar opinions on the issue.

Discussion of Findings

The findings of the study revealed that family's low income, lack of financial support from the extended family and families' struggles to meet basic needs significantly caused pupils drop-out in basic education enrolment in North-West, Nigeria. This aligns with the result of research question one, with a grand mean score of 3.46, which is higher than the instrument mean of 3.00. In line with this finding, Ndanusa and Abayomi (2021) studied fragments and causes of increasing

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out-of-school children in Nigeria and reported that factors that led to the situation were endemic insecurity, abject poverty and the marginalisation of disabled children. However, the finding disagreed with the findings of Salihu and Musa (2023), who assessed the socio-economic barriers to primary enrolment in Zamfara State and reported that poverty, household income level and transportation issues were not consistently linked to dropout, but had a relationship with increased absenteeism. Interestingly, the researchers observed that free-lunch programs in schools have a positive impact on retention that neutralises the impact of poverty.

The findings of the study revealed that frequent domestic responsibilities assigned to girls, community expectations regarding gender roles, and preferential treatment of boys' education over girls' education were perceived as factors contributing to pupils' dropout from basic education in North-West Nigeria. This finding is consistent with the result of Research Question Two, which recorded a grand mean of 3.48, higher than the criterion mean of 3.00, indicating general agreement among respondents regarding the influence of gender-related factors on pupils' dropout. The finding aligns with Lawal et al. (2021), who investigated cultural norms and early marriage in relation to girls' schooling in Kebbi State and found that early marriage, community pressure, and traditional expectations contributed to girls' school dropout. Similarly, Smith and Garcia (2022), in their study of household labour and school dropout in rural Peru, identified family labour demands as an important factor contributing to children's withdrawal from school, particularly when they were required to undertake agricultural and domestic activities. In addition, Obi and Eze (2022) reported that child labour contributed to primary school dropout in Ebonyi State, with girls more likely to be involved in household tasks and boys in farming and petty trading. Furthermore, Hassan and Usman (2021) found that maternal literacy was a significant predictor of pupils' school retention, while paternal literacy also had an observable, though less significant, influence. This suggests that parental education may help promote continued schooling by strengthening support for children's educational needs. Overall, the findings underscore the importance of addressing restrictive gender norms, reducing excessive domestic responsibilities, promoting equal educational opportunities for boys and girls, and improving parental awareness of the value of education. These measures may help reduce dropout and improve the retention and completion of basic education in North-West Nigeria.

Conclusion

The study concluded that low family income, inadequate financial support from extended family members, and difficulties meeting basic household needs were perceived as major socioeconomic factors associated with pupils' dropout from basic education in North-West Nigeria. The study also concluded that frequent domestic responsibilities assigned to girls, community expectations regarding gender roles, and preferential treatment of boys' education over girls' education were perceived as important gender-related factors associated with pupils' dropout from basic education in the study area.

Recommendations

In view of the findings, the following recommendations were made:

1. The Federal Government should strengthen and expand conditional cash transfer programmes for low-income households, particularly in areas with high rates of pupils' dropout, to ease financial hardship and encourage school attendance, retention, and completion of basic education.
2. The government, school administrators, and community leaders should promote gender equality in basic education by discouraging preferential treatment of boys over girls, reducing excessive domestic responsibilities assigned to girls, and raising awareness among parents about the importance of equal educational opportunities for all children to improve school attendance and reduce dropout.

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Qualitative Study on Semantic Entailment, Implicature and Pre-Supposition among Speakers of English: A Review of Donald Davison's Truth-Conditional Semantics Theory

SAMUEL, Chukwuemeke Eboh
nycnchap2020@gmail.com
08117904648, 07067601711

Department of General Studies, Nation Builders Polytechnic, Asaba, Delta State - Nigeria

Abstract
This paper takes a cursory look at what constitutes entailment in semantics. It discusses the sources of inclusion and attempts to distinguish between entailment and other similar terms, such as implicature and pre-supposition, with which it is sometimes confused. The constant confusion between the implicature, pre-supposition and entailment among speakers of English has prompted the researcher into investigating the three items using the Donald Davison's truth-conditional semantics theory. It was found that differences exist between them. Finally, the importance of entailment to the English speaker was not left out.
Keywords: Semantic Entailment, Implicature, Pre-Supposition, English Speakers

Introduction
In linguistics, entailment is the relation between two sentences or utterances, where the of one, *A* requires the truth of the other *B*. By this we mean that one statement entails another when the second is a logically necessary consequence of the first (Brinton, 2000). For instance**,** Omua lives Benin, entail *Omua Lives in Edo State.* An entailment can be thought of as a relation between a sentence, or a set of sentences (the entailing expressions) and another sentence (the entailed sentence). Truth-Conditional Semantics Theory (Donald Davidson, 1967)

Theoretical Framework
The theoretical frame work for this research is based on the Donald Davidson (1967) Truth-Conditional Semantics Theory, which holds that the meaning of a sentence can be understood by specifying the conditions under which the sentence would be true or false. According to Davidson, knowing the meaning of a sentence is equivalent to knowing what must be the case in the world for that sentence to be true. The theory is based on the idea that a semantic theory for a language should provide a systematic account of the truth conditions of all sentences in that language. Davidson drew inspiration from the work of Alfred Tarski, who developed a formal theory of truth. He argued that understanding meaning involves understanding the truth conditions associated with linguistic expressions. In relation to entailment, Truth-Conditional Semantics explains that one sentence entails another if the truth of the first sentence necessarily guarantees the truth of the second. For example: *John killed the lion*. *The lion died*.
If the first sentence is true, the second sentence must also be true. Therefore, the first sentence entails the second.
We can find countless examples where entailment relations hold between sentences and countless where they do not (Ghierchia and McConnel-Ginney,2000).

The sentence: Ade kissed Shola passionately can be interpreted so that it entails the sentences:
i)Ade kissed Shola
ii) Shola was kissed by Ade
iii) Shola was kissed
iv)Ade touched Shola eith her lips,
But it does not entail:
i) Ade married Shola
ii) Shola kissed Ade
iii) Ade kissed Shola many times
iv) Ade did not kiss Shola.

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Entailment is a very strong kind of implication; a semantic relation which holds no matter what the facts of the world happens to be. That is, it holds in all possible worlds (Sil International,2004). This is to say that the statement, *Doyin is a spinster, entails Doyin is unmarried*. Since the purpose here is to discuss the relation between the lexemes *spinster* and *unmarried*, we want to say that for any individual, not just *Doyin*, being a spinster entails being unmarried (Palmer, 1994). Let us take a look at the entailment pair: (a) *The anarchist assassinated the king*, and (b) *The king died*. Assuming the same individual is denoted by the king here, there are numbers of ways of describing the relationship. We could say that if somebody tells us A and we believe it, then we know B without being told anymore. Or we could say that it is impossible for somebody to assert A, but deny B; What such definitions try to capture is that entailment is not an inference in the normal sense. We do not have to reason to get from A to B; we just know it instantaneously because of our knowledge of English (Saeed 2003: 93). He further observes that such truth – base definition of entailment might allow us to state the relation more clearly, and would be something like:

A sentence, P, entails another, Q, guarantees the of the of the second, Q, and the falsity of the second Q, guarantees the falsity of the first, P. We can see how this would for our examples below:

STEP 1: *If P, The anarchist assassinated the king***,** *is true*.
Is Q, *the king died* automatically true? Yes.

STEP 11: If Q *the king died*, is false, is P, *The anarchist assassinated the king,* also false? Yes.

STEP 111: Then P, entails Q, If P is false, then we cannot say anything about Q; it can either be true or false.

This is referred to as the truth relations of entailment. When this set of relation hold between P and Q, then P entails Q. Only the truth of the entailing sentence and the falsity of the entailed sentence has consequences for the sentence. When P is false, Q can either be true or false; If all we were told was that, The anarchist did not assassinate the king, we would not know whether the king is dead or alive. When Q is true, P can either be true or false: if we just know that, the king is dead, that does not tell us anything about whether, the anarchist assassinated him or not (Saeed, 2003).

Sometimes, the speaker will necessarily produce a very large number of background entailments, but will indicate how these are to be ordered (SIL international, 2004).

Observe the following examples below:

1) Tunde ate three slices of bread
2) Someone ate three slices of bread
3) Tunde did something to three slices of bread
4) Tunde ate three of something.

On any occasion, in uttering sentence I, the speaker will communicate, by stress, which entailment is assured to be the foreground (or more importantly for interpreting intended meaning) than any other. So, when the utters the following sentences:

1) Tunde ate THREE slices of bread;
2) TUNDE ate three slices of bread;

He/she indicates that the foreground entailment, and hence his/her main assumption in the first sentence is that, Tunde ate a certain number, (THREE), of slices of bread. But in the second sentence, the focus shifts, the main assumption is that someone (TUNDE) ate three slices of bread. The stress in English function to mark the main assumption of the speaker in producing an utterance. Such, it allows the speaker to mark for the listener what the focus of the message is, and what is being assumed.

We have said that an entailment is given to us by linguistic structure: we do not have to check any fact in the world to deduce the entailed sentence from the entailing sentence. The source of entailment may sometimes be lexical. For instance, the relationship of entailment between the sentences; 'The anarchist assassinated the king' and 'the king died', derives from the lexical relationship between the lexemes, assassinated and died. In some sense, the meaning of assassinate contains the meaning of die.

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Hyponym between lexical items is also a regular source of entailment between sentences (Saeed, 2003). The noun 'dogs' is a hyponym of; animal'. So it follows that*, I bought a dog today*, entails*, I bought animal today.*

Another source of entailment is syntactic is nature. The active and passive versions of the same sentence will entail one another. So, *the cat killed the rat, entails, the rat was killed by the cat.*

Entailment differs from implicature**,** where the truth of *A* suggests the truth of B, but does not require it. For instance**,** *Ada had a baby and got married*; implicate that: *(A) She had a baby before (B) the wedding*. But this is cancellable by adding *…not necessarily in that order*. Again, *I tried to phone john yesterday,* would normally implicate, I did not in fact phone him; but there is nothing odd about continuing, … *and in fact, I succeeded in getting through* (Lyons 1977: 595). Implicature assumes that the speaker actually intends to provide information that is not part of his/her sentence meaning.

Entailment also differs from presupposition where the truth of what one is *presupposing* is taken for granted. Presupposing is what the speaker assumes to be the case prior to making an utterance, while entailment is what logically follow from what is asserted in the utterance. Speakers have presuppositions, while sentences (not speaker) have entailments (Shadia, 2010). For instance, *Bayo's brother bought two cars*, presupposes that *Bayo exists and his brother has a lot of money*. All these presuppositions are held by the speaker and all they can be wrong, as we have seen earlier on.

A simple test to differentiate presupposition from entailment is negation: *The Obi of Agbor was assassinated*, and *The Obi of Agbor was not assassinated*, presuppose that there is *an Obi of Agbor*. However, *the Obi was assassinated*, entails, *The Obi of Agbor is dead*. *But The Obi of Agbor was not assassinated,* no longer entails, *The Obi is not dead*; nor that is he alive, as he could have died in another way. Presupposition remains under negation, entailment does not. Negation destroys entailment (Shadia, 2010).

Whatever way we see it, it is easy to show that lexical relations are central to the way speakers and hearers construct meaning. Knowledge of entailment relationships is important, for it is a reflection of the speaker's lexical knowledge. Entailment can be said to follow from the semantic relationships that exist between words or lexical items contained in the sentences, or the utterances of the language, e.g. between assassinated and dead; father and man; and between spinster and unmarried.

Conclusion

In conclusion, to show that the meaning of words in a language is interrelated, the meaning of a word is defined, in part, by its relation with other words in the language. As well as being in relation with other words in the same sentence, a word is in a relationship with other related, but absent words. To take a very simple example, if someone says to you, I saw your father just now, you know, without further information, that the speaker saw a man. This follows from the relationship between the uttered word father and the related, but unspoken word man; representing links in the vocabulary. One could also claim that the word father contains a semantic element man, as part of its meaning.

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Perception of Health Workers on Risk Factors associated with Development of Uterine Fibroids in Ilorin Metropolis, Kwara State, Nigeria

BELLO, Abdullateef[1]
bello.al@unilorin.edu.ng
08133560428

SADIQ, Suleiman Sabonkudi[2]
sadiq.ss@unilorin.edu.ng
08032276145

LAMIDI, jibola Fatima[1]
fatireal121@gmail.com
07034236685

ABDULWAHAB, Aishat Oyamine[1]
Abdulwahab.ao@unilorin.edu.ng
08066616732

[1]Department of Health Promotion and Environmental Health Education, Faculty of Education, University of Ilorin.
[2]Department of Human Kinetics, Faculty of Education, University of Ilorin

Abstract

Uterine fibroids are benign growths of the uterus that can cause a swollen abdomen, pelvic pain, and other uncomfortable symptoms. Understanding the factors that predispose women to fibroids is therefore important for reducing their incidence. This study examined the risk factors associated with the development of fibroids as perceived by health workers in selected health facilities in Ilorin Metropolis. Specifically, the study investigated whether (i) obesity, (ii) family history, and (iii) lifestyle are perceived as risk factors of uterine fibroids among health workers in health facilities in Ilorin Metropolis. A descriptive survey research design was adopted. The population comprised health workers in selected health facilities across Ilorin West and Ilorin South Local Government Areas of Ilorin Metropolis. A multi stage approached was use to select a total sample of 215 respondents. A researcher-developed questionnaire, validated by experts and tested for reliability using the test retest method, was used for data collection; a Cronbach's alpha coefficient of 0.77 was obtained. The questionnaire was administered by the researcher with the assistance of two research assistants. Demographic data were analysed using frequency counts and percentages, while the Chi-square test was used to test the study hypotheses at the 0.05 alpha level. The findings revealed that: Obesity is significantly perceived as a risk factor of uterine fibroids, as the calculated Chi-square value of 314.69 is greater than the critical value of 21.03 ($df = 12$, $\alpha = 0.05$). Family history is significantly perceived as a risk factor of uterine fibroids, as the calculated Chi-square value of 198.15 is greater than the critical value of 16.92 ($df = 9$, $\alpha = 0.05$). Lifestyle is significantly perceived as a risk factor of uterine fibroids, as the calculated Chi-square value of 129.54 is greater than the critical value of 21.03 ($df = 12$, $\alpha = 0.05$). Based on these findings, it was concluded that obesity, family history, and lifestyle are significantly perceived as risk factors of uterine fibroids by health workers in health facilities in Ilorin Metropolis. It was recommended that public health educators organise targeted community education and awareness programmes that promote healthy eating, physical activity, and weight management, in order to reduce obesity rates and the associated risk of fibroid development among women in Ilorin Metropolis.

Keywords: uterine fibroids, risk factors, obesity, family history, lifestyle and health workers

Introduction

Uterine fibroids, also known as uterine leiomyomas, are the most common benign neoplasms affecting women. They are typically composed of disordered fascicles of smooth-muscle cells, vascular smooth-muscle cells, fibroblasts, leiomyoma-associated fibroblasts, and an excess of acellular extracellular matrix. Fibroids tend to be multiple and may develop in any part of the uterus, although they occur most commonly in the muscular wall of the uterus (the myometrium). Several epidemiological risk factors have been associated with uterine leiomyomas, including advanced age, race, age at menarche, low parity or nulliparity, family history, obesity, diet, physical activity, smoking, use of oral contraceptives, hormone

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replacement therapy, environmental exposure to elevated oestrogen and progesterone levels, and vitamin D deficiency (Arnett, 2019). Ferri (2017) found that an early age at menarche is associated with a higher risk of uterine leiomyomas, whereas multiparity is linearly associated with a reduced risk; the risk reduction among multiparous women, relative to nulliparous women, ranges from about 20% to 50%. Overweight and obesity are independent risk factors for uterine leiomyomas. Most studies have found low serum vitamin D levels to be associated with an increased risk of uterine leiomyomas, although a few reports no effect, and the association appears stronger among Black women than White women. Exposure to sunlight for more than an hour a day has similarly been associated with a reduced risk. Smoking has been associated with a reduced risk of uterine leiomyomas, particularly among women with a low body mass index (BMI), and most studies report an inverse relationship between regular physical activity and fibroid risk. The use of oral and injectable contraceptives has generally been associated with a reduced risk, although a few studies report an increased or negligible effect, while hormone replacement therapy or exposure to exogenous hormones particularly among postmenopausal women has been associated with an increased risk in some studies (Kashani et al., 2018).

Fibroids pose a significant threat to women's reproductive health and can complicate childbirth. During surgery, uterine fibroids may adhere to adjacent organs or tissues, forming what is referred to as a 'parasitic fibroid'. The World Health Organization (2022) reports that between 20% and 80% of women develop fibroids by age 50, with the condition being most common among women in their forties and early fifties. Not all women with fibroids experience symptoms, but those who do often find them difficult to live with, including pelvic pain and heavy menstrual bleeding. Fibroids can also exert pressure on the bladder, causing frequent urination, or on the rectum, causing rectal pressure; when very large, they can cause the abdomen to enlarge, giving the appearance of pregnancy (MedlinePlus, 2018). Fibroids often produce recurring clinical symptoms and, in some cases, can grow to fill the uterine cavity entirely and extend through the cervical canal into the vagina, a presentation referred to as a 'nascent fibroid'. Most women with fibroids are asymptomatic, while others experience painful or heavy menstrual flow; large fibroids may push on the bladder, causing a frequent urge to urinate, and may cause pain during intercourse or lower back pain (Awiwi et al., 2022). Occasionally, though uncommonly, fibroids can make conception more difficult. The exact cause of uterine fibroids remains unclear; however, they tend to run in families and appear to be partly influenced by hormone levels. Reported risk factors include obesity and high consumption of red meat (Wallach & Vlahos, 2018). The epidemiology of uterine fibroids is multifactorial, with reported risk factors including age, family history, obesity, reproductive characteristics, and hormonal influences. Obesity a condition in which excess body fat accumulates to an extent that negatively affects health is a growing concern among women managing a fibroid diagnosis, and weight gain is a common secondary issue in their care (Baird & Dunson, 2018). While there is no direct evidence linking fibroid symptoms to weight gain, larger fibroids add to uterine weight and cause the uterus to expand; the resulting abdominal swelling can create the visual impression of weight gain. Individuals are classified as obese when their BMI weight in kilograms divided by the square of height in metres exceeds 30 kg/m², while a BMI of 25–30 kg/m² is classified as overweight (with some East Asian countries applying lower cut-off values). Obesity is a major contributor to disability and is associated with cardiovascular disease, type 2 diabetes, obstructive sleep apnoea, certain cancers, and osteoarthritis (Duron, 2017). Its causes are individual, socioeconomic, and environmental, including diet, physical inactivity, automation, economic policy, endocrine disorders, and exposure to endocrine-disrupting chemicals; while many obese individuals succeed in losing weight in the short term, maintaining that loss over the long term is comparatively rare (Pischon, 2018).

A family history of fibroids may increase a woman's risk of developing the condition. Some clinical studies suggest that defects in particular genes may contribute to fibroid growth, although further research is needed to confirm a causal relationship between heredity and fibroids. Existing evidence suggests that women with one or more close relatives who have had fibroids particularly a mother or sister are more likely to develop fibroids themselves. Although fibroids are generally non-cancerous, they can cause symptoms such as heavy menstrual bleeding, pelvic pain, and fertility difficulties. While medical and surgical treatment remain the primary management options, lifestyle and dietary factors are also thought to influence symptom severity and possibly fibroid growth. Lifestyle choices before and during pregnancy including

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alcohol consumption, cigarette smoking, illicit drug use, certain medications, strenuous physical activity, high caffeine intake, and diets that promote weight gain have been associated with an increased likelihood of fibroid development (Warland et al., 2019). Evidence from sub-Saharan Africa on this subject remains relatively limited. A systematic scoping review of uterine fibroid epidemiology among Black African women found a shortage of robust epidemiological studies on the incidence, prevalence, and risk factors of fibroids, and highlighted the need for further research within African settings. Against this background, the present study assessed the perceived risk factors associated with uterine fibroids among health workers in selected health facilities in Ilorin Metropolis, Kwara State, Nigeria, focusing on three factors: obesity, family history, and lifestyle.

Statement of the Problem

Allowing fibroids to grow unchecked can adversely affect fertility and increase the likelihood of complications such as miscarriage. Delaying surgical removal also tends to make eventual surgery more complex, further reducing fertility prospects. Although uterine fibroids are usually not life-threatening, they can cause discomfort and complications such as anaemia a drop in red blood cells resulting in fatigue from heavy blood loss and, in rare cases, may require a blood transfusion. When present during pregnancy, fibroids can occasionally affect fetal development or complicate labour. Women with fibroids may experience abdominal pain during pregnancy and face an increased risk of preterm labour. Where large fibroids obstruct the vagina, a caesarean section may become necessary, and in rare cases fibroids can contribute to miscarriage. The severity of complications generally depends on the size, number, and location of the fibroids, which can give rise to both acute and long-term complications. Uterine fibroids are benign growths that occur in or around the uterus, affecting as many as 80% of women by age 50 (Moroni et al., 2019). They can cause heavy bleeding, pelvic pain, and abdominal pressure, and, if left untreated, may in some cases become life-threatening. Heavy bleeding associated with fibroids is a common cause of anaemia, and fibroids that develop within the uterine muscle can obstruct the fallopian tubes, impede conception, restrict fetal growth, and, in severe cases, necessitate preterm delivery. Against this background, this study examined the risk factors associated with the development of uterine fibroids as perceived by health workers in selected health facilities in Ilorin Metropolis.

Research Questions

The following research questions guided the study:

1. What is the perceived association between obesity and uterine fibroids among health workers in selected health facilities in Ilorin Metropolis?
2. What is the perceived association between family history and uterine fibroids among health workers in selected health facilities in Ilorin Metropolis?
3. What is the perceived association between lifestyle and uterine fibroids among health workers in selected health facilities in Ilorin Metropolis?

Research Hypotheses

The following null hypotheses were tested at the 0.05 level of significance:

H_{01}: There is no significant perceived association between obesity and uterine fibroids among health workers in selected health facilities in Ilorin Metropolis.

H_{02}: There is no significant perceived association between family history and uterine fibroids among health workers in selected health facilities in Ilorin Metropolis.

H_{03}: There is no significant perceived association between lifestyle and uterine fibroids among health workers in selected health facilities in Ilorin Metropolis.

Research Methodology

Research Design

A descriptive cross-sectional survey design was adopted. The study was conducted among health workers in selected health facilities in Ilorin Metropolis, Kwara State, Nigeria. Ilorin Metropolis comprises Ilorin West, Ilorin East, and Ilorin South Local Government Areas; Ilorin West and Ilorin South were selected for this study.

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Population and Sample

The accessible population across the selected facilities was 7,134 health workers. A proportionate allocation of 3% was applied to each facility's population, with facility-level allocations rounded to the nearest whole number, yielding a total sample of 215 respondents, as shown in Table 1.

No.	Health Facility	Population	3% Allocation	Sample
1	Community Health Centre	520	15.6	16
2	Avon Healthcare Olarewaju Hospital	637	19.1	19
3	Ayodele Medical Centre	1413	42.4	42
4	Slimfit	250	7.5	8
5	Federal Staff Clinic	690	20.7	21
6	General Hospital	1730	51.9	52
7	Whitewood Hospital	1894	56.8	57
	Total	7134	214.0	215

Sampling Procedure

A multistage sampling procedure was used. Health facilities were first selected through a stratified approach. The multistage sampling procedure was employed thus: a Stratified sampling technique was used to select seven (7) hospital in Ilorin metropolis. This includes Community Health Centre, Avon Healthcare Olarewaju Hospital, Ayodele Medical Centre, Slimfit, Federal Staff Clinic, General Hospital and Whitewood Hospital. Proportionate sampling was used to select 3% of the population. as shown in Table 1.

Instrument

Data were collected using a researcher-developed questionnaire titled 'Perceived Risk Factors Associated with Uterine Fibroids among Health Workers in Selected Health Facilities in Ilorin Metropolis.' The questionnaire comprised two sections: Section 'A' collected demographic information, while Section B assessed perceptions of obesity, family history, and lifestyle as risk factors of uterine fibroids, using a four-point Likert scale (Strongly Agree, Agree, Disagree, Strongly Disagree).

Validity and Reliability

The draft questionnaire was reviewed by three experts in the Department of Health Promotion and Environmental Health Education, Faculty of Education, University of Ilorin, and their comments were incorporated into the final instrument. Reliability was assessed using the test–retest method and Cronbach's alpha, yielding a coefficient of 0.77, indicating an acceptable level of internal consistency.

Data Collection

An introductory letter was obtained from the Department of Health Promotion and Environmental Health Education, University of Ilorin to get access to the respondents. The questionnaire was administered by the researcher with the assistance of two trained research assistants.

Data Analysis

Data were coded and analysed using IBM SPSS Statistics. Frequencies and percentages were used to summarise demographic characteristics and questionnaire responses, while the Chi-square test was used to test the three null hypotheses at the 0.05 alpha level. Because the study measured perceptions rather than clinically confirmed exposure and disease status, the inferential findings should be interpreted as statistically significant response patterns rather than as proof that the investigated factors cause uterine fibroids.

Presentation of Results

Respondents' Characteristics

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Characteristic	Category	n	%
Age	18–22 years	35	16.3
	23–27 years	101	47.0
	28–32 years	58	27.0
	33 years and above	21	9.8
Religion	Islam	127	59.1
	Christianity	88	40.9
Professional category	Nurse	53	24.7
	Midwife	72	33.5
	Laboratory assistant	34	15.8
	Laboratory attendant	26	12.1
	Medical doctor	14	6.5
	Other	16	7.4
Sex	Female	158	73.5
	Male	57	26.5
Marital status	Single	80	37.2
	Married	105	48.8
	Divorced	12	5.6
	Separated	18	8.4

Table 2: Distribution of respondents' demographic characteristics

The respondents were predominantly aged 23–27 years (47.0%). Females constituted 73.5% of the sample, while males constituted 26.5%. Muslims accounted for 59.1% of respondents and Christians for 40.9%. Midwives were the largest professional group (33.5%), followed by nurses (24.7%). Nearly half of the respondents were married (48.8%), while 37.2% were single.

Answers to Research Questions

Research Question 1: Is obesity perceived as a risk factor of uterine fibroids by health workers in health facilities in Ilorin Metropolis?

S/N	Item	SA	A	Positive Response	D	SD	Negative Response
1	Body mass index above normal body weight can lead to uterine fibroids	74 (34.4%)	88 (40.9%)	162 (74.4%)	40 (18.6%)	13 (6.0%)	53 (25.6%)
2	Fat cells produce more oestrogen, and a higher oestrogen level can promote fibroid growth	67 (31.2%)	122 (56.7%)	189 (88.0%)	13 (6.0%)	13 (6.0%)	26 (12.0%)
3	Fibroids are 2–3 times more prevalent in women with obesity	88 (40.9%)	98 (45.6%)	186 (86.5%)	19 (8.8%)	10 (4.7%)	29 (13.5%)
4	Obesity is a risk factor for fibroids	80 (37.2%)	103 (47.9%)	183 (85.1%)	17 (7.9%)	15 (7.0%)	32 (14.9%)

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S/N	Item	SA	A	Positive Response	D	SD	Negative Response
5	Excess weight can increase oestrogen production, which contributes to fibroid growth	78 (36.3%)	91 (42.3%)	169 (78.7%)	13 (6.0%)	33 (15.3%)	46 (21.3%)
	Overall			178 (82.6%)			37 (17.4%)

Table 3: Mean analysis of obesity as a risk factor of fibroid

Table 3 shows that 178 respondents (82.6%) gave a positive response, compared with 37 respondents (17.4%) who gave a negative response. This indicates that obesity is perceived as a risk factor of uterine fibroids by health workers in health facilities in Ilorin Metropolis.

Research Question 2: Is family history perceived as a risk factor of uterine fibroids by health workers in health facilities in Ilorin Metropolis?

S/N	Item	SA	A	Positive Response	D	SD	Negative Response
1	Patients with a family history of fibroids are likely to develop fibroids	115 (53.5%)	50 (23.3%)	165 (76.7%)	23 (10.7%)	27 (12.6%)	50 (23.3%)
2	Maternal history of fibroids is associated with a high risk of development in women	89 (41.4%)	84 (39.1%)	173 (80.5%)	6 (2.8%)	36 (16.7%)	42 (19.5%)
3	Family history combined with prolonged exposure to female sex hormones may increase fibroid risk	97 (45.1%)	68 (31.6%)	165 (76.7%)	24 (11.2%)	26 (12.1%)	50 (23.3%)
4	Family history is a risk factor for uterine fibroids	63 (29.3%)	97 (45.1%)	160 (74.5%)	13 (6.0%)	42 (19.5%)	55 (25.5%)
	Overall			166 (77.2%)			49 (22.8%)

Table 4: Mean analysis of family history as a risk factor of fibroid

Table 4 shows that 166 respondents (77.2%) gave a positive response, compared with 49 respondents (22.8%) who gave a negative response. This indicates that family history is perceived as a risk factor of uterine fibroids by health workers in health facilities in Ilorin Metropolis.

Research Question 3: Is lifestyle perceived as a risk factor of uterine fibroids by health workers in health facilities in Ilorin Metropolis?

S/N	Item	SA	A	Positive Response	D	SD	Negative Response
1	Poor engagement in exercise triggers fibroid growth in women	53 (24.7%)	70 (32.6%)	123 (57.2%)	73 (34.0%)	19 (8.8%)	92 (42.8%)
2	Excessive smoking can lead to fibroids	76 (35.3%)	91 (42.3%)	167 (77.6%)	30 (14.0%)	18 (8.4%)	48 (22.4%)
3	Stress is a cause of fibroids	62 (28.8%)	92 (42.8%)	154 (71.6%)	54 (25.1%)	7 (3.3%)	61 (28.4%)
4	Poor dietary intake can result in fibroids	59 (27.4%)	111 (51.6%)	170 (79.1%)	32 (14.9%)	13 (6.0%)	45 (20.9%)
5	Excessive alcohol intake among women can result in fibroids	57 (26.5%)	112 (52.1%)	169 (78.6%)	10 (4.7%)	36 (16.7%)	46 (21.4%)
	Overall			157 (73.0%)			58 (27.0%)

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Table 5: Mean analysis of lifestyle as a risk factor of fibroid

Table 5 shows that 157 respondents (73.0%) gave a positive response, compared with 58 respondents (27.0%) who gave a negative response. This indicates that lifestyle is perceived as a risk factor of uterine fibroids by health workers in health facilities in Ilorin Metropolis.

Testing of Hypotheses

Hypothesis	χ^2(calc)	df	Critical χ^2 (α = .05)	p-value	Decision
H01: Obesity	314.69	12	21.03	< .001	Reject H01
H02: Family history	198.15	9	16.92	< .001	Reject H02
H03: Lifestyle	129.54	12	21.03	< .001	Reject H03

Table 6: Summary of Chi-square test of hypotheses

Table 6 shows that the Chi-square results indicate statistically significant differences in the response distributions for all three domains tested. Accordingly, all three null hypotheses were rejected at the 0.05 significance level, indicating that obesity, family history, and lifestyle are each significantly perceived as risk factors of uterine fibroids by health workers in health facilities in Ilorin Metropolis.

Discussion of Findings

The data presented and analysed relate to the risk factors associated with the development of uterine fibroids as perceived by health workers in health facilities in Ilorin Metropolis. Three hypotheses were tested in the course of the study, and the findings are discussed below.

Hypothesis one, which stated that obesity would not significantly be perceived as a risk factor of uterine fibroids, was rejected, as the calculated Chi-square value of 314.69 is greater than the critical value of 21.03. This indicates that obesity is significantly perceived as a risk factor of uterine fibroids by health workers in health facilities in Ilorin Metropolis. This is consistent with respondents' views that fat cells produce more oestrogen, that higher oestrogen levels can promote fibroid growth, that fibroids are more prevalent among women with obesity, and that excess weight contributes to increased oestrogen production and fibroid growth. This finding is consistent with the study of Tate (2018), which identified obesity as a significant risk factor for fibroids, particularly among African American women and women of childbearing age. Similarly, Pischon (2018) reported that obesity increases the risk of various health conditions, including reproductive issues, and highlighted the role of BMI and diet in influencing reproductive health.

Hypothesis two, which stated that family history would not significantly be perceived as a risk factor of uterine fibroids, was rejected, as the calculated Chi-square value of 198.15 is greater than the critical value of 16.92. This indicates that family history is significantly perceived as a risk factor of uterine fibroids by health workers in health facilities in Ilorin Metropolis. This implies that patients with a family history of fibroids are perceived to be more likely to develop them, that maternal history of fibroids is perceived as carrying a high risk, and that family history combined with prolonged hormone exposure is perceived to increase risk. This finding aligns with the study of Alberts (2018), which indicated that women with a family history of fibroids particularly through their mothers or sisters are at higher risk of developing the condition themselves. Similarly, Poczai (2022) discussed the genetic aspects of trait inheritance, noting that certain gene variants can increase the risk of conditions such as fibroids.

Hypothesis three, which stated that lifestyle would not significantly be perceived as a risk factor of uterine fibroids, was rejected, as the calculated Chi-square value of 129.54 is greater than the critical value of 21.03. This indicates that lifestyle is significantly perceived as a risk factor of uterine fibroids by health workers in health facilities in Ilorin Metropolis. This implies that poor engagement in exercise, excessive smoking, stress, poor dietary intake, and excessive alcohol consumption are all perceived to contribute to fibroid development. This finding is consistent with Warland et al. (2019), who highlighted that lifestyle factors including smoking, alcohol consumption, and diet are associated with fibroid risk,

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and with Lange et al. (2017), who discussed the impact of prenatal alcohol exposure on health outcomes, indirectly linking lifestyle choices to reproductive health concerns such as fibroids.

Limitations

The cross-sectional design does not establish a temporal or causal relationship between the perceived factors and uterine fibroids. In addition, the study assessed health workers' perceptions rather than clinically confirmed fibroid cases and objectively measured risk factors; findings should therefore be interpreted as reflecting perceived associations rather than confirmed causal relationships.

Conclusion

Based on the findings of the study, the following conclusions were drawn:

1. Obesity is significantly perceived as a risk factor of uterine fibroids among health workers in health facilities in Ilorin Metropolis.
2. Family history is significantly perceived as a risk factor of uterine fibroids among health workers in health facilities in Ilorin Metropolis.
3. Lifestyle is significantly perceived as a risk factor of uterine fibroids among health workers in health facilities in Ilorin Metropolis.

Recommendations

1. Public health educators should organize targeted community education and awareness programmes that promote healthy eating, physical activity, and weight management, in order to reduce obesity rates and the associated risk of fibroid development among women in Ilorin Metropolis.
2. Healthcare providers should encourage the inclusion of family medical history assessments during gynecological consultations to identify women at higher risk of developing fibroids.
3. Community health workers should develop lifestyle intervention programmes that educate women on the risks associated with smoking, alcohol consumption, poor diet, and sedentary behaviour, emphasizing their potential contribution to fibroid development and other reproductive health concerns.

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Correlation Between Social Media Addiction and Mental Health Issues: A Case Study of Federal College of Education (Technical) Bichi, Kano State, Nigeria

IBRAHIM, Nasiru[1]
nasiruibrahimz2018@gmail.com
08032229072

ISA, Aisha Yusuf[2]
aishayufissa@yahoo.com
08066926654

[1]Department of Education, Zamfara College of Arts and Science (ZACAS) Gusau, Zamfara State, Nigeria
[2]Department of Educational Psychology / Guidance and Counselling, Federal College of Education (Technical) Bichi, Kano State

Abstract
This study assessed the Relationship between Social Media Addiction and Mental Health Among Students of Federal College of Education, Bichi, Kano State, Nigeria with Implication for Counselling. Utilizing a descriptive survey design, data were collected from 365 students through simple random sampling. The Social Media Addiction and Mental Health Problem Questionnaire (SMAMHPQ), a researcher-developed instrument with strong reliability (Cronbach's alpha = 0.85) was used to measure demographic variables, social media addiction, and mental health status. Results revealed that 71% of students were classified as addicted to social media, while 54% reported mental health problems. WhatsApp (31%) was identified as the most frequently used platform, followed by Facebook, TikTok, and Instagram. Female students showed significantly higher social media addiction scores (p = .010) and mental health problem scores (p = .028) than males, whereas age did not significantly influence these outcomes. A strong positive correlation (r = 0.859, p = .000) existed between social media addiction and mental health problems. These findings point significant Counselling implications, emphasizing the need for targeted interventions that address social media addiction as well as mental health challenges with particular attention to gender-sensitive approaches. Counselling professionals are urged to facilitate coping strategies, resilience building, and psychoeducation to support students' psychological wellbeing in the context of pervasive social media use.

Keywords: Social Media Addiction, Mental Health, Counselling Implications

Introduction
Social media is a recent and highly popular internet service that has brought about substantial changes in the social structures of various countries. In recent years, the advent and widespread adoption of social media platforms have profoundly transformed how individuals communicate, interact, and share information. Particularly among young adults and students, social media has become an integral part of daily life, serving not only as a tool for socialization but also as a source of entertainment, education, and self-expression. Social media has attracted the attention of millions of users around the world owing to the possibility of fast communication, access to a large amount of information, and its widespread dissemination (Anderson & Jiang, 2018). From prominent platforms such as Facebook, Instagram, X platform (formerly Twitter), to the popular video-sharing platform YouTube and Tik-tok, over 4.7 billion individuals actively engage with social media, which corresponds to approximately 60% of the global population (Digital Global Overview Report, 2023). According to recent statistics from early 2023, a substantial 94.8% of users have accessed chat and messaging applications and websites, closely followed by social platforms, which have been used by 94.6% of users (Digital Global Overview Report, 2023). These figures underline the pervasive nature of social media in today's digital landscape, emphasizing its role as a dominant mode of communication and information sharing worldwide. However, despite its many benefits, the excessive and uncontrollable use of social media has raised concerns regarding its impact on mental well-being. The notion of social media addiction, a behavioral addiction characterized by excessive, compulsive use of social media platforms has emerged as an area of intense scholarly attention. Social media addiction is characterized by an individual's excessive preoccupation with social media, an inability to control the urge to log in or engage with social media, and the allocation of an in-coordinate amount of time and effort to social media activities, often at the expense of other essential aspects of life. This addiction to social media can be attributed to its profound impact on the human brain,

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a phenomenon analogous to the mechanisms observed in substance use disorders. Social media has the capacity to influence human psychology by activating the brain's reward centers, triggering pleasurable sensations that elevate one's mood when using social media. For example, individuals addicted to platforms like Instagram may experience feelings of pleasure through likes and comments on their posts. This activation of the brain's reward circuitry renders individuals susceptible to compulsive behaviors related to social media. When confronted with triggers associated with these pleasurable experiences, individuals are often unable to resist the compulsion to engage with social media, driven by the fear of missing out on something important online. This study seeks to explore this phenomenon in the context of students at the Federal College of Education, Bichi, Kano State, Nigeria.

The rising prevalence of social media addiction globally has been linked to various negative psychological outcomes, including anxiety, depression, stress, and low self-esteem (Onyeizu et al., 2022; Islam & Sikder, 2020). Mental health, which encompasses emotional, psychological, and social well-being, is crucial during the student years, as it directly affects academic performance, interpersonal relationships, and overall quality of life. Mental health is the main pillar of healthy human societies, which plays a vital role in ensuring the dynamism and efficiency of any society in such a way that other parts of health cannot be achieved without mental health (Galderisi, et al., 2015). According to World Health Organization's (WHO, 2005) definition, mental health refers to a person's ability to communicate with others. Some researchers believe that social relationships can significantly affect mental health and improve quality of life by creating a sense of belonging and social identity (Massari, 2010). Scientific evidence also shows that social media affect people's mental health (Cunningham, et al., 2021). In Nigeria, where internet penetration and smartphone use have witnessed rapid growth, students are increasingly vulnerable to addictive patterns of social media use. Yet, there is limited empirical research investigating how social media addiction correlates with mental health issues within Nigerian academic institutions. Understanding the relationship between social media addiction and mental health among students is critical, as college life presents unique challenges and stressors, including academic pressure, social adjustment, and identity formation. These challenges may be compounded or alleviated by social media usage patterns. Excessive engagement with social media platforms can potentially disrupt sleep, reduce physical activity, and diminish face-to-face interactions, exacerbating mental health problems (Nwafor et al., 2023). Consequently, examining these dynamics within the student population of Federal College of Education, Bichi provides an insight into the realities of social media's psychological impact. Prior research has identified a positive correlation between social media addiction and symptoms of mental health disorders in different cultural and educational contexts. For instance, studies have found that excessive social media use is associated with heightened levels of anxiety and depressive symptoms among university students (Keles et al., 2019; Onyeizu et al., 2022). This relationship may be explained by factors such as social comparison, fear of missing out (FOMO), cyberbullying, and the pressure to maintain an idealized self-presentation online (Onyeizu et al., 2022). Despite these global findings, the extent to which social media addiction relate to mental health issues within the Nigerian colleges requires further validation and exploration.

Demographic variables such as age, gender, and academic level also appear to play a moderating role in the relationship between social media addiction and mental health. Gender differences may influence how individuals experience and cope with social media use, with some studies suggesting females are more prone to certain types of online engagement that can affect psychological health differently than males (Onyeizu et al., 2022). Similarly, younger students or those in different years of study may exhibit varying susceptibility to addictive behaviors depending on their maturity, academic demands, and social network dynamics. This study investigates these moderating effects to see how demographic factors (age and gender) impact the relationship between social media use and mental well-being. The Federal College of Education, Bichi, provides an interesting case study due to its diverse student body drawn from various parts of Kano State and beyond. As an educational institution focused on teacher training, the students' mental health and behavior are especially important, as these future teachers will influence younger generations. Understanding the relationship between social media addiction and mental health within this population can inform institution specific policies and intervention programs aimed at developing healthier digital habits and promoting psychological well being of students. Therefore, the findings from this

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study can contribute to broader discussions on integrating digital literacy, mental health awareness, and support services within Nigerian higher education frameworks.

Statement of the Problem

Social media has become an integral part of students' routines, yet excessive engagement often leads to addictive behaviour causing adverse mental health effects such as anxiety, depression, and stress. In Nigeria, particularly at the Federal College of Education, Bichi, there is limited empirical evidence on the extent to which social media addiction relates to students' mental health. The lack of empirical research on this subject hinders the development of effective policies and interventions to protect student well-being. Moreover, how demographic factors like age and gender influence this relationship remains unclear. Consequently, without empirical evidence, college stakeholders are constrained in their efforts to address social media addiction and its psychological impact on students. Hence, assessing the relationship between social media addiction and mental health issues among students of Federal College of Education (Technical) Bichi, Kano State, Nigeria.

Research Objectives

1. To determine the prevalence of social media addiction among students of Federal College of Education, Bichi, Kano State, Nigeria.
2. To find out the mental health status of students of Federal College of Education, Bichi, Kano State, Nigeria.
3. To identify the most commonly used social media platforms among students of Federal College of Education, Bichi, Kano State, Nigeria.
4. To determine gender difference in the prevalence of social media addiction among students of Federal College of Education, Bichi, Kano State, Nigeria.
5. To determine age difference in the prevalence of social media addiction among students of Federal College of Education, Bichi, Kano State, Nigeria.
6. To find out gender difference in the mental health status of students of Federal College of Education, Bichi, Kano State, Nigeria.
7. To find out age difference in the mental health status of students of Federal College of Education, Bichi, Kano State, Nigeria.
8. To determine the relationship between social media addiction and mental health problems among students of Federal College of Education, Bichi, Kano State, Nigeria.

Research Questions

1. What is the prevalence of social media addiction among students of Federal College of Education, Bichi, Kano State, Nigeria?
2. What is the mental health status of students of Federal College of Education, Bichi, Kano State, Nigeria?
3. Which social media platforms are most commonly used by students of Federal College of Education, Bichi, Kano State, Nigeria?
4. Is there gender difference in the prevalence of social media addiction among students of Federal College of Education, Bichi, Kano State, Nigeria?
5. Is there age difference in the prevalence of social media addiction among students of Federal College of Education, Bichi, Kano State, Nigeria?
6. Is there gender difference in the mental health status of students of Federal College of Education, Bichi, Kano State, Nigeria?
7. Is there age difference in the mental health status of students of Federal College of Education, Bichi, Kano State, Nigeria?
8. Is there a significant relationship between social media addiction and mental health problems among students of Federal College of Education, Bichi, Kano State, Nigeria?

Research Hypotheses

1. There is no significant gender difference in the prevalence of social media addiction among students of Federal College of Education, Bichi, Kano State, Nigeria?

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2. There is no significant age difference in the prevalence of social media addiction among students of Federal College of Education, Bichi, Kano State, Nigeria?
3. There is no significant gender difference in the mental health status of students of Federal College of Education, Bichi, Kano State, Nigeria?
4. There is no significant age difference in the mental health status of students of Federal College of Education, Bichi, Kano State, Nigeria?
5. There is no significant relationship between social media addiction and mental health problems among students of Federal College of Education, Bichi, Kano State, Nigeria.

Research Methodology

This study adopted a descriptive survey design. The population of the study comprised 6606 students of Federal College of Education, Bichi, Kano State, Nigeria. A total sample size of 365 students was selected for the study as suggested by Research Advisor Table for Determination of Sample Size (2006). The selection of respondents was guided by a simple random sampling technique to ensure representativeness across different schools in the College and levels of study. The instrument used for this study was a researcher-developed questionnaire titled the "Social Media Addiction and Mental Health Problem Questionnaire" (SMAMHPQ). The questionnaire consisted of three sections: demographic information, social media addiction, and mental health status. The demographic section collected data on age and gender. The social media addiction and mental health sections contained a total of 20 items, 10 items for each section measured on a four Likert scale format ranging from Strongly Agree (4) to Strongly Disagree (1). The scoring revealed that any respondent who obtained scores ranging from 25-40 from social media addiction section (Section B) is considered as social media addict. Equally, any respondent who obtained scores ranging from 25-40 from mental health problem section (Section C) is considered as having mental health issues. The questionnaire was administered to 20 pilot respondents from the Federal College of Education, Kano, (Now Yusuf Maitama Sule University of Education, Kano) to assess the reliability of the instrument using SPSS software. A Cronbach's alpha reliability coefficient of 0.85 was obtained, indicating good internal consistency. Data collected from the main survey were analyzed using parametric statistics. Descriptive statistics specifically frequency counts were employed to determine the prevalence of social media addiction; the most commonly used social media platforms and mental health status of students. T-test for independent samples was used to determine the gender and age difference in the prevalence of social media addiction and mental health status. Furthermore, Pearson Product Moment Correlation (PPMC) was used to examine the relationship between social media addiction and mental health problems.

Presentation of Results

Table 1: Demographic Characteristics of Respondents (N = 365)

Demographic Variables	Frequency	Percentage %
Gender		
Male	226	62%
Female	139	38%
Total	365	100%
Age Group		
16-20	270	74%
21-30	95	26%
Total	365	100%

Source: *Field Data, 2025*

Table 1 shows a summary of the demographic characteristics of the respondents across two key demographic variables: gender and age group. The information on the table indicates a sample of 365 students from Federal College of Education, Bichi, Kano State, Nigeria. Based on gender, the study included 226 male respondents representing 62% and 139 female respondents representing 38%, reflecting a higher proportion of males in the sample. This distribution allows the study to explore possible gender-based differences in social media use and mental health outcomes. Regarding age group, 270 respondents (74%) fell within the 16-20 years category, while the remaining 95 respondents (26%) were between 21-30 years old. This distribution highlights that the majority of the sample comprises younger students aged 16 to 20, which is

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typical of the student population and important for understanding age-related influences on social media addiction and mental health.

RQ1: What is the prevalence of social media addiction among students of Federal College of Education, Bichi, Kano State, Nigeria?

Table 2: Prevalence of social media addiction among students of Federal College of Education, Bichi, Kano State, Nigeria

Prevalence of social media addiction	Frequency	percentage %
Addicted	259	71%
Not Addicted	106	29%
Total	365	100%

Source: *Field Data, 2025*

Table 2 shows the distribution of social media addiction status among the 365 students surveyed at Federal College of Education, Bichi, Kano State, Nigeria. Majority of the respondents, 259 students (71%), were classified as addicted to social media based on the study's criteria. The remaining 106 students (29%) were classified as not addicted to social media. This indicates that social media addiction is quite prevalent among students of Federal College of Education, Bichi, Kano State, Nigeria

RQ2: What is the mental health status of students of Federal College of Education, Bichi, Kano State, Nigeria?

Table 3: Mental health status of students of Federal College of Education, Bichi, Kano State, Nigeria

Mental health status	Frequency	percentage %
Have Mental Health Issue	196	54%
Not Have Mental Health Issue	169	46%
Total	365	100%

Source: *Field Data, 2025*

Table 3 presents the distribution of mental health problems among the 365 students surveyed at Federal College of Education, Bichi, Kano State, Nigeria. A total of 196 students (54%) were identified as having mental health issues according to the criteria used in the study. Conversely, 169 students (46%) were classified as not having mental health issues. This indicates that slightly more than half of the students in the sample are experiencing mental health challenges.

RQ3: Which social media platforms are most commonly used by students of Federal College of Education, Bichi, Kano State, Nigeria?

Table 4: Social Media Platforms commonly used by students of Federal College of Education, Bichi, Kano State, Nigeria.

Commonly Used Social Media	Frequency	percentage %
WhatApp	113	31%
Facebook	82	22%
Instagram	62	17%
Twitter	24	7%
Tik-Tok	66	18%
Others	18	5%
Total	365	100%

Source: *Field Data, 2025*

Table 4 illustrates the distribution of the most commonly used social media platforms among the 365 students surveyed at Federal College of Education, Bichi, Kano State, Nigeria. WhatsApp is the most frequently used platform, with 113 students (31%) indicating it as their preferred social media platform. Facebook follows, used by 82 students (22%), reflecting continued popularity among the student population. Instagram is the choice of 62 students (17%), showing a strong preference among a significant portion of the respondents. TikTok is used by 66 students (18%), indicating growing popularity, especially among younger users. Twitter is less commonly preferred, with 24 students (7%) using it as their main platform. Finally, Others constitute a small group of 18 students (5%) who use alternative or less common social media platforms. This distribution highlights WhatsApp as the dominant social media platform among students, followed by Facebook, TikTok and Instagram, suggesting these platforms are key channels for engagement, communication, and possibly the development of social media addiction within this population.

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Ho1: There is no significant gender difference in the prevalence of social media addiction among students of Federal College of Education, Bichi, Kano State, Nigeria?

Table 5: t-test analysis for prevalence of social media by gender

Variables	Gender	N	Mean	S.D	t-cal	Df	P-Value (2-tailed)
Social Media Addiction	Male	226	26.14	5.829	-2.577	363	.010
	Female	139	27.71	5.332	.		

Source: *Field Data, 2025*

Table 5 shows the analysis of social media addiction prevalence by gender among students of Federal College of Education, Bichi, Kano State, Nigeria. The independent samples t-test results indicate that there is a significant difference in social media addiction scores between male and female students. The mean social media addiction score for male students is 26.14, while the mean score for female students is 27.71. The mean difference between the two groups is 1.57. The t-test yielded a significant result ($t = -2.577$, $df = 363$, $p = .010$). Therefore, the null hypothesis that there is no significant gender difference in the prevalence of social media addiction among students of Federal College of Education, Bichi, Kano State, Nigeria is rejected. This suggests that female students experience higher levels of social media addiction compared to their male counterparts in this population.

Ho2: There is no significant age difference in the prevalence of social media addiction among students of Federal College of Education, Bichi, Kano State, Nigeria?

Table 6: t-test analysis for prevalence of social media by age

Variables	Age	N	Mean	S.D	t-cal	Df	P-Value (2-tailed)
Social Media Addiction	16-20	270	26.85	5.458	.665	363	.506
	21-30	95	26.40	6.318	.		

Source: *Field Data, 2025*

Table 6 shows the analysis of social media addiction prevalence by age group among students of Federal College of Education, Bichi, Kano State, Nigeria. The independent samples t-test results indicate that there is no significant difference in social media addiction scores between students aged 16-20 and those aged 21-30. The mean social media addiction score for students aged 16-20 is 26.85, while the mean score for students aged 21-30 is 26.40. The mean difference between the two groups is 0.45. The t-test yielded a non-significant result ($t = 0.665$, $df = 363$, $p = .506$). Therefore, the null hypothesis that there is no significant age difference in the prevalence of social media addiction among students of Federal College of Education, Bichi, Kano State, Nigeria is retained. This suggests that age does not significantly affect the level of social media addiction among the students in this population.

Ho3: There is no significant gender difference in the mental health status of students of Federal College of Education, Bichi, Kano State, Nigeria

Table 7: t-test analysis for mental health status by gender

Variables	Gender	N	Mean	S.D	t-cal	Df	P-Value (2-tailed)
Mental –health Issues	Male	226	23.06	4.854	-2.202	363	.028
	Female	139	24.21	4.843	.		

Source: *Field Data, 2025*

Table 7 shows the analysis of mental health status by gender among students of Federal College of Education, Bichi, Kano State, Nigeria. The independent samples t-test results indicate that there is a significant difference in mental health problem scores between male and female students. The mean mental health problem score for male students is 23.06, while the mean score for female students is 24.21. The mean difference between the two groups is 1.15. The t-test yielded a significant result ($t = -2.202$, $df = 363$, $p = .028$). Therefore, the null hypothesis that there is no significant gender difference in the mental health status of students of Federal College of Education, Bichi, Kano State, Nigeria is rejected. This suggests

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that female students report significantly higher levels of mental health problems compared to their male counterparts in this population.

Ho4: There is no significant age difference in the mental health status of students of Federal College of Education, Bichi, Kano State, Nigeria

Table 8: t-test analysis for mental health status by age

Variables	Age	N	Mean	S.D	t-cal	Df	P-Value (2-tailed)
Mental –health Issues	16-20	270	23.59	4.714	.638	363	.524
	21-30	95	23.22	5.324	.		

Source: *Field Data, 2025*

Table 8 shows the analysis of mental health status by age group among students of Federal College of Education, Bichi, Kano State, Nigeria. The independent samples t-test results indicate that there is no significant difference in mental health problem scores between students aged 16-20 and those aged 21-30. The mean mental health problem score for students aged 16-20 is 23.59, while the mean score for students aged 21-30 is 23.22. The mean difference between the two groups is 0.37. The t-test yielded a non-significant result ($t = 0.638$, $df = 363$, $p = .524$). Therefore, the null hypothesis that there is no significant age difference in the mental health status of students of Federal College of Education, Bichi, Kano State, Nigeria is retained. This suggests that age does not significantly affect the level of mental health problems among the students in this population.

Ho4: There is no significant relationship between social media addiction and mental health problems among students of Federal College of Education, Bichi, Kano State, Nigeria

Table 9: Correlation analysis for Social Media Addiction and Mental health Issues

Variables	N	Mean	S.D	Pearson Correlation	P-Value (2-tailed)
Social Media Addiction	365	26.73	5.889	.859	.000
Mental health Issues	365	23.50	4.875		

Source: *Field Data, 2025*

Table 9 shows the correlation analysis between social media addiction and mental health issues among 365 students of Federal College of Education, Bichi, Kano State, Nigeria. The Pearson Product-Moment Correlation coefficient indicates a strong positive correlation of 0.859 between social media addiction scores and mental health issues scores. This correlation is statistically significant at the 0.05 level (2-tailed), with a p-value of .000. Therefore, the null hypothesis that there is no significant relationship between social media addiction and mental health problems among students of Federal College of Education, Bichi, Kano State, Nigeria is rejected. This result suggests that higher levels of social media addiction are strongly associated with greater mental health issues in the student population studied. This significant positive relationship supports the hypothesis that social media addiction is closely linked to mental health challenges among students.

Summary of Findings

1. Majority of students (71%) at Federal College of Education, Bichi, Kano State, Nigeria, are classified as addicted to social media.
2. Slightly more than half of the students (54%) report having mental health problems.
3. WhatsApp (31%) is the most commonly used social media platform among the students, followed by Facebook (22%), TikTok (18%), and Instagram (17%).
4. Gender significantly influences social media addiction levels, with female students exhibiting higher addiction scores than male students ($p = .010$).
5. Age does not significantly affect social media addiction levels among the students ($p = .506$).
6. Gender significantly affects mental health status, with female students reporting higher mental health problem scores than males ($p = .028$).
7. Age does not significantly influence mental health status in this student population ($p = .524$).

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8. There is a strong positive correlation between social media addiction and mental health problems (r = 0.859, p = .000), indicating that higher addiction levels are associated with worse mental health outcomes.

Discussion of Findings

The first finding of this study revealed that majority of students (71%) at Federal College of Education, Bichi, Kano State, Nigeria, are classified as addicted to social media. This finding aligns with Allahverdi (2022) who conducted a study on Relationship between perceived social media addiction and social media applications frequency usage among university students and found that around 70% of students believed they were addicted to social media. The finding also agreed with with Chukwudum, et al., (2023) who conducted a study on Prevalence of Social Media Addiction and its predictive role on Mental health of Undergraduates in a Nigerian University and found a significant prevalence rate of social media addiction among undergraduates, reporting that 43.3% of students were classified as addicted to social media. Although this prevalence is somewhat lower than the 71% found at Federal College of Education, Bichi, it corroborates that social media addiction is a widespread concern among Nigerian students. The second finding revealed that slightly more than half of the students (54%) report having mental health problems. This finding resonate with Awopetu,et al., (2024) who conducted systematic review of social media addiction and mental health of Nigerian university students: The good, the bad and the ugly, and concluded that, though, social media has contributed significantly to the modern dissemination of clinical delivery but its addiction, could negatively affect the mental health of the students. The finding also agree with Ayinde, et al., (2022) who conducted descriptive study of mental health and burnout among Nigerian medical students and found a prevalence of psychological distress at 54.5% among Nigerian university students.

The third finding of this study revealed that WhatsApp (31%) is the most commonly used social media platform among the students, followed by Facebook (22%), TikTok (18%), and Instagram (17%). This finding aligns with the findings of Tambuwal, et al., (2025) who conducted study on Assessing Social Media Usage Patterns Among Undergraduate Students in Sokoto Metropolis, Nigeria and reported that WhatsApp was the most frequently used social media platform among undergraduate students, with approximately 32.5% of respondents using it, followed by Facebook at 30%, Instagram at 25%**,** and Twitter at about 6.25%**.** The finding also resonates with findings of Oche, et al., (20219) who conducted a study on Prevalence and effect of social media on sleep among students of higher institutions in Sokoto Metropolis, Sokoto State Nigeria and reported that a total of 97.9% of the respondents used social media with WhatsApp ((84.9%) and Facebook ((81.7%) being the commonly used platforms. The fourth finding of this study revealed that gender significantly influences social media addiction levels, with female students exhibiting higher addiction scores than male students (p = .010). The finding resonates with Choudhury and Ali (2020) who conducted a cross-sectional survey among college-going youth in Guwahati, Assam, India on Social media addiction among youth: A gender comparison. The study found a significant difference in social media addiction between both male and female participants with females showing higher addiction scores than males (Mean rank=216.29 and Mean rank= 253.32) respectively and p value= .001. The study also aligns with Aparicio-Martínez, et al., (2020) who conducted a study on gender differences in the addiction to social networks in the Southern Spanish university students. The results showed difference among male and female about addiction (chi-square = 12.77, p-value = 0.002).

The fifth finding of this study revealed that age does not significantly affect social media addiction levels among the students (p = .506). This finding aligns with Gazi, et al., (2017) who conducted a study to identify whether there is a statistically significant differentiation between social media addiction levels of users; according to gender, age and educational situation, daily social media use time and tool used to connect to social media. The study revealed that as a result of the one-way analysis of variance, there was no significant difference between participants' age and social media dependence. This finding disagree with Li, et al., (2021) who conducted a study on impacts social media have on young generation and older adults and found that younger people, particularly teens and young adults, are more vulnerable to social media addiction compared to middle-aged adults. The sixth fining of this study Gender significantly affects mental health status, with female students reporting higher mental health problem scores than males (p = .028) resonates with Cen, et al., (2025) who conducted a cross-sectional study on gender differences in the relationship between mental health and

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academic performance among undergraduate students at a medical school in Shanghai and found that female students exhibited significantly higher rates of mental health problems across multiple dimensions than their counterpart males with female exhibiting mental health positive rate (41.9%) than males (39.6%). This finding did not align with the finding of K Damodaran and Paul (2016) who conducted a study assess differences on Gender and Mental Health. They highlighted that independent sample t test revealed no significant gender difference in overall mental health and conclude that male and female youth of Kerala do not differ in terms of their mental health.

The seventh finding of this study revealed that age does not significantly influence mental health status in this student population ($p = .524$). This finding is contrary with Singh and Mishra (2021) who conducted a study on age and gender difference in mental health of young adults and found that majority of years young adults between the age range of 18-21 years portrayed poor mental health (64.60%) followed by young adults with average (35.40%) mental health as compared to young adults of age-range between 22-25 years. The result further revealed that the young adults belonging to the age range of 22-25 years also portrayed poor (51.10%) and average (48.90%) mental health. This findind also disagree with Clarkin, et al., (2024) who found that Younger participants were more likely to identify a mental health problem. The last finding of this study revealed that there is a strong positive correlation between social media addiction and mental health problems ($r = 0.859$, $p = .000$), indicating that higher addiction levels are associated with worse mental health outcomes. This findind resonates with Feng, et al., (2025) who conducted a network analysis on the relationships between mental health and social media addiction, and between academic burnout and social media addiction among Chinese college students: A network analysis. The study reveals a significant positive correlation between social media addiction and both academic burnout and mental health issues. This study also aligns with Zaw and Azenal (2021) who conducted a study on the association between social media addiction and mental health among International Islamic University Malaysia (IIUM) undergraduate nursing students and found that there is an association between social media addiction and mental health status and social media can have a negative impact on mental health among the students.

Conclusions

Based on the outcomes of this study, it is concluded that social media addiction is highly prevalent among students of Federal College of Education, Bichi, Kano State, Nigeria, with a majority (71%) classified as addicted. It is also concluded that slightly more than half of the students (54%) report experiencing mental health problems. WhatsApp is the most commonly used social media platform among students, followed by Facebook, TikTok, and Instagram. Furthermore, gender significantly influences social media addiction levels and mental health status, with female students exhibiting higher addiction scores and reporting more mental health problems than their male counterparts. Conversely, age does not significantly affect social media addiction levels and mental health status within the student population studied. Lastly, there is a strong positive correlation between social media addiction and mental health problems, indicating that higher levels of addiction are associated with worse mental health outcomes among students.

Recommendations

Based on the findings of this study, the following recommendations are made:

1. Given the high prevalence of social media addiction among students, targeted intervention programs should be developed to raise awareness about the risks of excessive social media use and to promote healthier digital habits among students.
2. Since more than half of the students report mental health problems, mental health support services including counselling and stress management workshops should be made more accessible and promoted within the institution to address these challenges.
3. Considering WhatsApp and Facebook are the most commonly used platforms, awareness and prevention campaigns focusing on responsible social media use should prioritize these channels to maximize reach and impact.
4. Because female students are more vulnerable to social media addiction and mental health issues, gender-sensitive support programs and prevention strategies should be designed to address the specific needs of female students.
5. Since age does not significantly affect social media addiction and mental health status in this population, interventions and support efforts can be designed broadly for all student age groups without age specific differentiation.

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6. Given the strong positive correlation between social media addiction and mental health problems, it is recommended that integrated approaches combining social media use monitoring and mental health screening be implemented to identify at-risk students early and provide timely support.
7. Educational authorities and policymakers should collaborate to incorporate digital literacy and mental health education into the curriculum to equip students with skills to manage social media use and mental well-being effectively.

Counselling Implications

The findings of this study have important Counselling implications for students at Federal College of Education, Bichi, Kano State, Nigeria. Given the high prevalence of social media addiction and the significant proportion of students experiencing mental health problems, counsellors should be equipped to address issues related to excessive social media use and its psychological impacts, such as anxiety, depression, and stress. Counsellors can play a crucial role in helping students develop healthy coping mechanisms and digital habits to manage social media use effectively and reduce addiction related harm. Interventions should also focus on strengthening mental health resilience, particularly among female students, who are more vulnerable to both social media addiction and mental health challenges.

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Qualitative Study on Gender Inclusion and Power in Digital Religious Spaces in Nigeria: A Review

MUHAMMAD, Sani Mukhtar[1]*
gwani1978@gmail.com
SHERIF, A. R. Ajiteru[2]
DOGARA, Rahmatullah Abdullahi[3]
ISAH, Maigida Damau[4]

[1]Department of Arts and Social Science Education, Kaduna State University, Kaduna, Nigeria
[2]Department of Political Science, International Relations and Public Administration, Achievers University, Owo, Ondo State, Nigeria
[3]Department of Educational Foundation, Kaduna State University, Kaduna State, Nigeria
[4]Department of General Studies Unit, Air force Institute of Technology, Mando, Kaduna State, Nigeria

Abstract

Digital platforms have become important sites of worship, religious education, pastoral care, identity formation, debate, and community building. Yet expanded participation does not necessarily produce equitable participation. This paper examines how gender, social location, institutional authority, and platform design interact to shape inclusion and power in digital religious spaces, with particular attention to Nigeria and comparable Global South settings. It adopts a critical integrative review and qualitative thematic synthesis of scholarship on digital religion, gendered religious authority, platform governance, online activism, and digital inequality, supplemented by reports from international institutions. The analysis is guided by networked religion, intersectionality, counter public theory, and platform power. Four interconnected dimensions emerge: access, visibility, authority, and safety-accountability. Digital media can reduce spatial and institutional barriers, enable women to access religious knowledge, create alternative publics, and establish relational forms of authority. However, affordability constraints, unequal digital skills, language hierarchies, algorithmic ranking, engagement-driven visibility, harassment, and persistent patriarchal norms restrict these gains. Nigerian evidence shows that women religious leaders and learners can achieve wider reach online while male authority, institutional endorsement, and platform metrics continue to structure credibility and influence. The paper proposes a Digital Religious Power and Inclusion Framework for assessing who can enter digital faith spaces, whose speech becomes visible, whose knowledge is treated as legitimate, and who can participate without disproportionate risk. It recommends gender-responsive digital policies within religious organisations, transparent and locally informed platform governance, improved affordability and literacy, accessible low-bandwidth design, safeguarding protocols, and independent research using disaggregated data. Inclusive digital religion therefore requires more than connectivity: it requires the deliberate redistribution of visibility, voice, protection, and decision-making power.

Keywords: digital religion; gender inclusion; religious authority; platform power; Nigeria; intersectionality; digital inequality

Introduction

Religious life is no longer adequately described through a strict separation between physical and virtual spaces. Livestreamed worship, WhatsApp study groups, online madrasas, YouTube sermons, prayer applications, Facebook fellowships, TikTok apologetics, podcasts, and digitally coordinated charitable networks now form part of ordinary religious practice. Campbell (2012) conceptualises this condition as "networked religion", marked by networked community, storied identities, shifting authority, convergent practice, and a multisite reality. Digital religion is therefore not religion transferred unchanged to a screen. It is a field in which religious meanings, practices, identities, and institutions are continuously negotiated through digital media (Campbell, 2017; Campbell & Evolvi, 2020). These developments matter greatly in Nigeria, where Christianity, Islam, and indigenous religious traditions shape public life, education, welfare, political discourse, and community identity. Mobile phones and social platforms allow religious organisations and independent teachers to reach dispersed audiences, maintain communities across distance, and circulate religious knowledge quickly. For women, young people, persons with disabilities, rural residents, migrants, and people constrained by domestic responsibilities, digital participation can open doors that physical institutions have not always made equally accessible. Fahm (2025), for example, shows how online madrasas, WhatsApp groups, Zoom Qur'anic classes, and mobile

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applications can give Yoruba Muslim women greater flexibility, autonomy, and access to Islamic knowledge. In Nigerian Christianity, Oloba and Blankenship (2025) similarly find that digital platforms enable female religious leaders to bypass some conventional barriers and communicate with wider audiences. Nevertheless, a larger audience is not the same as equality. Digital platforms are commercial and technical systems that rank, recommend, monetise, moderate, and archive speech. Their algorithms determine which religious messages are displayed, whose accounts are suggested, and what forms of content become influential. Existing gender hierarchies can also travel online through institutional endorsement, household control of devices, unequal skills, reputational policing, harassment, and doctrinal claims about who may teach or lead. The same environment that enables a woman to speak beyond the pulpit can expose her to intensified surveillance, abuse, or accusations of religious impropriety. Digital religious space is thus simultaneously an arena of access and exclusion, empowerment and discipline, innovation and continuity. This paper examines these contradictions through the linked concepts of gender, inclusion, and power. Its central argument is that digital religious inclusion must be evaluated at four levels: access to the space, visibility within it, authority gained through participation, and safety-accountability conditions that make participation sustainable. Connectivity alone is an incomplete measure. Genuine inclusion exists when diverse participants can enter, be heard, be regarded as credible, influence community decisions, and seek redress when harmed.

Statement of the Problem

Research on digital religion has established that online and offline religious practices are interdependent and that digital media can alter community, authority, identity, and ritual (Campbell, 2012, 2017; Cheong, 2017). Gender scholarship has also shown that women use digital media to form counter publics, narrate religious identities, challenge spatial restrictions, and develop authority through authenticity and sustained relationships with audiences (Lövheim & Lundmark, 2019; Nas, 2022). However, three problems remain. First, studies sometimes treat access to a platform as evidence of inclusion. This approach underestimates the material barriers that determine meaningful participation. The International Telecommunication Union (ITU, 2025) reports continuing gender, income, and urban-rural divides in internet use. The GSMA (2025) likewise finds that women in low- and middle-income countries remain less likely than men to use mobile internet, with especially pronounced gaps in Sub-Saharan Africa and South Asia. A person who depends on a shared handset, intermittent electricity, expensive data, or a low-capacity device may technically be connected but unable to livestream, upload video, moderate a community, or participate consistently. Digital inclusion must therefore address quality, autonomy, affordability, literacy, accessibility, and security, not merely the presence of a connection. Second, the redistribution of religious authority is frequently described as though platforms automatically weaken established hierarchies. In practice, authority becomes hybrid. Formal qualifications, denominational position, clerical networks, gender expectations, performance skills, follower counts, visual branding, and algorithmic amplification combine to determine credibility. Bunt (2018) demonstrates that cyber-Islamic environments transform how Muslims encounter scholars and guidance, but they do not remove struggles over expertise. Cheong (2017) similarly argues that new media reorganise communicative authority rather than simply replacing institutional leaders. In Nigeria, female Christian leaders gain visibility online, yet male leaders retain greater reach and authority (Oloba & Blankenship, 2025). The unresolved question is therefore not whether authority changes, but who benefits from its changing criteria. Third, scholarship on gender and digital religion often examines Christian, Muslim, or platform-specific cases separately. It gives less attention to the common power mechanisms that operate across faith traditions and platforms in Global South settings. The interaction among gender, class, age, disability, location, language, marital status, religious minority status, and platform design requires an explicitly intersectional analysis. Without such an analysis, policy responses may favour already visible urban and educated women while overlooking those facing multiple barriers. The knowledge gap addressed by this paper is the absence of an integrated framework linking material access, algorithmic visibility, religious legitimacy, and safety. The study responds by asking:

1. How do digital platforms redistribute religious visibility and authority across gender and other intersecting social positions?
2. Which mechanisms enable or constrain inclusion in Nigerian and comparable Global South digital religious spaces?

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3. What responsibilities should religious organisations, platforms, public institutions, and civil society assume in creating more inclusive digital faith environments?

Conceptual and Theoretical Framework

Digital religion and networked authority

Digital religious spaces are online or digitally mediated environments in which religious knowledge, identity, community, ritual, leadership, service, or debate is produced and negotiated. They include both explicitly religious platforms and religious activity on general platforms. Their boundaries are porous because users commonly move between online and offline congregations, institutions, families, and peer networks. Campbell's (2012) networked religion approach is useful because it treats this movement as a multisite reality rather than a competition between "real" and "virtual" religion. Mediatisation theory adds an institutional dimension. Hjarvard (2016) argues that media acquire the capacity to shape the conditions under which religion is represented and practised. Religious actors adopt platform conventions such as short-form video, personal storytelling, livestreaming, hashtags, thumbnails, and frequent posting. Consequently, authority increasingly depends on communicative competence and media visibility alongside formal religious office. Febrian (2024) shows how religious influencers visually perform authority on Instagram, while Lövheim and Lundmark (2019) describe a relational form of women's religious authority based on authenticity, trust, vulnerability, and ongoing audience interaction. These changes can broaden participation. A woman who lacks access to a physical pulpit may teach through audio messages or host a digital study circle. A young believer may compare interpretations from multiple traditions. A person with limited mobility may participate in worship from home. Yet these opportunities are mediated by platform ownership, interface design, data extraction, moderation rules, and recommendation systems. Digital religion is therefore networked but not power-free.

Intersectionality and participatory parity

Crenshaw's (1989) concept of intersectionality explains why gender cannot be isolated from other structures of disadvantage. The experience of an urban professional woman with a private smartphone differs from that of a rural woman using a shared device. Likewise, an established female cleric, an unmarried youth, a religious minority, and a woman with a disability may face different barriers even when using the same platform. Tsuria (2020) demonstrates that religious and cultural contexts can discourage women's digital participation, showing why universal accounts of the digital divide are inadequate. Fraser's (1990) concept of participatory parity and her account of subaltern counter publics are also relevant. Digital groups can operate as alternative publics in which people excluded from dominant religious institutions develop interpretations, identities, and collective claims. Nas (2022) shows how the Women in Mosques movement used online activism to challenge gendered religious space. However, counter public visibility can provoke resistance. Banet-Weiser (2018) argues that popular feminism and popular misogyny are co-constituted within economies of visibility. In religious contexts, women's public piety or teaching may generate support while also attracting gendered scrutiny intended to restore conventional boundaries.

Platform power

Platforms are not neutral containers. Van Dijck et al. (2018) describe a platform society in which datafication, commodification, and selection organise public communication. Bucher (2012) identifies algorithmic power in the production of visibility and the threat of invisibility. Recommendation systems favour content predicted to hold attention, while creators adapt language, aesthetics, timing, and controversy to remain visible. Noble (2018) further demonstrates that algorithmic systems can reproduce social hierarchies while appearing objective. Applied to digital religion, platform power changes what counts as influence. Expertise may be overshadowed by emotional intensity, production quality, celebrity, or frequent posting. Minority languages and locally specific theological vocabulary may be poorly recognised by automated moderation. Content that provokes anger can receive more engagement than careful teaching. The legitimacy of a religious message is consequently shaped not only by doctrine and community recognition but also by opaque infrastructures optimised for commercial objectives. Taken together, networked religion, intersectionality, participatory parity, and platform power provide a multi-level framework. Networked religion explains the online-offline continuity of practice; intersectionality identifies differentiated barriers; participatory parity evaluates inclusion; and platform power reveals how technical and commercial infrastructures distribute visibility.

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Research Methodology

The paper adopts a critical integrative literature review. This method is appropriate for an interdisciplinary question involving religious studies, gender studies, communication, platform governance, and digital inequality. An integrative review permits the comparison of theoretical and empirical studies while retaining attention to context and conceptual development (Snyder, 2019). The analytical corpus consists of 23 scholarly works and four institutional reports published principally between 2012 and 2025, with foundational earlier works retained for intersectionality and counter public theory. Sources were purposively selected for direct relevance to at least one of five areas: digital religion, gendered religious authority, digital inclusion, algorithmic or platform power, and online safety. Priority was given to peer-reviewed journal articles, academic books, official institutional publications, Nigerian studies, and comparative research from other religious and Global South contexts. The institutional reports were produced by the GSMA, ITU, UNESCO, and UN Women. The analysis followed three stages. First, each source was examined for its account of access, participation, authority, visibility, exclusion, and harm. Second, recurring claims were coded and compared across Christian, Muslim, and cross-cultural studies. Third, the themes were synthesised into four dimensions: access; visibility; authority; and safety-accountability. These dimensions form the Digital Religious Power and Inclusion Framework presented later in the paper. This is a conceptual synthesis rather than a systematic review or an empirical survey of platform users. It does not estimate the prevalence of particular experiences. Its value lies in integrating fragmented evidence and producing propositions that can guide future empirical research, organisational policy, and conference discussion. The emphasis on Nigeria is supported by available studies, but the diversity of Nigerian religious traditions and regional contexts requires caution against overgeneralization.

Discussion of Findings

Access: From connection to meaningful participation

Digital media can reduce the importance of physical distance, fixed schedules, mobility, and building-based restrictions. Fahm (2025) reports that Yoruba Muslim women use online classes and messaging platforms to pursue Islamic education with increased flexibility. Comparable research on Islamic learning shows that social media can expand access to teachers and create new networks of knowledge, although questions of populism and authority remain (Solahudin & Fakhruroji, 2020; Wahid, 2024). For Christians, digital services and discussion spaces can sustain religious participation for people unable to attend physically. These benefits are conditional. Meaningful access requires an affordable device, reliable electricity, sufficient data, digital literacy, privacy, language competence, and control over when and how a device is used. ITU (2025) data show that internet use remains stratified by gender, income, and settlement. GSMA (2025) identifies affordability, literacy, relevance, safety, and family or social approval as important barriers to women's mobile internet use. The religious implications are significant. A shared phone may expose private counselling or study-group participation. Limited data may confine users to text and audio while leadership visibility increasingly rewards video. Poor connectivity may exclude rural participants from real-time deliberation even when recordings are later available. Access is therefore graduated rather than binary. At the lowest level, a person receives forwarded religious content. At higher levels, the user searches, comments, creates content, moderates a group, teaches, raises funds, and participates in decisions. Each level demands more resources and autonomy. Gender inclusion policies should assess where participants are positioned on this ladder rather than counting group membership or page followers.

Visibility: The politics of being seen and heard

Visibility is a scarce and governed resource. Platforms rank religious voices through recommendation systems, search results, follower networks, paid promotion, moderation, and engagement measures. Bucher's (2012) analysis of algorithmic visibility explains why users continually adjust their behaviour to avoid becoming invisible. Religious communicators may simplify complex doctrine, personalise messages, use sensational titles, or engage controversy because platform systems reward attention. This visibility economy can benefit women who are skilled communicators and who build trust through consistent interaction. Lövheim and Lundmark (2019) show that authenticity and relationality can support women's religious authority online. Febrian (2024) demonstrates that visual presentation is central to the construction of influencer authority. Yet the same requirements can create gendered burdens. Women may be assessed more heavily through appearance, domestic respectability, marital status, voice, clothing, and emotional style. A male leader's confidence may

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be read as authority, whereas a woman's confidence may be framed as arrogance or religious impropriety. Commercial platform logic also favours those able to produce high-quality content, post frequently, purchase data, and pay for promotion. This can privilege urban, affluent, institutionally supported creators. Low-bandwidth users, minority-language speakers, and persons who avoid visual exposure for safety or religious reasons become less visible. The result is a two-stage inequality: unequal access determines who enters, and algorithmic selection determines who is noticed after entry.

Authority: New pathways and persistent hierarchies

Digital religion pluralises the sources from which believers obtain guidance. Bunt (2018) documents the transformation of Islamic authority through cyber-Islamic environments, while Cheong (2017) emphasises changing communicative authority in religious organisations. Online users compare clerics, influencers, institutions, peers, and searchable archives. Authority can become distributed, personalised, and networked. Women can use this opening to demonstrate knowledge and build communities without first obtaining access to a male-controlled physical platform. Muttaqin (2020) shows how social media creates space for Muslim women's identities and new religious authority, although gender bias persists. Nas (2022) illustrates how online activism can turn gendered religious space into a public issue. In Nigeria, Fahm (2025) identifies expanded autonomy and learning opportunities for Muslim women, while Oloba and Blankenship (2025) find that female Christian leaders broaden their communication and influence online. However, authority remains hybrid rather than fully democratised. Institutional position, theological education, age, family lineage, denomination, and male endorsement interact with follower counts, visual competence, and audience intimacy. Nigerian female leaders may be visible but still receive less recognition than male leaders (Oloba & Blankenship, 2025). Moreover, popularity can be mistaken for expertise. When engagement metrics are treated as proof of spiritual legitimacy, the platform's commercial ranking system becomes an unacknowledged participant in religious credentialling. This produces a central paradox. Digital media weaken some gatekeepers while creating others. Traditional gatekeeping by religious institutions is supplemented by platform gatekeeping, influencer networks, monetisation systems, and audience surveillance. Inclusion therefore requires transparent ways of recognising expertise without simply restoring exclusionary hierarchies or accepting popularity as truth.

Safety and accountability: The unequal cost of participation

Participation carries gendered risks. Women and girls face harassment, stalking, non-consensual image use, impersonation, sexualised abuse, doxing, and coordinated attacks. UNESCO (2023) warns that generative artificial intelligence can intensify technology-facilitated gender-based violence through synthetic media, automated harassment, and discriminatory systems. UN Women (2022) similarly identifies online violence as a barrier to women's public participation and rights. Religious discourse can intensify these risks because criticism may be presented as defense of sacred values. Women who interpret texts, claim leadership, discuss sexuality, or challenge institutional practice can be attacked simultaneously as women and as allegedly deviant believers. Intersectional factors affect the severity of harm: minority status, age, disability, ethnicity, poverty, and public visibility may increase exposure while reducing access to remedies. Safety is not achieved merely by advising women to be cautious. Such advice can shift the burden from institutions and perpetrators to potential victims. Sustainable participation requires community rules, trained moderators, confidential reporting, evidence preservation, pastoral and psychological support, clear escalation pathways, and platform responsiveness. Religious leaders must distinguish good-faith theological disagreement from humiliation, threats, and gendered abuse. Platforms must provide context-sensitive moderation and meaningful appeals, including support for Nigerian languages and local religious terminology.

Belonging, difference, and digital religious publics

Digital religious inclusion also concerns relations among faiths and internal differences within a tradition. Haq and Kwok (2024) find that social media can increase exposure to religious others while also reinforcing stereotypes, selective exposure, and polarisation. Platform affordances allow believers to encounter diversity, but shallow or hostile engagement may harden group boundaries. Women and minority voices may become symbolic battlegrounds through which communities display moral purity. Counter publics can provide protection and solidarity. Closed women's groups, youth networks, disability fellowships, and minority-faith forums may create spaces in which participants speak with reduced risk and develop collective interpretations. Fraser (1990) helps explain their democratic value. Yet closed spaces should

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not become the only locations in which marginalised groups can participate. Inclusion also requires access to the main arenas where religious priorities, resources, and policies are decided. The Nigerian context demonstrates both promise and limitation. Digital platforms can connect Muslim and Christian women to knowledge and leadership networks, but regional inequality, data costs, patriarchal norms, and uneven institutional recognition continue to shape participation. The evidence does not support either technological optimism or pessimism. Digital media can redistribute power, but only through the interaction of user agency, community norms, institutional reform, and platform accountability.

Digital Religious Power and Inclusion Framework

The synthesis supports a four-dimensional framework for evaluating digital religious spaces. The dimensions are sequential but mutually reinforcing. Weak access reduces visibility; limited visibility constrains authority; insecurity produces withdrawal; and lack of authority prevents marginalised participants from changing the conditions of access and safety.

Dimension	Core question	Mechanisms of inclusion	Mechanisms of exclusion	Indicative measures
Access	Who can enter and participate consistently?	Affordable data, device autonomy, low-bandwidth options, accessible design, digital literacy, local languages	Cost, shared devices, poor electricity, inaccessible interfaces, limited skills, household restrictions	Independent device use, participation frequency, accessibility compliance, language availability
Visibility	Whose content is discovered and amplified?	Transparent ranking, diverse recommendations, captions, searchability, fair moderation	Algorithmic invisibility, pay-to-reach systems, visual bias, language errors, unequal production resources	Reach by gender and location, removal and appeal outcomes, recommendation diversity
Authority	Whose knowledge and leadership are treated as legitimate?	Fair recognition, transparent credentials, participatory governance, audience trust	Patriarchal endorsement, celebrity metrics, institutional exclusion, harassment-driven silence	Leadership roles, speaking time, decision influence, recognition beyond follower counts
Safety-accountability	Who can participate without disproportionate harm and obtain redress?	Codes of conduct, trained moderators, confidential reporting, survivor support, platform accountability	Gendered abuse, doxing, impersonation, weak moderation, victim-blaming, opaque appeals	Incident response time, remedy rates, recurrence, user confidence, safeguarding audits

The framework advances three propositions. First, access without visibility creates nominal inclusion. Participants may be present but unheard. Second, visibility without authority creates spectacle rather than influence. Marginalised voices may attract attention while remaining excluded from decisions. Third, authority without safety is unstable. A person who must endure disproportionate abuse to speak cannot participate on equal terms. The desired outcome is participatory parity across all four dimensions.

Policy and Practical Recommendations

Religious organisations

Religious organisations should adopt gender-responsive digital governance policies that cover official pages, livestreams, messaging groups, teaching platforms, fundraising, counselling, and the personal accounts of authorised representatives. Policies should define acceptable conduct, prohibit gendered abuse, establish confidential complaints procedures, and specify consequences. Moderators require training in safeguarding, theological disagreement, privacy, and technology-facilitated violence.

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Leadership and content decisions should involve women, young people, persons with disabilities, rural members, and minority groups. Gender balance should apply not only to public speakers but also to administrators who control passwords, data, schedules, budgets, and moderation. Organisations should provide low-bandwidth audio and text alternatives, captions and transcripts, accessible documents, and predictable publication schedules. Digital participation should complement rather than replace accessible physical participation. Religious institutions should also clarify how online teachers and influencers are recognised. Transparent information about qualifications, institutional relationships, funding, sponsorship, and content ownership can help audiences distinguish expertise from popularity. Such transparency must not be used to exclude emerging voices; mentoring and fair pathways to recognition should accompany it.

Platform companies

Platform companies should publish clearer information about recommendation, demonetisation, content removal, and appeal processes. Gender and language audits should test whether religious content by women or in Nigerian languages is disproportionately suppressed, misclassified, or exposed to abuse. Local expertise is essential because automated systems may not understand theological vocabulary, coded insults, or the distinction between documentation, criticism, and incitement. Safety tools should include effective controls for mass harassment, impersonation, doxing, non-consensual imagery, and synthetic media. Reporting mechanisms must be usable on low-cost devices and weak connections. Platforms should preserve evidence for legitimate complaints while protecting privacy. Accessibility features such as captions, screen-reader compatibility, alt text prompts, adjustable text, and audio alternatives should be treated as core infrastructure rather than optional additions.

Government, regulators, and civil society

Public policy should address affordable connectivity, reliable electricity, rural coverage, digital literacy, disability access, and women's control of devices. Responses to online violence must protect freedom of expression and religious liberty while providing clear remedies for threats, stalking, impersonation, and image-based abuse. Overbroad regulation that permits political or religious censorship would undermine the inclusion it claims to protect. Civil society organisations and universities can establish digital safety clinics, support research, train faith-community moderators, and provide public resources in major Nigerian languages. Partnerships among religious organisations, women's groups, disability organisations, technology experts, and legal practitioners can develop context-sensitive safeguarding standards.

Research agenda

Future research should combine digital ethnography, interviews, content analysis, and platform data. Studies should compare Christian, Muslim, and indigenous religious settings across Nigeria's geopolitical zones and disaggregate findings by gender, age, disability, location, language, education, and income. Researchers should examine not merely who posts, but who is recommended, believed, monetised, invited to lead, and able to obtain redress. Longitudinal studies are needed because platform rules and audience practices change rapidly. Research should also include people who withdraw or remain silent, since visible users cannot represent those excluded by cost, fear, or social pressure. Ethical protocols must protect participants whose religious and gender identities make them vulnerable. Finally, participatory research should involve affected communities in defining inclusion and evaluating proposed interventions.

Conclusion

Digital religious spaces are neither inherently emancipatory nor inherently oppressive. They are contested environments in which religious traditions, social inequalities, user agency, institutional rules, and platform infrastructures meet. Digital media can enable women to gain knowledge, narrate faith, form communities, challenge spatial exclusions, and establish relational authority. Nigerian evidence from Christian leadership and Muslim women's learning confirms these possibilities. At the same time, male authority, unequal connectivity, reputational policing, engagement-driven algorithms, and technology-facilitated violence can reproduce or intensify exclusion. The paper's principal contribution is to distinguish four requirements of digital religious inclusion: access, visibility, authority, and safety-accountability. These requirements move analysis beyond the assumption that connectivity equals empowerment. Access asks who can participate; visibility asks who is seen; authority asks who can influence belief and decision-making; safety-accountability asks who bears the risks and whether remedies exist. Inclusive digital religion must therefore be intentionally designed and governed. Religious organisations must reform their own digital practices; platforms must accept responsibility for ranking,

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moderation, accessibility, and safety; governments must improve meaningful connectivity while protecting rights; and researchers must produce intersectional evidence. The ethical test is not simply whether religious messages travel farther, but whether digital transformation enables more people to participate with dignity, credibility, security, and real power.

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Qualitative Study on Strategies for Promoting Entrepreneurial Skills Development for Self-Reliance among Primary School Pupils in Nigeria

ANI, Hannah Sunday[1]
hannahsundayani@gmail.com
08038174731

NDIFON, Friday Ogobi[1]
fridayogobi@gmail.com
08039626551

OKON, Emilia Etim[1]
08108456227

[1]Department of early Childhood Education, Faculty of Professional Education, University of Education and Entrepreneurship Akamkpa, Cross River Sate, Nigeria

Abstract

Introducing entrepreneurial values from an early age is one of the most important efforts in shaping the character of future generations. Therefore, entrepreneurship learning in children leads more to child mental change so that entrepreneurship education will form a strong child character such as being creative, discipline, critical, able to solve problems, able to communicate, appreciating time, self-controlled, and so on. In promoting entrepreneur-based programmes in early childhood, it is not only the efforts of cognitive formation by informing children about the definition, benefits, and ways of entrepreneurship but also being able to integrate it through the themes in the curriculum used. The following terms were clearly discussed namely, childhood education, the entrepreneurship, self-reliance, entrepreneur for early childhood were also stated including the entrepreneur-based programmes to be adopted such as entrepreneur stimuli, visit to farm, bank, market, outing to culinary entrepreneurs and cooking learning activity. Entrepreneurial values instilled through those activities are creative, unyielding, action-oriented, hardworking, honest, resilient, imaginative, inquisitive, and communicative. Based on these propositions as well other discourses a number of recommendations were suggested which includes; a call for Nigerian Government and other relevant stakeholders must ensure that educational programme across all levels of education are relevant so as to provide children, youths and graduate with the necessary skills to go into entrepreneurship. The paper emphasis that based on the shared responsibilities for entrepreneurship development it can be employed as a viable tool for sustainable development in Nigeria

Keywords: Childhood, Entrepreneurship, Entrepreneurial Skills and Self-Reliance

Introduction

Education is a vital instrument for national and sustainable development and it involves the acquisition of fundamental knowledge and essential development skills needed for technological breakthrough and sociopolitical development which accelerates economic growth. According to Ndifon and Orim (2026), one way to transmit societal values that would transform the young child and make his society a better place to live, schemes for better ways of passing the desired knowledge and values that would make them functional is through education. Education is the process of preparing the younger generation to be useful to themselves and society. Educators have argued that one of the best ways for schools to prepare early learners for a successful future life is to develop in them a range of life skills (Bassey and Ndifon, 2021). The early learner must be developed totally through education to enhanced national development (Ndifon, Bassey, and Ewa, 2022). For the development of an educational system that is knowledge based both in structure and functionality, there is a great need for children's acquisition of creative and entrepreneurial skills for self-reliance. These skills may not be properly acquired without the contributions of childhood education. Childhood is the earliest period of human life, started at the time of birth and ended at the time of adulthood. It is a very decisive period of human life, having certain characteristics and potentials which become the basis for growth in the future (Wasty, 2018). Thus, early childhood education should be able to form the strong trait, character, and personality of children in order to achieve their success in the future. Early childhood education is the holistic development of the child for sustainable development (Bassey, and

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Ndifon, 2025). Thus, this paper is an attempt to discuss on strategies for promoting entrepreneurial skills development for self-reliance among primary school pupils.

Literature Review

Childhood is a period of time in the life of any human between birth and eighteen years. Childhood as opined by the United Nations Children's Fund (UNICEF, 2004) is the foundation of the world's future and must be given the highest priority attention in all ramifications. The Encarta Encyclopedia (2006) described childhood as the first stage of life and the most important, tender and dangerous which is characterized by physical, emotional growth and development. Olaitan and Akpan (2023) see childhood as a unique, precious and critical period for effective development. The United Nations General Convention (1990) is of the view that childhood determines anybody's lifetime. Ogboru, Arinze and Eboh-Nzekwue (2015) said that childhood is a natural phenomenon. He stressed that it is a developmental period which biologically determines a distinct period of life. It is glaring from the aforementioned that childhood is an important period in the life of any human being. It is the period that determines the personality of any person. Because it is the foundation of life, it is therefore expedient that this very important period in anyone's life be handled with utmost care, and be given necessary attention because the period has the potential to make or mar the future of any person, as the case may be. Thus, childhood education is necessary. Childhood education is the education given to children from birth to 12 years. It comprises pre-primary and primary education. The focus of this paper is the Primary School Child. Because children is plural of child, both are used interchangeably in this paper. The primary school child receives education at the primary education level. Primary education is the education given in institutions to children aged 6 – 12 years (FRN, 2013). Its objectives are to:

1. inculcate permanent literacy, numeracy and the ability to communicate effectively;
2. promote patriotism, fairness, understanding and national unity;
3. instill social, moral norms and value in the child;
4. develop in the child the ability to adapt to the changing environment; and
5. lay a sound basis for scientific, critical and reflective thinking;
6. provide opportunities for the child to develop life manipulative skills
7. that will enable the child function effectively in the society within the limits of the child's capacity.

From this objective mentioned above it can be deduced that the objective is focused on reconciling the issues of self-reliance that is necessary for higher standard of living with that of enhancing with the challenges being faced in the Nigerian space today. Hence, entrepreneurial skills among primary school children can aid in fostering self-reliance and sustainable development. (Ani, H. S., Ndifon, F. O. and Bassey L. A, 2026). Skill could be defined as the learned capacity to carry out pre-determined results often with the minimum outlay of time, energy, or both. The concept of skill comes from the field of psychology, where it is widely used to explain human development across different domains. Fischer and Bidell (2005) define skill as "a capacity to act in an organized way in a specific context". A skill is a translation of one's expertise/knowledge into a behavior. In adapting the skill concept to entrepreneurial behaviour, it is suggested that entrepreneurial skills represent a capacity to organize and develop a business successfully and sustainably.

Concept of Entrepreneurship/Entrepreneurial Skills

Entrepreneurship is the creative and innovative ability that is used as the basis, tips, and resources to find opportunities for success. The essence of entrepreneurship is the ability to create something new and different through creative thinking and innovative action to create opportunities (Suryana, 2006). In the past, entrepreneurship was deemed to be done only through direct experience in the field and was an innate talent so entrepreneurship could not be learned and taught. Now that understanding has changed. Entrepreneurship is a separate discipline because it contains a complete and real body of knowledge which has objects, concepts, and methods. The discipline of entrepreneurship has rapidly grown. Initially, entrepreneurship was applied in the field of trade, but later it developed in other fields such as industry, government, health, and education. Entrepreneurship has become the core competency in creating change, renewal, and progress. In the field of education, entrepreneurship aims to foster entrepreneurship spirit in students so that in the future it can create entrepreneurs. However, the integration of entrepreneurship education in the learning process itself is an internalization of entrepreneurial values in learning activities. The values developed in entrepreneurship education are the development of

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values from the characteristics of entrepreneurs that should be owned by the learners. Some of the entrepreneurial values along with their descriptions will be integrated through entrepreneurship education as follows:

Table 1: Values and description of values of entrepreneurship education

Value	Description
Independent	Attitudes and behaviours that are not easy depend on others in completing tasks
Creative	Think and do something to produce different ways or outcomes from existing products/services
Take a risk	A person's ability to love challenging, courageous and risk taking jobs
Action-oriented	Take the initiative to act, and not wait, before an unwanted event occurs
Leadership	The attitude and behavior of someone who is always open to suggestions and criticism, easy to get along, cooperate, and direct others.
Hardworking	Behaviours that indicate efforts to complete tasks and to overcome various barriers.
Honest	Behaviours based on an attempt to make oneself trustworthy in words, actions, and works.
Discipline	Action that demonstrate orderly behaviour and abide by various rules and regulations.
Innovative	Ability to apply creativity in order to solve problems and opportunities to enhance and enrich life
Responsible	Attitudes and behaviour of a willing and capable to carry out duties and obligations.
Cooperative	Behaviour based on an attempt to make oneself able to establish relationships with others in carrying out actions, and jobs.
Resilient	Attitudes and behavior of someone who does not easily give up to achieve goal with various alternatives.
Commitment	Agreement about something made by a person, both to himself and to others
Realistic	Ability to use facts/reality as a rational basis of thinking in every decision and action
Enthusiasm	Attitudes and actions that always strive to know in depth and breadth of what is learned, seen, and heard
Communicative	Actions that show the pleasure of talking, getting along, and working with others
Strong Motivation	Attitudes and actions are always looking for the best solution for success

Source: Agus (2021:35)

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Concept of Self-Reliance

Self-reliance denotes confidence, trust and a state of being dependent on oneself. To rely means to need or depend on; to trust or to have confidence in. Self-reliance therefore would mean depending on oneself for all what one would need, having trust in oneself and a high self- esteem. Self-reliance is said to be a precursor of independence and creativity. During the preschool years, parents and caregivers are normally very careful of the child's nutrition, health and association. Extra care is normally given to the child that when unbiased people assess, it may be said that the child is overindulged. This is normally the case with only, first and sometimes last children. When the child is of school age, parents investigate and over pressurize the school authority to the extent that the child is not given any physical work to do. Schools where labourers and cleaners are employed are socially judged as the best for children. Where and when will the child learn to do things for himself which is the whole essence of self-reliance? Where and when will the child assess his capability so that he learns to have confidence in himself? Starting from birth, rudiments of self-reliance should be laid in the child depending of course on the developmental tasks of the age grade. According to Sigmund Freud (1931) in Faw (2020), the child at the oral stage (0-2yrs) has the libidinal energy centred around the mouth. He gains gratification through the mouth. If he is taught (education) how to lift his bottle by himself towards his mouth, empty it and gain satisfaction there from, this will surely be laying a good foundation for self-reliance. By age 2-3yrs, he (Freud) x-rays that the libidinal energy is centred around the anus and the child gains gratification from toilet training. At this stage, a child can be taught how to be clean by proper toilet training. Cleanliness they say is next to godliness. Cleanliness in body lays a foundation for an upright character. At the phallic stage, he loves and cares for himself and his belongings while he can be taught to care for the elderly around him at the Oedipus/electral stage. He can learn to reduce selfishness/egocentricism at this and the next stages (latency stage). By the last stage (age 11+), a stable personality who has self-confidence which can be harnessed and enhanced has emerged. Going by the above paradigm, the pre-primary child should be able to do a few things for himself. He should be able to dress and undress himself with minimal assistance; he should be able to wash some little bits of clothing like socks, pants and handkerchief. He should be able to run some errands. Especially as he approaches the Oedipus/electral complex stage, he should be able to pound pepper for mummy, take daddy's shoes to his room, and fetch water to wash some plates. He should be able to do these with ease, pride and confidence. In many homes, children of this age normally have a younger sibling. He would be happy to play a significant role in taking care of the sibling. "Bring me baby's powder". "Put this in baby's drawer" and the like. All these errands build in the child confidence, initiative and autonomy especially when praise and encouragement are applied. By the early primary classes, the child who is raised in the positive line of Erikson's psychosocial stages would grow towards knowing what he can do and having sufficient confidence in trying even challenging tasks (Ndifon, F.O., Bassey, E.O. and Ewa, G.M. 2022). By mid-primary age and even before end of primary education, we would have a child who is confident, knowledgeable about what he is able to do and what he may consider challenging. He would use this attitude to approach every other aspect of life. Here, we can say that the foundation to self-reliance has been laid. Hence, entrepreneurship can aid in fostering self-reliance.

Entrepreneur for Early childhood

Entrepreneurial education in schools is not just about motivations and skills needed to start-up a business or a new venture, it is about nurturing the ability and willingness of individuals to create value for themselves, for others and for society. Initiative and entrepreneurship form a key transversal competence, which can be effectively promoted through education. The idea of promoting entrepreneurship through education has spurred much enthusiasm in the last few decades in expectance of a wide range of outcomes, such as individual development, increased school engagement and performance, enhanced courage to contribute to societal development, improved equality, as well as job creation, economic growth and increased societal resilience. Turning this into educational practice, is, however, posing significant challenges to teachers, and school management and external partners in creating creative and open learning environments. Key enablers and barriers lie in teaching and learning environments. Lack of time, learning materials and financial resources, the fear of teachers and parents of "commercialism", rigid institutional frameworks, and challenges to assess learning outcomes of entrepreneurial education are some of the challenges practitioners are encountering. Effective environments are constituted by the right combination of leadership and flexibility, resources, incentives and professional development opportunities for teachers, innovative pedagogies and constructive involvement of pupils into education, as well as community engagement,

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involvement of businesses and entrepreneurs in teaching and learning, authentic learning and local curricula. Introducing entrepreneurship in school could affect children's views on entrepreneurship, and childhood is considered the ideal stage to educate and develop a positive attitude towards it. Additionally, preschool constitutes the take-off for the evolution of the entrepreneurial self, and childhood has been considered to be the most appropriate age group to acquire positive attitudes towards entrepreneurship and to adopt an entrepreneurial approach (Axelsson, 2015). Growing the entrepreneurial spirit in early childhood is basically more on building the traits and characters of being independent, responsible, optimistic, and not easily giving up. Therefore, entrepreneurship learning in early childhood can be integrated into the curriculum through programmes or activities designed by schools which the implementation involves not only principals, teachers and children but also involving parents.

To cultivate strong traits and characters as expected, according to Mursid (2015) learning for early childhood should take into account the following principles:

1. Children as active learners: Education should lead children to become active learners. Creatively designed education will produce an active learner. The process of education like this is a form of learning that relies on active learning activities or known as the Student Active Learning (CBSA = Student Active Learning)
2. Children learn through sensory and senses: Children gain their knowledge with their sensory, they can see with their eyes, they can hear the sound with their ears, they can feel hot and cold with their touch, they can distinguish the smell with their nose and they know the different tastes with their tongue. Therefore, learning in children should lead children to the various abilities that can be performed by all senses.
3. Children build their own knowledge: Children are allowed to learn through their experiences and their knowledge that they have experienced since they were born and they have gained during their life.
4. Children think through concrete objects: Children need to learn with real objects so that they are not confused. It means they are stimulated to think with learning methods that use real objects as examples of learning materials.
5. Children learn from the environment: Education is a conscious effort which is done deliberately and planned to help children develop their potential optimally so that they are able to adapt to the environment.

The establishment of the entrepreneurial spirit especially in children does not occur in a short time, but it takes time as the child's development process. They can be directed to form their entrepreneurial spirit. The formation of the entrepreneurial spirit is not an activity to form a child to become an entrepreneur directly, but it can be directly or indirectly internalized to the child. The internalization of entrepreneurial spirit at the stage of preschool can be conducted with various methods of games. The purpose of this game is not shaping the skills of the child's business directly but forming the specific character needed to become a successful entrepreneur later. For example, children are asked to sing while crossing the wooden bridge. This stimulates the courage of children to take risks for the purpose to be achieved. Similarly, when they are grown-up, an entrepreneur should be able to take risks for the development of his business (Muhamad and Wirawan, 2024).

Promoting Entrepreneurial Skills Development for Self-Reliance Among Primary School Pupils

In order to realize the goals of self-reliance among primary school pupils in Nigeria teachers and parents must develop various programmes. The entrepreneur-based programmes that aim to direct and introduce entrepreneurial values are as follows according to (Muhamad and Wirawan, 2024):

Entrepreneur Stimuli:

Entrepreneur stimuli are activities that stimulate the mindset of children to become entrepreneurs Bassey, Ndifon, and Diwa, (2025). The activities are daily given to the children through daily learning activities such as building blocks that is making high and luxurious apartment buildings so that later they become an apartment businessman or any other building that children want according to their ideas. Also, children are invited to elaborate their ideas, projects, interests or goals, within a context were they experience total freedom and confidence. Children's initial statements are crucial to build communities based on common interests. It is also intention that children are introduced to a culture in which the public presentation of interests and the sharing with others with similar interests are opportunities for work development. For example (task for children 3-6 years old) - A story about a child who loves drawing and how he/she took part in doing an

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exhibition of his/her drawings. Afterwards the teacher talks to the children about what they love to do. The teacher writes the children's statements on the board and children are asked to draw their own ideas.

Visit a Farm: Visit a farm is a programme of outing or visit to the animal farms to introduce the world of entrepreneurs in children. In this activity, a lot of entrepreneurial value that can be given to children such as being brave, confident, creative to mention business opportunities, and visionary that the child can have big dream such as being a dairy businessman.

Visit to Bank: A visit to the bank is a programme that can introduce the meaning of money to children. The activity includes visiting every teller and customer service. Their children can ask what the teller and customer service do. In addition, children are also introduced ATM and how to do transactions using ATM. In this activity, the children know the use of money, kinds of money and how to use it. Besides they learn to be efficient and to love saving money.

Outing to Culinary Entrepreneurs: Outing to culinary companies is a visit activity to introduce children to culinary entrepreneurs. It starts from visiting the place, introducing the product and how to make it until participating directly to make the product. Then the children are also introduced to how the marketing process of the product runs. This visit aims to provide knowledge to children about how to be a manager of a creative and innovative culinary company instead of being a worker and a company's labor. Children can more develop ideas and business opportunities as they wish.

Cooking learning Activity: This is a set of activities that every child awaits. In this activity, the participants are taught how to cook, starting from introducing raw materials, tools used for cooking, cooking practice until how to organize and serve food.

Visit to Market: Visit to the market day is the next activity. It is a macro role-play activity that can be held at school. In this activity they act as sellers and buyers like in the market, either traditional market or modern market. This activity aims to provide experience directly to the child to become an entrepreneur or a trader. In this activity children are required to be brave, Independent, able to communicate with the public and able to promote products in the form of goods that they bring from home. With this activity they do not feel like they are learning, but they consider it as a fun activity.

Conclusion

It has therefore become apparent that entrepreneurship can be taught and that countries who seek to continuously develop most adopt entrepreneurship education. Nigeria is no exception and there is no better time than presently if the nation is to overcome its present economic woes and transition into a developed culture so as not to jeopardize the future of generations to come. Nigeria can key into the Economic survival theory which highlights that entrepreneurship is encouraged by those impacted by unpleasant circumstances in life. Learning activities to introduce and in still the values of entrepreneurship in children can be implemented through entrepreneur-based programmes, such as entrepreneur stimuli, visit to farm, bank, market, outing to culinary entrepreneurs and cooking learning activity. All learning activities from the beginning to the end are done in accordance with the principles of learning for early childhood and directed towards the achievement of learning objectives. Entrepreneurial values instilled through those activities are creative, unyielding, action-oriented, hardworking, honest, resilient, imaginative, inquisitive and communicative.

Recommendations

The following recommendations were made**:**

1. This research identifies the importance of entrepreneurship in the growth and advancement of developing countries which Nigeria is one of them. It is imperative therefore that the Nigerian government should urgently provide materials and well-furnished and equipped capacity building centers for teaching in institutions of learning.
2. The Nigerian Government and other relevant stakeholders must ensure that educational programme across all levels of education are relevant so as to provide children, youths and graduate with the necessary skills to go into entrepreneurship.
3. The school should pay attention and organize the existing infrastructure of the school so that the learning process through the activity programmes that have been made can be more optimized.
4. Teachers should develop self-capacity with an additional set of knowledge and skills through seminars and workshops

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Impact of Adaptive Pedagogy and AI-Driven Support Systems on Educational Management Training among Universities in Nigerian: A Review

ANISULOWO, Bukola Olumide[1]
bukola.anisulowo@fuoye.edu.ng

SHAIBU, Leonard[2]
leoshaibueyi@gmail.com
+2347036759541

[1]Department of Educational Management and Business Studies, Faculty of Education, Federal University Oye Ekiti. Ekiti State.
[2]Department of Educational Management and Planning, Faculty of Education, Federal University Lokoja, Kogi State-Nigeria

Abstract
This narrative review examines the possibilities and implications of AI-based support systems for educational management training in Nigerian universities, with particular attention to adaptive pedagogy. Using a literature-based review approach, it draws on pertinent scholarly research and conceptual literature on artificial intelligence, adaptive learning systems, educational management, leadership development, learning analytics and institutional decision-support. The sources were synthesised thematically to identify applications, benefits, constraints and gaps in AI-supported management training. The review finds that AI-enabled support can strengthen individualised professional learning, analysis, administration, decision-making and adaptive institutional leadership. Implementation in Nigerian universities is constrained by weak digital infrastructure, connectivity and funding; low digital literacy; shortages of skilled staff; limited capacity-development structures; and unresolved issues of data privacy and ethical governance. A major empirical gap remains: little research examines AI support systems specifically within educational management training in Nigerian universities. The study contributes an integrated account of AI, adaptive pedagogy and educational management training in the Nigerian context, and identifies the institutional conditions required for sustainable use. It recommends continuous professional development in AI, investment in digital infrastructure, and context-specific governance models for responsible implementation.

Keywords: Artificial Intelligence, Adaptive Pedagogy, AI-Driven Support Systems, Educational Management Training, Nigerian Universities, Higher Education.

Introduction
AI is not just about automation; it is redefining higher education and transforming it into adaptive, personalized learning. AI/ML's incorporation into e-learning has been proven in reviews, where adaptive systems optimize learning progressions for individual learners, boost engagement, and aid in academic achievement (Gligorea et al., 2023). At the curricular level, AI-powered tools and applications have transformed management education by making it more experiential and immersive, more evidence- and data-driven, and more personalized, enhancing students' engagement and learning (Mutsuddi, 2025). In AI-driven teaching, intelligent tutoring systems, predictive analytics, and real-time feedback mechanisms are now regarded as integral tools that enhance engagement, retention, and critical thinking (Rajkumar et al., 2025). On the institutional side, AI has also started to play a crucial role in university management: AI's capability to analyze and consolidate data from various sources like admissions, learning platforms, academic records, and human resources into a unified whole is a significant challenge, as it enables to transform that data into actionable insights for strategic planning, quality assurance, and operational efficiency, suggesting positive impacts on enrollment management, resource allocation, and student success efforts (Nara et al., 2026). Decision support systems have also shown positive impacts on managing student enrollments, allocating resources, and supporting student success programs (Zhang & Goyal, 2024). However, faculty readiness and institutional capacity limit the potential of these systems. To equip teachers with the knowledge, skills, and mindsets to use these tools effectively, professional development, training programmes, and technical support are needed (Ng et al., 2023, p. 153). However, several universities have reported that faculty members still lack access to the required infrastructure, policy guidance, and professional development programmes to implement AI pedagogy

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effectively (Hazra, 2026). This global context exists against the backdrop of a long-standing quality challenge in Nigerian public universities, where the quality of graduates and the relevance of their skills and attributes to the socioeconomic development of the nation have been constantly questioned (Nnadozie et al., 2023; Ogar et al., 2022; Olutola & Olatoye, 2020). TETFund has made several investments in staff training to offset the capacity gap (Ezekwe & ANI, 2023), and the adoption of technology has been found to affect academic staff engagement when institutions provide support (Ruth et al., 2024). Despite the potential of AI in reshaping the landscape of education, its penetration into the Nigerian university system is still in its early stages, facing challenges such as limited internet access, a shortage of resources, a lack of skilled personnel, concerns about data privacy and security, and inadequate infrastructure (Luwoye et al., 2024). Despite the benefits that Nigerian students see in using technology-based learning platforms for improved comprehension and retention, Nigerian studies also highlight the positive aspects of generative AI (learner support, accessibility, scalability) as well as the negative aspects (subversion of academic honesty, increased lecturer work load, and overreliance) emphasizing the need for critical AI literacy, institutional AI policies, and robust data governance (Peters & Olojede, 2025). However, little empirical research exists on the impact of AI-based support systems on educational management training and on training academic and administrative staff in managing teaching, learning, and institutional processes. This gap, along with the current study's examination of how AI-based support systems influence educational management training in Nigerian universities through the lens of artificial intelligence and adaptive pedagogy, forms the basis for this study.

Review of Related Literature

Artificial Intelligence

Artificial intelligence (AI) is the family of computational technologies that can mimic human cognitive capabilities, including learning, reasoning, perception, and problem-solving, in computer systems. AI has been a reality since the early 1960s, when intelligent tutoring systems (I.T.S.) emerged as a substantive area of research in education (Bond et al., 2024, p. 1). AI has also come to the fore in higher education; the 2018 Horizon Report in higher education forecasted that the use of AI in teaching and learning would accelerate at a faster pace than other uses, predicting that it would increase by 43% between 2018 and 2022 (Zawacki-Richter et al., 2019, p. 1). The survey results indicate that adaptive systems and personalisation, and profiling and prediction, are the two most commonly researched areas of AI for HE, while the most prominent application areas are intelligent tutoring systems and learning analytics, and automated assessment (Bond et al., 2024, p. 1; Crompton & Burke, 2023, p. 20). In the context of developing countries like Nigeria, AI is seen as a potential game-changer in education due to its ability to personalise learning, optimise administrative processes, enrich content delivery, and make informed decisions based on data, despite a lack of infrastructure, internet connectivity, funding, and expertise to back its implementation (Luwoye et al., 2024).

Adaptive Pedagogy

Adaptive pedagogy is an orientation to instruction that continuously and systematically adapts instruction to the features of the individual learner. It stems from the pedagogy of personalising learning, which is explicitly learner-centred and inclusive, and requires educators to cater for all learners (Peng et al., 2019, p. 4). It is defined as: "The systematic adjustment of instructional parameters as a function of the specific characteristics of the learner that are relevant" (Tetzlaff et al., 2023, p. 2), such as a person's prior knowledge, cognitive capabilities, and affective and motivational states. Adaptivity exists on a continuum, from differentiated instruction, which is teacher-led planning of instruction based on learner differences (Peng et al., 2019, p. 3) to adaptive instruction, which is the customization of the content, feedback, and pacing of instruction based on learners' real-time data (Ginting et al., 2024, p. 2007). However, there is a danger in being too purely technological or, as critics warn, "lacking pedagogies" in the use of personalising tools (Pina et al., 2018, p. 2), as pedagogical assumptions that are implicit in the design of the adaptive environments must be made explicit if they are to be used for educational purposes. Adaptive pedagogy thus can be interpreted as a principled combination of learner-centred theory and data-driven educational practice.

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AI-Driven Support Systems

AI-powered support systems in universities are technological infrastructures that gather, combine and interpret institutional data for human decision-making. Higher education institutions produce vast, dispersed data sets in the areas of admissions, learning platforms, academic records, advising, finances, and human resources, which makes it possible to leverage AI and transform these data into actionable intelligence to inform strategic planning, quality assurance, student success initiatives, and operational efficiencies (Nara et al., 2026). Empirical research on decision support systems in higher education administration has consistently documented high rates of use and found they have had a positive impact on strategic planning, enrolment management, resource allocation and student success initiatives, as well as highlighted issues of data quality, data privacy, and change resistance (Zhang & Goyal, 2024). AI-based systems can be designed to be tailored, built using machine learning, predictive modelling, and adaptive algorithms to optimise student experiences, identify students at risk, and inform administrative and academic decisions – and to be fair, accountable, and transparent (M, 2022; Paul et al., 2024). These systems serve as the operational link between raw institutional data and improved management and pedagogical outcomes.

Educational Management

Educational management integrates organizational, administrative, strategic, and pedagogical processes to provide high-quality education and ensure the efficient functioning of educational institutions (Lysokon et al., 2024). As a science, it is pluralistic (multiple perspectives) and should be pluralistic in its content and perspectives and must never be detached from educational purpose; when educational purpose and management are separated, there is the risk of "managerialism": "a stress on processes at the expense of educational purpose and values" (Sauphayana, 2021, p. 166). In modern educational management, digitalisation, capacity building, ethics, and decision-making have been identified as central aspects of leadership that distinguish institutional vision from inclusive learning spaces and continuous innovation (Ashraf & Alam, 2025). In this context, university management needs a balanced approach that sets clear goals, assesses the quality of teaching and research, continually improves educational processes, and maintains open communication with stakeholders (Lysokon et al., 2024). Here, AI-powered support systems are relevant as tools to make management more evidence-based, responsive, and adaptable.

Educational Management Training

Educational management training is a structured process for developing the specialized skills and knowledge of personnel in charge of educational institutions, including training centers for educational management officials (Thom & Ngoc, 2024). University research shows that leadership skills can improve through formal management training, but informal approaches like self-awareness, social networks, and peer problem-solving are likely key methods in managerial development (Terrion, 2006). The best professional development program for university administrative staff aligns with the university's strategic goals, is flexible to its organizational structure and culture, and builds an "adaptive administrative environment" (Grinkevich & Шабанова, 2018). Based on empirical research on training middle-level administrative managers, factors fall into three categories: organisational, functional, and individual; human-related factors (support from leaders, staff capacity, and manager motivation) are most influential (Ngân, 2023). To be transformative, university management training needs supportive institutional climates.

Higher Education: Nigerian Universities

In Nigeria, public universities face constant resource limitations and growing demand, embodying this paradox in their approach to AI. AI's potential for personalised learning, administrative efficiency, and data-driven decisions is juxtaposed with challenges such as limited internet access, a scarcity of skilled personnel, data privacy and security concerns, inadequate infrastructure, and underfunding of the university system (Luwoye et al., 2024). Critical examinations confirm that infrastructural and resource gaps, along with low-quality and limited information availability, constrain adoption and require intentional investment in capacity building and fair, transparent system design (FCIMN, 2026). Institution-based findings from Nigeria further suggest infrastructural problems, lack of lecturer training, and low digital competence as key challenges, implying that unless deliberate capacity-building efforts are made, most lecturers will continue to use traditional

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teaching methods (Jesam et al., 2025, p. 136). Meanwhile, Nigerian research on generative AI highlights both the benefits – such as facilitating student learning, making learning more accessible and scalable – and the risks – including integrity in academic work and workload burden on lecturers (Peters & Olojede, 2025); the technology-based learning platforms also have been shown to boost learners' understanding and retention of knowledge (Yetunde, 2025). On the other hand, the Nigerian higher education landscape is poised for and against transformation through AI.

Personalized Learning

Personalized learning aims to promote individual learning; the learning process adopts suitable methods, techniques, content, starting points, and evaluation processes based on each learner's characteristics and learning potential (Peng et al., 2019, p. 4). The United States Department of Education defines it as instruction that maximizes learning for each learner by adjusting pace and instructional approach and using varied learning objectives, approaches, content, and sequencing based on learner needs (Shemshack & Spector, 2020, p. 5). More recent scholarship views personalisation as a "responsive and structured approach that responds to the individual learner's approach to learning", and AI technologies as providing an intuitive, data-tracked approach to teaching. (Hardaker & Glenn, 2025) After screening 17,899 records and consolidating the findings of 45 studies, a systematic review confirmed that AI in personalised learning in the higher education sector can be a powerful tool for optimising learning outcomes by adapting materials and feedback to meet the individual needs of learners, but that there remain many ethical, data protection, and teacher training challenges (Merino-Campos, 2025). In short, personalised learning provides the pedagogical justification for adaptive and AI learning systems to work.

Intelligent Tutoring Systems

Intelligent tutoring systems are computer programs that simulate the learner's psychological State to deliver personalized tutoring in a variety of disciplines, including algebra, medicine, law, and reading (Ma et al., 2014). This effectiveness is one of the most consistently demonstrated in educational technologies. A recent meta-analysis of 107 effect sizes (14321 participants) revealed that ITS had a positive effect on achievement compared to teacher-led large group instruction ($g = 0.42$), non-ITS computer based instruction ($g = 0.57$), and textbooks/workbooks ($g = 0.35$), with no significant difference when compared to individualised human tutoring ($g = -0.11$) (Ma et al., 2014). Moderate positive effects are reported in the literature when focusing on college students, with ITS outperforming all instruction methods other than human tutoring (Steenbergen-Hu & Cooper, 2013), and with a 50-evaluation meta-analysis reporting a median effect of 0.66 standard deviations (from the 50th percentile to 75th percentile) (Kulik & Fletcher, 2015). More recent syntheses extend this finding with overall gains ($g = 0.86$) but with variation in the design (Huang et al., 2025). In higher education, ITS serves in several ways, including delivering instructional content, assessing knowledge gaps, providing automated feedback, curating content, and creating opportunities for learner collaboration (Zawacki-Richter et al., 2019, p. 14).

Digital Learning

Digital learning refers to the use of digital technologies to facilitate and improve learning, and is a key part of the higher education student experience. By mapping 243 studies published from 2007 to 2016, Bond et al. (2020, p.1) found that educational technologies were associated with increases in student engagement across behavioural, affective, and cognitive measures, all of which are of primary concern to teachers. However, the engagement potential of technology is not equal: a large-scale review involving 61 research-based recommendations for eight types of educational technologies ends up with several conclusions, one of which is that some types of technology have demonstrated a wider engagement potential in relation to supporting higher-order activities, structure, communication and active learning (Godsk & Møller, 2024, p. 2941). Qualitative evidence from 52 lecturers in 12 Ugandan universities shows that digital tools positively affect engagement, theory–practice linkages, and achievement, while slow internet connectivity and limited digital literacy remain limiting factors in Africa (Uzorka & Odebiyi, 2025). Pedagogical integration, infrastructure and faculty capability are thus the three components of digital learning that can bring benefits together (Jha et al., 2022).

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Educational Technology

Educational technology (edtech) is the purposeful use of technology in education, learning, and administration. The TPACK framework (Content, Pedagogy and Technology knowledge) has been identified as the overarching lens for teacher preparation and practices in Higher Education (Akintayo et al., 2024, p. 58; Chugh et al., 2023, p. 16420). Structured frameworks such as SAMR (substitution, augmentation, modification, and redirection) and ADDIE (analyze, design, develop, implement, and evaluate) can be used to evaluate the transformative power of technology and to plan the design of learning experiences integrating technology (Akintayo et al., 2024, p. 58; Mekheimer, 2025, p. 25017). Content analysis of edtech frameworks by practitioners and researchers documents the growing number of frameworks and highlights the need to use them in a contextualised manner (Cherner & Mitchell, 2020). At the system level, protocols and scaffolding have been developed for quality technology integration for leaders, educators, and students, with a range of responsibilities (Crompton & Burke, 2024, p. 712), such as UNESCO's ICT in Education Policy Toolkit and ISTE standards. In this sense, therefore, educational technology is not just about hardware and software, but about a system of frameworks, standards, and professional development that defines how technology can enhance learning (Chugh et al., 2023, p. 16420).

AI in Education

AI in education refers to the use of AI methods in teaching and learning, assessment, and administration, and is predicted to significantly transform higher education. The field has grown in leaps and bounds: AI in education is expected to increase by 43% from 2018–2022, whereas the number of teaching- and learning-related applications is projected to grow even more rapidly (Zawacki-Richter et al., 2019, p. 1). Current AIEd practice in higher education largely focuses on adaptive systems and personalisation, followed by profiling and prediction, and calls for greater ethical, methodological, and contextual rigor in the future (Bond et al., 2024, p. 1). In practice, AI in higher education can take various forms, such as virtual agents or digital assistants, automated assessment, and the coordination of learning analytics, curriculum sequencing, and instructional design (Crompton & Burke, 2023, p. 20). In particular, in the field of management education, AI-powered tools have influenced the curriculum, making it more evidence-based, experiential and immersive, thus enhancing student engagement and personalization (Mutsuddi, 2025 & Shaibu et al, 2025), while AI-driven pedagogies are reported to have improved management education engagement, retention and critical thinking (Rajkumar et al., 2025). E-learning integrated with adaptive systems has also been proven to optimize individual learning paths and boost learning performance (Gligorea et al., 2023). AIEd's future thus looks like further embedding AIEd in university pedagogy and administration.

Learning Analytics

Learning Analytics is defined as the measurement, collection, analysis and reporting of data relating to learners and their context to understand and optimise learning and learning environments (Gašević et al., 2015, p. 70). The main motivations for adopting learning analytics in institutional contexts are to enhance students' learning and motivation to learn (and thus decrease the dropout rate) and to offer adaptive learning pathways that lead toward curriculum-defined goals (Ifenthaler & Yau, 2020, p. 1964). In theory, analytics gather and track learning activities in real-time: online tasks, group work, interactions with university systems, and so forth, and process this information as it occurs and use it to make decisions (Guzmán-Valenzuela et al., 2021, p. 25). Documented institutional outcomes include lower student attrition, such as when student attrition at the University of New England fell from 18% to 12% (see Wong, 2017, p. 24), and a 40% drop in dropout rates among students who received proactive communications at Rio Salado Community College. Learning analytics can also predict students at risk of dropping out, allocate resources, and provide interventions to support student learning success (Gašević et al., 2015, p. 70; Hernández-de-Menéndez et al., 2022, p. 1211). Yet, scholars warn of the danger of analytics producing "one size fits all" models as instructional conditions moderate the predictive power of analytics (Gašević et al., 2015, p. 70), and that institutions must be wary of collecting data without a clear implication of an improvement in learning (Guzmán-Valenzuela et al., 2021, p. 25).

m. Adaptive Learning Systems

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Adaptive learning systems are computerised learning systems that adapt learning content, presentation style, or learning paths based on an individual student's learning profile, learning status, or human factors (Shemshack & Spector, 2020, p. 5). They track each student's progress and adjust instruction as needed, dynamically changing the level and type of instruction based on the student's abilities and skill attainment, whether automatically or through teacher intervention (Peng et al., 2019, p. 4). In concept, adaptive learning is a product of Artificial Intelligence, supported by intelligent technology, and shares three common characteristics with all adaptive approaches: individual differences, individual performance, and adaptive adjustment (Peng et al., 2019, p. 3). Modern adaptive strategies use different approaches to the learning process tailored to students' needs, competences, and abilities, fostering active and self-regulated learning (Rincón-Flores et al., 2024, p. 5). They are based on pedagogical principles of mastery learning, formative assessment, and autonomy, and depend on ethical design, sufficient infrastructure, and pedagogical orientation (Borah, 2025). Adaptive systems, therefore, make the vision of personalised learning and adaptive pedagogy actionable in data-centered learning environments.

University Management Training

University management training includes formal and informal training for academic and administrative leaders who guide teaching, learning, and institutional processes. There is a long history of leadership development in higher education that is behind the pace of development in other sectors, in part because for a long time academics were thought to have enough subject-matter knowledge to lead their institutions (Gigliotti & Ruben, 2017, p. 98); but effective programmes are now known to help institutions to retain their talent, build connections, and revitalise their institutions. A review of these programmes reveals three components of effective leadership development: habits of mind (conceptual understanding), habits of practice (demonstrated skills), and habits of heart (reflective commitment) (Gigliotti & Ruben, 2017, p. 98). Long-term effects from empirical studies indicate sustained transfer of training up to one year following participation: an 8-week academic leadership programme for academic programme coordinators (APCs) resulted in positive long-term effects, which were maintained up to 12 months after completing the programme (Ladyshewsky & Flavell, 2011, p. 127); a 6-week intervention led to improved awareness of transformational leadership behaviours being sustained for a year following training (Zulfqar et al., 2016). Based on a synthesis of 32 empirical studies, a PRISMA-based analysis reveals that leadership development programmes are effective in improving the communication skills of faculty members, strategic decision-making, collaborative leadership, and involvement in institutional governance, with the most significant results seen in experiential learning, mentoring, and reflective practice (Agarwal, 2026). Findings from Nigerian universities suggest that AI-powered support systems will enhance educational management training if integrated into well-developed development programmes suited to the local context (Dopson et al., 2018, p. 228).

Synthesis of the Reviewed Literature

All the literature reviewed is grounded in the same logical flow: AI becomes the computational substrate (Bond et al., 2024, p. 1; Zawacki-Richter et al., 2019, p. 1); adaptive pedagogy provides the learner-centred instructional rationale (Peng et al., 2019, p. 4; Tetzlaff et al., 2023, p. 2); personalised learning and adaptive learning systems operationalise that rationale technologically (Peng et al., 2019, p. 4; Shemshack & Spector, 2020, p. 5); intelligent tutoring systems deliver measurable learning gains; and AI-based support systems integrate these capabilities within university management (Nara et al., 2026; Zhang & Goyal, 2024). Educational management and its associated training, which are the explicit focus of this study, are the connective tissue for the benefits of AI, as the benefits of AI will only be felt when administrators are trained to interpret the analytics, manage data-driven systems, and lead adaptive institutions (Agarwal, 2026; Ladyshewsky & Flavell, 2011, p. 127; Terrion, 2006). However, the Nigerian literature reveals that the chain is the weakest at the point it is most needed: infrastructural problems, low digital literacy, and lack of proactive capacity building are still major challenges to the adoption of AI in Nigerian universities (FCIMN, 2026; Jesam et al., 2025, p. 136; Luwoye et al., 2024). This study fills two gaps: empirical (few studies have examined AI's role in supporting education management in Nigeria) and developmental (current training models have not systematically linked AI use to education management practice).

Conclusion

The literature examined shows that AI and adaptive pedagogy have significant potential to enhance the educational management training in Nigerian universities. AI-powered support tools can improve personalised professional learning, provide instant feedback, enable institutional intelligence, streamline administration, and facilitate evidence-based

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decision-making. But their effectiveness depends on academic and administrative staff's digital competency, appropriate professional development, adequate infrastructure, institutional support, and ethical and governance frameworks.

While this is the case globally, poor infrastructure, limited connectivity, lack of funding, low digital literacy, lack of skilled personnel, and data privacy concerns remain critical barriers to effective AI implementation in Nigeria. The review also shows an empirical and developmental gap, as there has been little focus on AI-based support systems in educational management training. To enable sustainable adoption, it is essential to provide context-sensitive training, ongoing capacity development, improved digital infrastructure, and responsible AI governance. Addressing these issues will be crucial to designing competent, institutionally relevant AI-based educational management training systems based on AI in Nigerian higher education.

Recommendations

The following suggestions are made based on the review and conclusion made in the study:

1. Nigerian universities must establish a comprehensive training curriculum on educational management using AI that includes adaptive pedagogy, data literacy, digital competence, ethical use of AI, strategic decision-making, and leadership development. The programmes should aim to be an ongoing learning process for both academic and administrative staff and should include hands-on experience with AI tools for decision-making support, learning analytics, personalised learning platforms, and other related digital management solutions. This would enhance university staff's ability to understand AI-generated information, make informed decisions, manage technology-assisted educational processes, and drive adaptive institutional change effectively.
2. University management, government agencies and higher education regulatory bodies should create an enabling institutional framework for the sustainable use of AI-based support systems in universities in Nigeria. These frameworks should include investments in robust digital infrastructure and internet connectivity, sufficient funding, technical support, data protection and cybersecurity protocols, and clear institutional policies and ethical guidelines in using AI responsibly. Special emphasis should also be placed on devising implementation guidelines that reflect the context of Nigerian universities. Improving these institutional conditions would help to make AI-based support systems in educational management training more effective, sustainable and responsible.

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Promoting International Science, Technology, Engineering and Mathematics (STEM) Education by Creativity

AYUA, Geoffrey Aondolumun[1]
ayuageofrrey@gmail.com
+234 806 933 7213
JESULOWO, Janet Funke[2]
jjesulowo@gmail.com
+234 818 759 7753
TOFI, Msuur[1]
tmsuur@gmail.com
+234 703 242 3655
ABAH, John Clement[3]
jonabah@gmail.com
+234 806 952 3916
KWAGH, Tertsea Caleb[1]
kwaghcaleb@gmail.com
+234 816 179 5694
ONAH, Benedict Ojedor[1]
boonah-pg26@bsum.edu.ng
+234 701 032 4609

[1]Department of Science Education, Benue State University (now Rev. Fr. Moses Orshio Adasu University), Makurdi, Nigeria
[2]Department of Arts and Social Sciences Education, Faculty of Education, National Open University of Nigeria, Abuja.
[3]Department of Integrated Science, Alvan Ikoku Federal University of Education, Owerri, Imo State, Nigeria

Abstract

The rising intricacy of international challenges has amplified the necessity for STEM education which goes yonder rote-leaning science and technology procedures. Creativity offers a vital pathway for aiding learners apply knowledge, reconnoitre possibilities, and advance innovative solutions to real-world issues. In this paper, the role of creativity in strengthening Science, Technology, Engineering and Mathematics (STEM) education globally was examined with focus on developing contexts like Nigeria. Drawing on relevant literature and theoretical perspectives, including Torrance's Creativity Theory with the 4Cs of 21st century skills, the paper establishes the close link among creative thinking, problem-solving, inquiry, design, collaboration, and innovation in STEM learning. It recognises curriculum inflexibility, examination-oriented assessment, and inadequate teacher preparation as major barricades to creative STEM education. To address these issues, the paper proposes the CREATIVE-STEM Framework, containing: Curiosity-Driven Inquiry, Real-World Problem Solving, Engaging Design Thinking, Artistic and Technological Integration, Teacher Facilitation, Innovation Hubs and Laboratories, Value of Failure and Iteration, and Equity and Inclusivity. The paper concludes that implanting creativity within STEM education can fortify learners' capacity to create, evaluate, and improve ideas while preparing them to address local and global challenges responsibly.

Keywords: STEM Education, Creativity, Creative Thinking, Design Thinking, STEM Pedagogy, CREATIVE-STEM Framework.

Introduction

Science, Technology, Engineering, and Mathematics (STEM) education is known as a key driver of innovation, economic growth, and maintainable development. This is because it arms learners with the knowledge and skills required to solve real-world problems. STEM education is beyond mere knowledge acquisition in science and technology to include creativity, critical thinking, collaboration, and problem-solving skills. To Bybee (2023) and Ayua et al. (2023b), STEM education can prepare learners to think/act innovatively in retort to modern societal and technological challenges, while Henriksen (2024) contends that creativity is a fundamental component of STEM learning because innovative solutions often emerge when scholars are stimulated to integrate thoughts with scientific perception. Nurturing creativity in STEM classrooms allow learners to transform theoretical knowledge into practical solutions, making them better ready to

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contribute meaningfully to scientific and technological development. Over time, conventional STEM education has focused on the acquisition of disciplinary knowledge and technical competence. This is still a fundamental problem to educational success, possessing knowledge alone is insufficient for fostering innovation. A student for instance, may understand the principles of electricity yet be unable to develop an affordable electrical solution to address a community problem. A learner may master mathematical formulas but struggle to apply mathematical reasoning to unfamiliar technological, environmental, or societal issues. Modern STEM education stresses the integration of disciplinary knowledge with essential 21st-century skills such as creativity, critical thinking, communication, and collaboration (Organization for Economic Co-operation and Development [OECD], 2024). STEM education can better prepare students to become innovators, responsible citizens, and problem solvers capable of contributing to sustainable societal development. In developing countries like Nigeria, the creativity in STEM education is important. The Federal Ministry of Education recognizes Technology and Science Education as a strategic area of educational development. Through its Technology and Science Education (TSE) Department, the Ministry is responsible for policy formulation and implementation, curriculum development and monitoring, standard setting, capacity building, and the supervision of science and technical education programmes below the tertiary level. Federal Ministry of Education (2019). Nevertheless, transformation in STEM education entails more than policy outlines and institutional oversight. Real STEM education hinges on classroom practices that encourage learners to question, investigate problems, explore alternative solutions, engage in experimentation, design and innovate, learn from errors, reflect on results, and refine their ideas by unceasing review.

Statement of the Problem

In spite of the mounting relevance of creativity in STEM education, some teachers still remain on one-size-fit-all teaching approaches and examination-driven learning that emphasize memorizing instead of creativity and problem-solving. Although, knowledge acquisition is indispensable, STEM education becomes more meaningful when learners are heartened to apply scientific ideas in real-world situations rather than merely reproducing them in examinations. To Beghetto and Kaufman (2024), creativity flourishes best in classrooms that combine intrinsic motivation, choice, and openness to unusual ideas with strong content learning, instead of treating the two separately. Practically, chances for creative STEM learning continue unevenly distributed, with well-resourced schools presenting laboratories, robotics, and maker spaces which poor schools lack, while many teachers, censored exam-driven schooling, receive little training in design thinking or project-based teaching (OECD, 2023). Inadequate resources, teacher preparation, creative teaching approaches, and assessment systems which prioritize stereotype answers continue to restrict opportunities for creative STEM learning. There is a wide gap between policy and practice in STEM classrooms limiting creativity and innovative skills required for present-day world. Addressing this gap is central for developing learners who can not only understand science but also create solutions to real-world problems (Anwar et al., 2023; Ayua et al., 2023b).

Purpose of the Study

This paper examines how creativity can reinforce international STEM education and recommends the CREATIVE-STEM model for embedding creativity in STEM teaching and learning.

Significance of the Study

This paper provides policy makers, educators and the global STEM community with a real-world model for designing learning experiences which promote curiosity, experimentation, and critical thinking, while guiding curriculum designers on integrating creativity across STEM subjects.

Scope and Structure of the Paper

This paper centres on school-level STEM education, although its inferences cover higher and lifelong education. It involves international STEM education broadly, while focusing on challenges facing developing nations like Nigeria. Besides introduction, the paper clarifies STEM education concepts, and creativity; exploring how the two relate. The literature review then examines global STEM trends, the role of creativity, barriers to its growth, and germane theoretical standpoints, before presenting the CREATIVE-STEM Framework. Succeeding sections address the implications for policy, practice and teacher education alongside the challenges and strategies for implementation.

Conceptual Clarifications

Here, STEM education, creativity, and the link between creativity and STEM learning outcomes are discussed.

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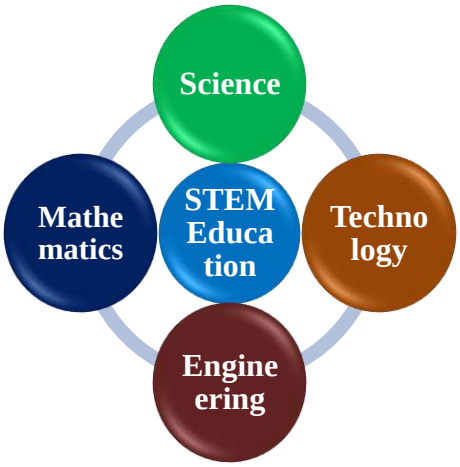
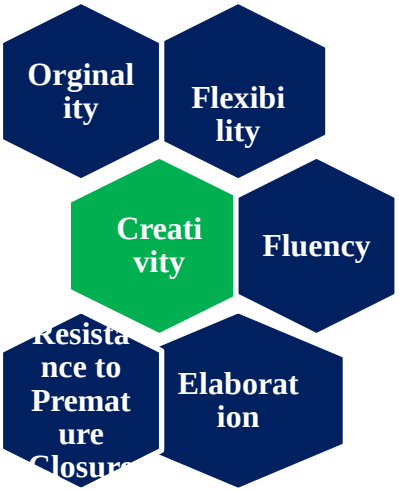


Figure 1: Diagrammatic Representation of STEM Education

Figure 1 represent an interdisciplinary educational approach involving Science, Technology, Engineering and Mathematics (STEM). Although the four disciplines possess distinct bodies of knowledge, contemporary STEM education emphasizes their connections. Real-world problems rarely appear in separated disciplinary categories. Climate change, for example, involves scientific understanding, technological systems, mathematical modelling, engineering design, economics and social decision-making. STEM education promotes the integration of science, technology, engineering, and mathematics to help learners apply knowledge in solving real-world problems rather than memorizing concepts. The engineering design process, which involves designing, testing, and refining solutions, provides valuable opportunities for creativity, critical thinking, and innovation (Diep et al., 2023). STEM education prepares learners for a rapidly changing workforce by developing adaptable competencies such as problem-solving, collaboration, and lifelong learning, which are essential in contemporary societies (UNESCO, 2024). The principal goals of STEM education could be seen as cultivating scientific literacy, technological aptitude, problem-solving ability, innovation, employability, responsible citizenship, and a vow to workable advancement. Reaching these goals require a cautious balance between laying foundational knowledge and building the higher-order capabilities which allow that knowledge meaningful use.

Creativity:

Is the ability to generate new, original, and useful ideas. Its key mechanisms include: imagination, originality, flexibility, fluency, and problem-solving.



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Figure 2: Schematic Representation of Creativity

As shown in Figure 2, the components help individuals to think variously, develop innovative possibilities, and find real solutions to challenges. Ayua, et al. (2023a) and Ayua et al (2026a) make a related point in the Nigerian context, that fostering learners' creative minds and hands in science, technology and engineering is central to producing graduates capable of sustainable innovation in the aftermath of disruptions such as the COVID-19 pandemic. This classroom-level of everyday creativity aligns with the OECD's current definition, which emphasizes the generation of diverse and original ideas alongside the capacity to evaluate and refine them (OECD, 2019). Additionally, Ayua (2019) and Ayua, et al. (2023) reported that creative teaching strategies significantly improve students' creative-thinking originality, suggesting that creativity is an essential educational outcome that supports innovation, problem-solving, and lifelong learning.

Creativity and STEM learning outcomes:

Creativity is fundamentally connected to the nature of STEM disciplines. Scientific investigation entails scholars to frame hypotheses and consider alternate clarifications. Engineering demands designers to produce and test likely solutions. Mathematics involves finding diverse strategies to solving complex problems. Technology deals with creating and improving tools and systems. Thus, creativity is an important element in STEM education because scientific and technological advancement depends on learners' ability to create ideas, explore substitutes and develop solutions to unfamiliar problems. So, STEM learning entails more than factual knowledge acquisition. It requires learners to question, investigate, design, test and improve ideas. Ayua et al. (2023) emphasized that developing creative minds and practical skills in science, technology and engineering is essential for addressing contemporary challenges (Ayua & Terhemba, 2025) and promoting sustainable development. Creativity is associated with learners' engagement with STEM. Pont-Niclòs et al. (2024) reported that meaningful relationships between scientific creativity, learners' engagement and their intentions to pursue STEM-oriented fields, highlighting the importance of creativity-tailored learning experiences in maintaining interest in STEM. Intercontinental evidence further strengthens this relationship. The OECD's PISA (2022) assessment found positive associations between creative thinking and performance in Mathematics, reading and science. This suggests that creativity and academic learning complements rather than compete each other. Creativity supports numerous key STEM results. It betters engagement, active participation, problem-solving ability, consideration of multiple possibilities, and creativity, and knowledge transfer to unfamiliar contexts.

Literature Review and Theoretical Framework

This are review covered global trends in STEM education, the role of creativity in STEM, barriers to creativity in STEM classrooms, and theoretical underpinnings.

Global trends in STEM education:

The features of universal STEM education include: interdisciplinary learning, digital technologies, problem-based learning, inquiry, engineering design, and real-world applications. Since artificial intelligence emergence, these transitions have accelerated. Learners need not only know how to use technologies but also how technologies are designed, evaluated and applied responsibly. This method encourages learners to examine problems, collaborate, advance solutions and think creatively across subject boundaries (Couch et al., 2024). As AI and digital technologies are rapidly reshaping STEM education, teachers and learners are expected not only to use them but also understand their applications, limitations and ethical implications. UNESCO (2024) stresses human-centred thinking, AI ethics, technological application and AI system design as important capabilities for modern learners. Tus, teachers are anticipated to facilitate inquiry, support collaboration, fit in digital tools, and create learning settings that encourage higher-order thinking. UNESCO (2024) highpoints teachers' AI-related didactic competence and responsible use of technology. Creativity is an important outcome of STEM learning. The OECD's inclusion of creative thinking in PISA 2022 tells the growing intercontinental recognition that learners can create, evaluate, and improve ideas rather than merely reproducing existing knowledge in examinations (OECD, 2024). Thus, present-day STEM education emphasizes knowledge application, creativity, innovation, problem-solving and responsible use of technologies.

The Role of Creativity in Science, Technology, Engineering and Mathematics:

The role of creativity in STEM education is discussed as follows.

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1. **Creativity in science:** Creativity plays an important role in science because scientific inquiry requires learners to ask questions, develop hypotheses, plan investigations, interpret evidence and reconsider explanations when findings do not match expectations. The National Research Council identifies asking questions, planning and carrying out investigations, analysing and interpreting data, constructing explanations, and engaging in argument from evidence as central scientific practices (National Research Council, 2022). Creativity in science is not about producing unusual ideas; it involves generating questions and explanations that can be investigated and revised in response to evidence. Scientific inquiry therefore provides opportunities for students to look at familiar phenomena from different perspectives and develop new interpretations of observations.
2. **Creativity in technology:** In technology, creativity is closely associated with designing, adapting and evaluating tools or technological solutions to address human needs. Modern technology education requires learners to consider not only whether a technological product works, but also whether it is appropriate, accessible, safe and responsible. For example, UNESCO's (2023) guidance on digital learning technologies stresses that technology could respond to identified learner needs and can be evaluated in relation to equity, sustainability, safety and evidence of effectiveness. AI competency framework places creativity and design alongside human-centred thinking and ethics, highlighting the importance of developing technologies that are both innovative and responsible (Miao, et al, 2024).
3. **Creativity in engineering:** Creativity is fundamental to engineering because engineering problems commonly permit several possible solutions rather than a single predetermined answer. The engineering design process involves identifying a problem, establishing criteria and constraints, generating alternative solutions, developing prototypes, testing them and refining the design (National Research Council, 2020). Engineers can balance finding an alternative method for solving a familiar problem or recognising a novel relationship within a pattern. Such activities encourage learners to justify their reasoning and transfer mathematical knowledge to unfamiliar situations rather than relying exclusively on memorised procedures. Rather than treating science, technology, engineering and mathematics as completely separate areas, integrated STEM approaches connect disciplinary knowledge within meaningful problems and design challenges. The National Academies competing considerations such as safety, cost, efficiency, available materials and other constraints when selecting among possible solutions. The National Academies further explains that engineering accommodates multiple solutions provided that they satisfy the requirements and constraints of the design problem, with iterative testing and improvement used to reach an effective solution (National Academies of Sciences, Engineering, and Medicine, 2020).
4. **Creativity in mathematics:** Creativity in mathematics involves more than applying established procedures. It can be expressed through generating multiple solution strategies, identifying patterns, posing problems, using different representations and making connections between mathematical ideas. Research in mathematics education indicates that multiple-solution and problem-posing activities provide opportunities for students to develop fluency, flexibility and originality in mathematical thinking (Albert & Kim, 2023). For example, mathematical creativity may involve finding an alternative method for solving a familiar problem or recognizing a novel relationship within a pattern. Such events inspire learners to justify their reasoning, and transfer mathematical knowledge to unusual situations rather than depending completely on memorized procedures.

Creativity in Interdisciplinary STEM

Interdisciplinary STEM provides chances for creativity by demanding learners to combine knowledge and practices across fields in solving complex, real-world problems. Rather than treating science, technology, engineering and mathematics as separate areas, integrated STEM approaches connect disciplinary knowledge within meaningful problems and design challenges. The National Academies describes integrated STEM education as an approach that can bring together concepts and practices from multiple STEM disciplines, while engineering design itself draws on mathematics, science and technological tools. National enabling learners to adapt the design to local conditions, generate alternative solutions and respond to constraints. Such interdisciplinary learning reflects the broader goal of STEM education: using disciplinary Academies of Sciences, Engineering, and Medicine (National Research Council, 2020). For example, designing a solar-powered water system could require students to apply physics to understand energy conversion, mathematics to calculate energy requirements, engineering to develop and test the system, and technology to monitor its operation. Creativity

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connects these disciplinary contributions by enabling learners to adapt the design to local conditions, generate alternative solutions and respond to constraints. To UNESCO (2026), intersubject learning reflects the broader goal of STEM education. Thus, linking subject content knowledge with creativity, problem-solving, and critical thinking to solve complex issues.

Barriers to Creativity in STEM Classrooms

These hinderances to creativity in STEM classrooms are hereby stated.

1. **Curriculum Constraints:** One challenge to creativity in STEM education is the burden to complete a content-heavy curriculum within a inadequate period. When teachers are chiefly concerned with completing the syllabus before examinations, learners may have fewer chances to examine problems, experiment ideas, or create their solutions. Creativity does not typically emerge from merely receiving more information; it necessitates time to explore, question, test, revise, and reflect. Ayua et al. (2026b) emphasize learner-centred, activity-oriented, and exploratory approaches to science education. Thus, curriculum practice can afford enough time for creative and practical STEM activities rather than depending primarily on content transmission.
2. **Assessment Constraints:** Creativity can either encourage or discourage by assessment modes. Typical examinations habitually place more emphasis on obtaining the correct answer, remembering information, and completing tasks within a specified time. Such practices give learners little reason to propose unusual ideas or explore other solutions. Naramore (2025) notes that uncertainty on how creativity could be assessed remains one of the challenges to nurturing it. Ayua and Agbidye (2020) showed that Science-Technology-Society can provide prospects for developing entrepreneurial creativity among learners. STEM assessment should be yonder conventional tests to include projects, practical investigations, design tasks, portfolios, presentations, and other activities that allow learners display originality and problem-solving dexterity.
3. **Teacher Capacity:** The worth of STEM creativity mostly depends on what, why and how teachers are ready to teach. Teachers need more than knowledge of their subject; they need real-world skills in inquiry-based learning, project work, joint problem-solving, creative questioning, and formative evaluation. Shernoff et al. (2017) identified proficient development needs as key consideration in implementing integrated STEM education. In Nigeria, Nwachukwu and Njoku (2021) also identified capability gaps among Basic Science teachers as a factor inhibiting effective teaching. Ayua and Eriba (2014) found that teachers' creative behaviours are vital to learners' interest in science and technology learning. Non-stop professional upgrading makes better teachers than otherwise.

Theoretical Underpinning

The theories underpinning this paper are presented as follows:

Torrance's Creativity Theory

Torrance's (1974) Creativity Theory conceptualises creative thinking as a multidimensional process linking fluency, flexibility, originality, and elaboration. Fluency entails generating multiple ideas, flexibility mirrors the ability to consider various tactics, originality concerns creating fresh ideas, and elaboration requires advancing and refining those ideas. The theory is relevant to STEM education because operative STEM learning requires learners exploring alternatives, solving open-ended problems, designing solutions, and improving their ideas. consequently, the theory provides useful basis for understanding and assessing how STEM learning experiences could foster learners' creative thinking.

The 4Cs of the 21st-Century Skills

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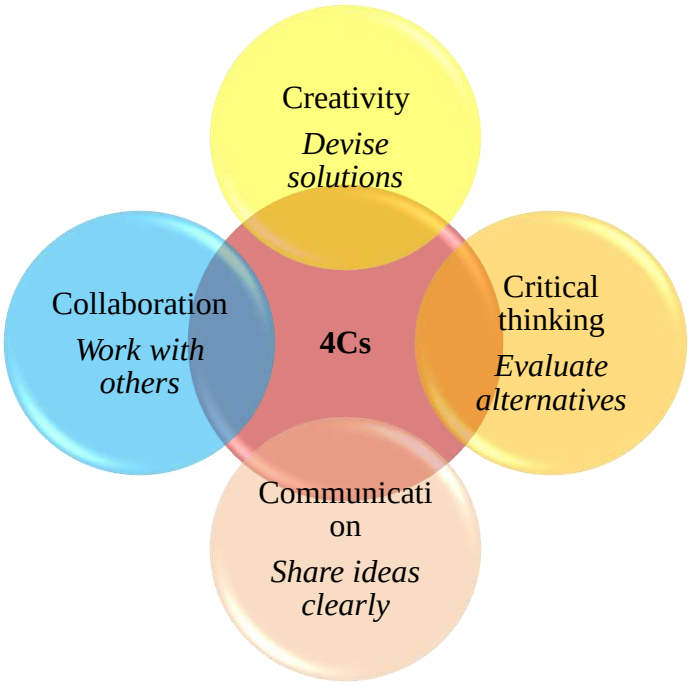


Figure 3: The 4Cs of the 21st-Century Skills

As contained in Figure 3, each of the Cs has a shared work of solving STEM problems, rather than separate, standalone skills. It shows that STEM problems are not only solved by committal to memory, but also via learners drawing on all the four competencies at once creating ideas, evaluating them critically, articulating them clearly, and building abilities with others.

The CREATIVE-STEM Framework

The CREATIVE-STEM model is presented in Figure 4.

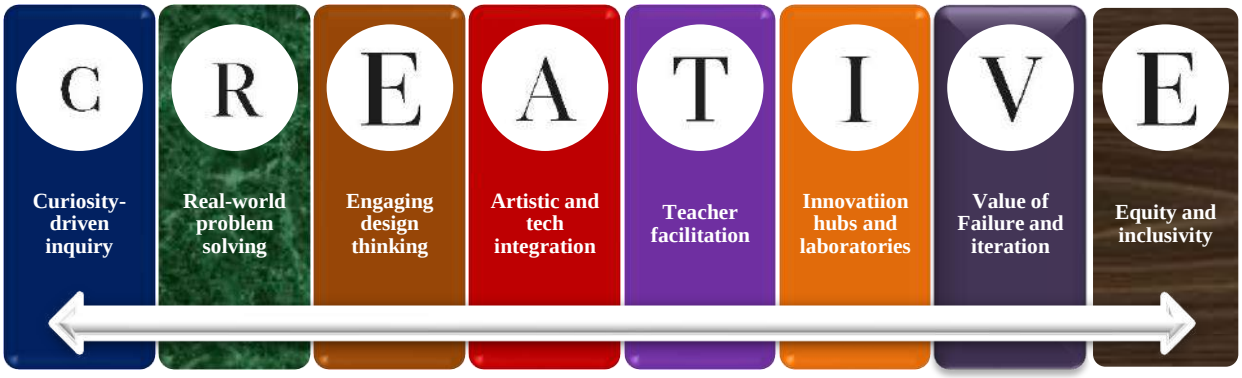


Figure 4: The CREATIVE-STEM Framework

Figure 4 treats Creativity as a pedagogical core, with each letter carrying a principle that is meant to be actionable rather than aspirational from starting lessons with a genuine "what if" question, through making sure innovation opportunities aren't quietly reserved for well-resourced schools.

Rationale for a Creativity-Driven Approach to International STEM

The focus of this paper is that STEM education can move from a predominantly knowledge-reproduction model towards a knowledge-creation and problem-solving model. This does not mean reducing attention to scientific facts, mathematical concepts or technical skills. Rather, it means creating opportunities for learners to use those foundations creatively.

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Components of the Creative-STEM Framework

These components are further presented in their themes.

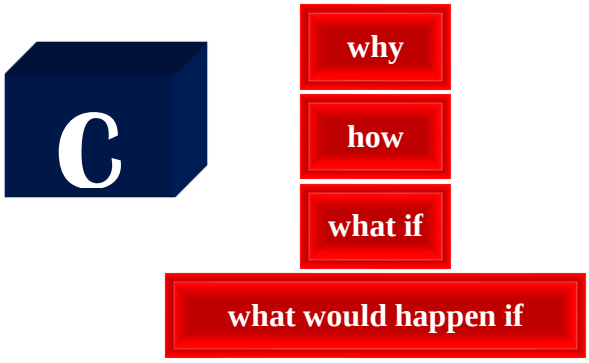


Figure 5: C – Curiosity-Driven Inquiry

Figure 5 point of creative STEM learning explains that teachers may encourage learners to ask "why," "how," "what if" and "what would happen if." questions. Inquiry activities can begin with familiar local phenomena such as water quality, waste management, energy use, agricultural production or transportation.

R – Real-World Problem Solving explicate that STEM learning may connect classroom concepts with authentic problems. Students could be challenged to identify problems within their communities and develop evidence-based solutions. This approach may help learners recognise the usefulness of STEM knowledge beyond examinations.

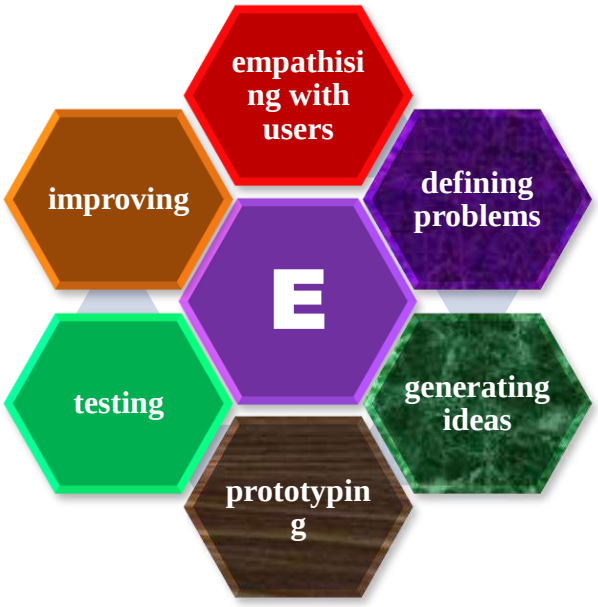


Figure 6: E – Engaging Design Thinking:

Figure 6 shows that in STEM education, students can use these processes to develop solutions while learning disciplinary concepts.

A – Artistic and Technological Integration explains that an integration of arts with STEM creates opportunities for communication, visualisation, creativity and interdisciplinary thinking. This does not mean turning every STEM lesson into an art lesson. Rather, artistic representation, storytelling, visual design, music, cultural knowledge and creative expression can enhance technological and scientific learning.

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T – Teacher Facilitation of Creative Pedagogy: Means that teachers are central to the framework. Their role is to design environments in which students can explore ideas while maintaining academic rigour. Effective teachers ask productive questions, encourage evidence-based reasoning and provide feedback that helps learners improve their ideas.

I – Innovation Hubs and Laboratories: Highlight that schools may establish innovation spaces where learners can experiment, design, and team-work. These spaces do not certainly require costly equipment. A well-organised classroom corner with recycled materials, basic tools, computers or improvised resources can function as a small innovation laboratory.

V – Value of Failure and Iteration: Creative STEM necessitates a different understanding of failure. When experiments do not produce the probable result or prototypes fail, learners should be motivated to investigate why. Thus, failure becomes information which guides perfection. This principle is key in engineering, where solutions emerge by repeated testing and modification.

E – Equity and Inclusivity in Creative Access: Creativity can be accessible to all learners regardless of gender, socioeconomic background, location or disability. Global STEM education avoids creating learning situation where bias is practiced.

How the Framework Promotes International STEM Education

The CREATIVE-STEM model aids global STEM education by promoting mutual competencies like: creativity, problem solving, collaboration, inquiry and design; while permitting the capabilities to be applied to problems that are meaningful within different cultural and ecological contexts. This tactic is imperative because STEM education is not experienced homogeneously across nations. Its priorities and practices are designed by historical, cultural, socioeconomic and political circumstances (Mudaly & Chirikure, 2023). Thus, learners in Nigeria may design low-cost water purification systems, solar energy solutions or agricultural technologies. Learners elsewhere could explore coastal erosion, urban transport, renewable energy or digital inclusion. The basic creative procedure is transferable even when the problem differs. This context-sensitive style braces meaningful STEM learning while knowing cultural variances (Kier & Johnson, 2022). This may also aid world-wide team-work by digital platforms, where learners exchange ideas, compare data and jointly devise solutions to global problems.

Implications for Policy, Practice and Teacher Education

Implications on curriculum redesign, Teacher professional development, Institutional support, and Global Partnerships are discussed here.

Curriculum Redesign for Creativity: To better prepare students for real-world challenges, curriculum developers should create greater opportunities for inquiry, project-based and interdisciplinary learning alongside essential content knowledge. Curriculum goals should therefore emphasize creativity, critical thinking, collaboration, problem-solving and innovation. STEM learning can support these outcomes by engaging students in authentic tasks that require learners to apply knowledge, develop solutions and reflect on their work. Assessment should provide opportunities for students to show creative thinking through projects, design tasks, investigations, products and other forms of performance-based assessment alongside traditional examinations (OECD, 2024).

Teacher Professional Development in Creative STEM Pedagogy: Professional development should extend beyond one-off workshops that simply introduce new technologies. Effective STEM teacher development requires sustained, active opportunities for teachers to experience and practise innovative pedagogies, reflect on their classroom application, and collaborate with colleagues (Surahman & Wang, 2023). Training should therefore address inquiry-based, project-based and problem-based learning, design thinking, interdisciplinary STEM, creative assessment, low-cost experimentation, digital and AI-supported learning, and inclusive pedagogical practices. Effective STEM professional development commonly incorporates learning by doing, learning by design, reflection, collaboration and connections between professional learning and classroom practice (Huang et al., 2022).

Institutional Support through Laboratories, Funding and Assessment Reform: Creative pedagogy requires institutional support through adequate laboratories, digital resources, teaching materials and funding for innovation. However, such investment should reflect local realities. In resource-constrained settings, schools can encourage creativity through locally available and recycled materials, community partnerships and low-cost STEM activities, making learning

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more relevant to students' contexts (Holmes et al., 2021; Playful and frugal learning design, 2025). Assessment should similarly provide opportunities for students to demonstrate reasoning, originality, problem-solving and improvement through open-ended projects, investigations and design tasks. Evidence from recent meta-analyses indicates that project-based, problem-based and STEM learning approaches can positively support students' creativity and scientific problem-solving (Pinar et al., 2025).

Global Partnerships and Cross-Border Collaboration: Universal partnerships can strengthen STEM creativity by connecting schools, industries and research organizations through joint projects, virtual laboratories, research team-work, and online STEM communities. These partnerships should stress shared learning, merging technical expertise with locally grounded knowledge and resource-efficient solutions to solve shared challenges (OECD, 2025; York et al., 2025).

Challenges and Strategies for Practice

In this section, challenges of culture, infrastructure, resource, and strategies for overcoming them are discussed.

Cultural, Infrastructural and Resource Challenges

Implementing creative STEM education faces several challenges. Cultural resistance may continue where teachers are traditionally viewed as the main source of knowledge and learners as passive recipients. Still Creative STEM entails more interactive, collaborative and learner-centred relationships. Examination burden limit creativity when teachers prioritize preparation for standardized examination over projects and open-ended activities. Scarce infrastructure, mostly restricted access to laboratories, digital technologies and learning resources, may additionally inhibits implementation in rural schools. Another issue is limited teacher preparation for interdisciplinary teaching, as science, Mathematics, technology and engineering are habitually taught separately. Cultural and contextual variances should be considered when accepting global STEM models. Rather than being copied directly, such frameworks can be modified to local needs, resources and cultural contexts (Holmes et al., 2021; Mudaly & Chirikure, 2023).

Strategies for Overcoming Barriers in Developing Contexts like Nigeria

In developing countries like Nigeria, creative STEM practice should prioritize hands-on, affordable, and context-sensitive methods. Schools can use improvised or recycled materials for activities such as water filtration, solar energy, irrigation, bridge construction and simple engineering designs. Teacher professional growth should emphasize creative teaching (Ayua, 2019; Ayua & Eriba, 2023, Ayua & Terhemba 2025), enabling teachers to engage learners in designing, testing and refining solutions even where laboratory resources are limited. Universities can support schools by mentorship, laboratory access and innovation programmes, while industry can provide equipment, internships and real-world problem-solving prospects. Policy could promote equitable STEM access, particularly for rural schools. Such context-based tactics can make STEM learning more relevant while firming teacher capacity, community involvement and learners' linking with real-world problems (Holmes et al., 2021).

Conclusion

Creativity is key to the future of STEM education. Outside acquiring established knowledge, STEM learners need to question, generate and assess ideas, project solutions and improve existing tactics. This shift is reflected in international education. The OECD's PISA 2022 framework identifies creative thinking as the ability to generate, evaluate and improve ideas, while UNESCO's AI Competency Framework highpoints human agency, critical judgement, responsible technology use and creative engagement with AI (OECD, 2024; Miao et al., 2024). Together, these growths strengthen the need for STEM education to prepare learners not only to understand knowledge, but also to use creativity to solve evolving real-world problems. The shift from rote learning to creative STEM cannot diminish the importance of foundational knowledge. Rather, knowledge can assist as a foundation for inquiry, problem-solving and innovation. STEM learners want to move beyond remembering concepts to applying them in unacquainted situations, assessing evidence, creating solutions and refining ideas. Therefore, functional STEM education requires not only what learners remember, but also how they can the acquired knowledge in solving real-world problems.

Call to Action for Educators, Policymakers and Global Stakeholders

Globally, all stakeholders in education may recognise creativity as a core element of STEM education rather than an optional augmentation. The future of STEM depends not only on mounting scientific and technical knowledge but also on producing learners who can apply that knowledge creatively, critically and correctly. The projected CREATIVE-STEM

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model provides a conceptual pathway towards this goal. Its effectiveness, however, will depend on contextual edition, effective practice and empirical authentication. Future research could examine its applicability across countries, educational systems, age groups and socioeconomic setting.

Recommendations

From the discourse, these recommendations are proposed:

1. STEM curricula should integrate creativity, inquiry, design thinking, problem solving and innovation alongside knowledge of subject content.
2. Teachers should ensure professional improvement in creative STEM teaching, including inquiry-based learning, project-based learning, design thinking, intersubject teaching and responsible use of emerging technologies.
3. Schools should find accessible innovation spaces, with both conventional laboratory equipment and improvised materials to ease creative STEM learning.
4. Assessment systems should be diversified to include projects, portfolios, open-ended problems, prototypes and other tasks which test creativity, reasoning, evaluation and development besides factual knowledge.
5. Governments, universities, industries and global organisations should fortify STEM collaborations to provide learners with equitable access to mentors, technologies, and innovation programmes.

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Evaluation of Artificial Intelligence Driven Research Methodologies on Lecturers' Productivity in Lagos State Owned Universities, Nigeria

GBESOEVI, Emmanuel Semako[1]
emmanuel.gbesoevi@lasu.edu.ng
https://orcid.org/0000-0002-1737-9980
^

ENOSAKHAE, Stephens Isaac[1]
isaacstephens2018@gmail.com

ONASANYA, Hafsat Ibironke[1]
hafsat.onasanya@lasu.edu.ng
https://orcid.org/ 0000-0002-4576-2645

SALAMI, Fatimat Funmilola [2]
salamiff@lasued.edu.ng
https://orcid.org/0009-0000-8769-9966

[1]Department of Educational Management, Faculty of Education, Lagos State University, Ojo
[2]Department of Educational Management, College of Management and Social Sciences Education, Lagos State University of Education, Oto/Ijanikin, Nigeria

Abstract

This study examined the influence of Artificial Intelligence (AI)-driven research methodologies on lecturers' productivity in Lagos State University (LASU), Ojo Campus. The growing integration of AI tools such as Machine Learning (ML), Natural Language Processing (NLP), and ChatGPT into academic research and teaching, alongside concerns about lecturers' research efficiency, publication output, and teaching effectiveness in Nigerian universities, motivated the study. Specifically, the study sought to ascertain lecturers' awareness of AI-driven research methodologies, examine their knowledge of ML, NLP and ChatGPT, determine their perception of these tools in enhancing research quality and academic productivity, and establish the influence of the tools on research efficiency, publication output, and teaching effectiveness. A descriptive survey research design was adopted, with a sample of 165 lecturers drawn from seven faculties and two schools across Lagos State Owned Universities. Data were collected using a researcher-designed instrument, the Artificial Intelligence Driven Research Methodologies and Lecturers' Productivity Questionnaire (AIDRMLPQ). Out of 189 copies of the questionnaire distributed, 165 were properly completed and returned, giving a response rate of 89.2%. Data were analysed using descriptive statistics (mean and standard deviation) and Pearson Product Moment Correlation at the 0.05 level of significance. Findings revealed a significant positive relationship between the adoption of AI-driven research methodologies and lecturers' research efficiency (r = 0.742), between knowledge of ML, NLP and ChatGPT and academic productivity (r = 0.781), between lecturers' perception of AI tools and research quality (r = 0.766), and between AI tools utilisation and research efficiency, publication output, and teaching effectiveness (r = 0.754). The study concluded that AI-driven research methodologies play a significant and positive role in enhancing lecturers' productivity at LASU, and that institutional support and structured training remain critical to maximising the benefits of AI in higher education. It was recommended, among others, that the University organise regular training on AI tools, develop clear policies on ethical AI use, and invest in AI-compatible infrastructure to support lecturers' effective adoption of AI in research and teaching.

Keywords: *Artificial Intelligence, research methodologies, lecturers' productivity, machine learning, natural language processing, LASU*

Introduction

In today's rapidly evolving academic environment, Artificial Intelligence (AI) driven research methodologies are transforming the way lecturers conduct research, analyze data, which in the word of Gbesoevi et al. (2024) that data analytics can help educators customize instruction and provide targeted support to students and among others enhance lecturers productivity. AI is increasingly being integrated into higher education institutions to improve efficiency, accuracy,

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and innovation in academic research. This study explores how AI driven research methodologies influence lecturers' productivity at Lagos State owned Universities, highlighting both the benefits and challenges of AI adoption in academia. Artificial Intelligence is defined as the simulation of human intelligence in machines, allowing them to perform tasks such as data processing, pattern recognition, decision-making, and natural language processing (Russell & Norvig, 2020). AI driven research methodologies refer to the application of AI tools such as machine learning, deep learning, data mining, and natural language processing (NLP) to enhance research efficiency. These methodologies enable researchers to handle large datasets, automate literature reviews, and generate insights more quickly and accurately than traditional research methods (Bishop, 2021). AI driven research tools such as ChatGPT, IBM Watson, Google Scholar AI, and Elsevier's AI research assistants provide researchers with intelligent recommendations, automated summaries, and predictive analysis capabilities (Brynjolfsson & McAfee, 2021). In addition, AI-powered statistical tools like SPSS AI, Stata AI, and Python-based AI models assist researchers in conducting more accurate and efficient data analysis, thereby improving the quality of academic output (Goodfellow et al,, 2020). Quality of academic output could constitute quality teaching which here could stem from lecturers communicating effectively for better understanding, prompt completion of the course contents by the lecturers, lecturers providing clinical instructions, and clinical supervision as well as the use of a professionally constructed questionnaire for the evaluation of instructors' teaching quality and making use of relevant applicable tools for teaching (Gbesoevi et al., 2023). Lecturers play a crucial role in research, knowledge dissemination, and innovation within universities. Productivity in academia is often measured by the number of published research papers, contributions to knowledge, research collaborations, and supervision of student research projects (Altbach, 2021). However, lecturers face significant challenges that hinder their research productivity, including heavy teaching loads, administrative duties, lack of funding, and limited access to advanced research tools (Ogunleye, 2020). Also as submitted by Lawal et al. (2024), the intersection between compliance with, and teachers or lecturers productivity presents a multifaceted challenge deserving of investigation most especially in this era of artificial intelligent.

In the opinion of Gbesoevi et al, (2025), the productivity of a teacher's or lectures work is how a teacher or lecturer performs his or her work or tasks. Also teachers' and lecturers productivity may be measured in terms of performance. AI driven research methodologies provide an opportunity to enhance lecturers' productivity by automating repetitive research tasks such as data collection, literature review, citation management, and hypothesis testing. These advancements enable lecturers to focus more on critical analysis and innovative contributions to their fields (Nguyen & Pham, 2022). The use of AI in research also promotes interdisciplinary collaborations by enabling lecturers to connect with researchers globally through AI driven academic networking platforms (Smith, 2021). The adoption of AI in Nigerian universities is still in its early stages, with many institutions facing challenges such as inadequate technological infrastructure, low digital literacy among lecturers, and resistance to change (Adebayo, 2022). Lagos State owned Universities are among some of the Nigeria's leading institutions integrating technology into academic research, but the extent to which AI is being used remains largely unexplored. Several Nigerian universities have started adopting AI driven solutions in education, including AI assisted grading systems, plagiarism detection tools, and digital libraries powered by machine learning algorithms (Eze, 2021). However, many lecturers may not yet be fully aware of or trained on how to utilize AI driven research tools effectively. The lack of AI literacy and infrastructural support may hinder lecturers from maximizing the benefits of AI for research productivity (Okonkwo, 2021). Artificial Intelligence (AI) has emerged as a transformative force across various sectors, offering innovative solutions to complex problems. In the realm of education been seen as the bedrock of every society and a tool for national development as been opined by Gbesoevi et al. (2025), AI holds the potential to revolutionize traditional teaching methods and streamline research processes. Artificial Intelligence refers to the development of computer systems capable of performing tasks that typically require human intelligence. This includes a range of technologies, including machine learning, natural language processing, and data analytics. AI systems leverage algorithms and data to simulate cognitive functions, enabling machines to analyze information, adapt to changing circumstances, and improve performance over time (Russell & Norvig, 2010). AI as a system is composed of different tools working inter-dependently to achieve a singular purpose.

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Numerous AI based tools have been developed to cater to the unique needs of teaching and research in the academic setting. These tools harness advanced algorithms and data processing capabilities to streamline tasks, offer personalized learning experiences, and provide valuable insights or research endeavors. Some of these AI based tools include Intelligent Tutoring Systems (ITS): Intelligent Tutoring Systems utilize AI algorithms to adapt to individual learning needs. These systems provide personalized feedback and guidance to students, aiding in their academic progress. For lecturers, ITS can be a valuable tool for tailoring teaching materials based on individual student requirements (VanLehn, 2011). Plagiarism Detection Software is an AI powered plagiarism detection tools crucial in maintaining academic integrity. These tools employ advanced algorithms to compare submitted work with vast databases, identifying instances of plagiarism and ensuring the authenticity of research outputs (Sallam & Hossain, 2018, Anih 2019). Automated Grading Systems: Automated grading systems, driven by AI, can efficiently assess assignments, exams, and coursework. These systems not only save time for lecturers but also provide consistent and unbiased evaluations, fostering fairness in the assessment process (Zafar, et al, 2018). Other AI based tools still include, predictive analytics tools, this tool utilizes AI algorithms to analyze historical data and predict student performance trends. Lecturers can leverage these insights to identify at-risk students early on, enabling targeted interventions to support their academic success (Romero & Ventura, 2010). Research Topic Recommendation Systems, this AI based recommendation system analyze academic literature, citation patterns, and emerging trends to suggest relevant research topics. Lecturers can use these tools to stay abreast of current developments and discover novel avenues for their research endeavors (Ren, et al., 2012).

However, despite the promising potential of AI tools in academics, as listed above, the extent of utilization, of these tools is still a subject under investigation. In this context, the utilization of AI based tools for teaching and research refers to the effective and efficient application of these technological solutions in educational and research settings. It involves leveraging AI tools to enhance teaching methodologies, streamline research processes, and ultimately improve the overall quality of education (Anderson & Dron, 2011). The utilization of these AI based tools is paramount, because, it enhances Personalization, take for instance, AI based tools, such as Intelligent Tutoring Systems (ITS), enable personalized learning experiences by adapting to individual student needs. This personalized approach enhances student engagement and comprehension. It is also enables efficiency in Grading and Assessment, like, Automated grading systems, powered by AI streamline the assessment process for lecturers. This not only saves time but also ensures consistency and objectivity in evaluations. More also in research for instance, it provides Advanced Data Analytics, Predictive analytics tools utilize AI algorithms to analyze historical data, providing insights into student performance trends. Lecturers can proactively identify students at risk and tailor interventions accordingly. AI based tools as well provides Innovative Research Insights, AI facilitates more efficient literature reviews and research topic selection. Recommendation systems help researchers stay abreast of emerging trends, fostering innovative and impactful research (Siemens, 2013). In no doubt, the utilization of AI based tools in teaching and research holds immense importance for advancing education and knowledge creation. Not only that, In education, numerous global systems have embraced digital technology-based approaches such as e-learning, distance education, e-assessment, artificial intelligence, cloud computing, and gamification for instructional delivery and assessment (Ukeh & Nwankwo, 2023; Anih & Ukeh, 2023; Okechukwu & Ukeh, 2022; Ukeh, et al., 2020). Nevertheless, despite all these above mentioned importance associated with utilizing various types of AI based tools, lecturers in Nigerian universities, including Lagos State owned Universities seem not to have fully embraced these technologies. However, be it as it may, one cannot out rightly say for sure that Lecturers in Lagos State owned Universities are not effectively utilizing AI based tools for both Teaching and Research without proper empirical and statistical evidence. On this note it is worthwhile to state that, the primary concern of this study is to ascertain the extent to which the Lecturers in Lagos State owned Universities Utilizes AI based tools in the realms of teaching and research. Thus the choice of this topic, titled artificial intelligence driven research methodologies and lecturers' productivity in Lagos State owned Universities. This research therefore aims to unravel the current state of AI adoption, explore available tools for teaching and research, and address the significant barrier hindering their widespread utilization.

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In recent years, Artificial Intelligence (AI) has revolutionized various aspects of academic research, offering enhanced data analysis, literature review automation, plagiarism detection, and predictive modeling (Smith & Brown, 2020). AI driven research methodologies have the potential to improve the efficiency and effectiveness of research output by reducing the time and effort required for data processing, enhancing accuracy, and facilitating innovative knowledge discovery (Johnson et al., 2021). However, despite these advantages, there is limited empirical evidence on how AI driven research methodologies impact lecturers' productivity, particularly in Lagos State owned Universities. Lecturers in Nigerian universities, face numerous challenges that affect their research productivity. These include inadequate access to research funding, time constraints due to heavy teaching and administrative responsibilities, and limited exposure to advanced technological tools (Adeyemi & Olatunji, 2019). While AI tools have the potential to mitigate some of these challenges, their adoption and integration into research practices remain inconsistent. Many lecturers may lack adequate training on AI applications, leading to resistance or underutilization of AI tools in academic research (Ogunleye, 2022). Additionally, concerns about data privacy, ethical implications, and the reliability of AI-generated insights may further hinder the widespread use of AI driven methodologies in academic settings (Okafor, 2023). Another critical issue is the digital divide in Nigerian higher education institutions. The accessibility of AI driven research tools is often constrained by inadequate infrastructure, limited internet access, and the high cost of acquiring advanced software (Bamidele & Yusuf, 2020). As a result, while AI has the potential to enhance research productivity, disparities in technological access and proficiency may create unequal research opportunities among lecturers at Lagos State owned Universities.

Furthermore, there is a need to examine whether AI driven research methodologies contribute to the quality and impact of research outputs. Quality in the regards refers to, Quality teaching and research in higher education, together with access, funding, tuition fees, research excellence and productivity, has been one of the central focuses of government policies. (Gbesoevi, et al., 2022) Although AI can facilitate faster data processing and improve literature synthesis, there is an ongoing debate regarding whether AI-assisted research maintains the same level of academic rigor and critical analysis as traditional research methods (Eze & Nwankwo, 2021). Understanding the effectiveness of AI in enhancing research productivity requires an in-depth exploration of lecturers' experiences, perceptions, and the actual outcomes of AI integrated research I university. Given these challenges, this study seeks to investigate the extent to which AI driven research methodologies influence lecturers' productivity in University. It explored the level of AI adoption, the barriers to effective implementation, and the perceived benefits and drawbacks of using AI in academic research. The findings of this study provide valuable insights into the role of AI in higher education research and offer recommendations for optimizing AI integration to enhance lecturers' research productivity.

Purpose of the Study

The purpose of this study is to examine the influence of artificial intelligence driven research methodologies on lecturers' productivity in Lagos State owned Universities. Specifically, the study aims to:

1. Ascertain the extent of awareness of AI driven research methodologies among lecturers in Lagos State owned Universities.
2. Find out the relationship between adoption of AI-driven research methodologies and lecturers' research efficiency
3. Examine the extent of knowledge lecturers in Lagos State owned University have about machine learning, natural language processing (NLP), ChatGPT and their applications in academia.
4. Find out lecturers' perception on the use of machine learning, natural language processing (NLP) and ChatGPT in enhancing research quality and academic productivity at Lagos State owned University.
5. Determine the influence of machine learning, natural language processing (NLP) and ChatGPT on lecturer's research efficiency, publication output, and teaching effectiveness in Lagos State University.

Research Questions

This study was guided by the following research questions:

1. To what extent are lecturers in Lagos State owned University aware of AI driven research methodologies?
2. To what extent do knowledge of machine learning, natural language processing (NLP), and ChatGPT influence lecturers' research efficiency and academic productivity in Lagos State owned Universities?

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3. What are the perceptions of Lagos State University lecturers regarding the effectiveness of machine learning, natural language processing (NLP) and ChatGPT in enhancing research quality and academic productivity?
4. How does machine learning, natural language processing (NLP) and ChatGPT influence lecturers' research efficiency, publication output, and teaching effectiveness in Lagos State owned Universities?

Null Hypothesis

Based on the research questions, the following hypotheses were formulated to guide the study:

1. There is no significant relationship between the adoption of AI driven research methodologies and lecturers' research efficiency in Lagos State owned Universities.
2. There is no significant relationship between the use of machine learning, natural language processing (NLP), ChatGPT and their applications in academia and lecturers' academic productivity in Lagos State owned Universities.
3. There is no significant relationship between perceptions of Lagos State owned Universities lecturers and the effectiveness of machine learning, natural language processing (NLP) and ChatGPT in enhancing research quality and academic productivity.
4. There is no significant relationship between machine learning, natural language processing (NLP) and ChatGPT and it influence on lecturers' research efficiency, publication output, and teaching effectiveness in Lagos State owned Universities.

Research Methodology

This study adopted a descriptive correlation research design, with the target population comprising of all academic staff in Lagos State owned universities. A multistage stage sample technique consisting stratified, purposive and simple random sampling technique was used to select 189 academic staff or lecturers from seven faculties from across the three universities owned and financed by Lagos State Government. A self-developed questionnaire titled "Artificial Intelligence Driven Research Methodologies and Lecturers' Productivity Questionnaire (AIDRMLPQ) designed to align with the purpose of the study, research questions and hypotheses served as the instrument for collection of data foe this study. The instrument was divided into two sections; Section A and Section B. Section A contains the demographic data of the respondents while Section B contain a 20 items responded to by the respondents under the structured adoption of scored 4 point likert scale of Strongly Agreed (4), Agreed (3), Disagree (3) and Strongly Disagree (1). The instrument was validated through face and content validity and validated through a test-retest method and the coefficient of the reliability value of $r = 0.81$, which implies that, the instrument is valid as it measures what is was purposed to measure. Data collected were analyzed using both descriptive and inferential statistics. The descriptive statistics include table, percentage and mean was used to analyses the demographic data while the inferential statistics of Pearson product moment correlation - PPMC was used to test all hypotheses at 0.05 level of significance and with the aid of Statistical Package for Social Science (SPSS) version 26.0

Presentation of Results

This section presents the analysis of data collected from lecturers of Lagos State owned Universities on Artificial Intelligence Driven Research Methodologies and Lecturers' Productivity. The data were obtained through a structured questionnaire designed in line with the objectives, research questions, and hypotheses of the study. Out of the total number of 189 questionnaires distributed for data collection, only 165 questionnaires were successfully filled and recovered and this was used for the data analysis.

Table 1: Presentation of Demographic Variables

Demographic Variable		Frequency Count	Percent
Gender	Male	102	61.8
	Female	63	38.2
Academic Rank	Assit. Lecturer	18	10. 9
	Lecturer II	41	24.8
	Lecture I	52	31.5
	Senior Lecturer	36	21.8
	Professor	18	10.8

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Experience	1-5 years	36	21.8
	6-10 years	47	28.5
	11-15 years	52	31.1
	16+ years	30	18.2

Table 1 show that out of the 165 lecturers who participated in the study, 102 respondents, representing 61.8%, were male, while 63 respondents, representing 38.2%, were female. This indicates that the majority of the respondents were male lecturers. The distribution suggests that male lecturers are more represented in the study population, although female lecturers also formed a substantial proportion of the respondents. The inclusion of both genders implies that the views expressed in the study are gender-balanced and therefore provide a fair representation of lecturers' perceptions on artificial intelligence-driven research methodologies and productivity in Lagos State University. Table 3 indicates that 18 respondents (10.9%) were Assistant Lecturers, 41 respondents (24.8%) were Lecturer II, 52 respondents (31.5%) were Lecturer I, 36 respondents (21.8%) were Senior Lecturers, while 18 respondents (10.9%) were Professors. This shows that the majority of the respondents were Lecturer I, followed by Lecturer II and Senior Lecturers. The presence of respondents across all academic ranks suggests that the study captured the perceptions of lecturers at different career stages, thereby enhancing the reliability and generalizability of the findings on artificial intelligence-driven research methodologies and lecturers' productivity in Lagos State owned Universities. Table 4 shows that 36 respondents (21.8%) had between 1–5 years of teaching experience, 47 respondents (28.5%) had 6–10 years of experience, 52 respondents (31.5%) had 11–15 years of experience, while 30 respondents (18.2%) had above 15 years of experience. This indicates that the majority of the lecturers had between 11–15 years of teaching experience, followed by those with 6–10 years of experience. The distribution implies that most respondents were moderately experienced in the academic profession, suggesting that their responses on artificial intelligence driven research methodologies and lecturers' productivity were based on substantial teaching and research experience.

Research Question 1

Table 2: To what extent are lecturers aware of AI-driven research methodologies?

S/N	Items	SA	A	D	SD	Mean
1	I am aware of AI tools such as ChatGPT and SPSS AI	78	61	17	9	3.26
2	I understand the concept of AI-driven research methodologies	69	66	20	10	3.18
3	AI tools are commonly used in modern research	71	58	22	14	3.13
4	My institution exposes me to AI research tools	63	57	30	15	3.02
5	I regularly hear about AI use in academia	76	54	23	12	3.17

Grand Mean = 3.15 → Accepted

Table 2 presents the responses of lecturers on their level of awareness of AI driven research methodologies. The mean scores for all the five items ranged from 3.02 to 3.26, which are all above the decision benchmark of 2.50. Specifically, item 1, which states that lecturers are aware of AI tools such as ChatGPT and SPSS AI, recorded the highest mean score of 3.26, indicating a high level of awareness of specific AI tools among the respondents. Item 2, on understanding the concept of AI-driven research methodologies, also recorded a high mean score of 3.18, suggesting that most lecturers have a good conceptual understanding of AI applications in research. Item 3, which measured the perception that AI tools are commonly used in modern research, had a mean score of 3.13, showing that lecturers largely agree that AI has become an integral part of contemporary research practices? Furthermore, item 4, which assessed institutional exposure to AI research tools, recorded the lowest mean score of 3.02, though still above the acceptance level, implying that while lecturers are exposed to AI tools, institutional support could be improved. Item 5, on regularly hearing about the use of AI in academia, recorded a mean score of 3.17, further confirming the growing visibility of AI in the academic environment. The grand mean of 3.15 indicates that lecturers in Lagos State University have a high level of awareness of AI driven research methodologies. This implies that awareness is not a major barrier to the adoption of AI tools among lecturers.

Research Question 2

Table 3: To what extent does knowledge of ML, NLP and ChatGPT influence lecturers' productivity?

S/N	Items	SA	A	D	SD	Mean
6	I understand machine learning concepts	65	63	25	12	3.10
7	I can use NLP tools for literature review	59	61	30	15	2.98

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8	ChatGPT improves my research efficiency	83	56	16	10	3.29
9	AI helps me complete research faster	74	58	22	11	3.18
10	AI tools improve my academic output	77	55	21	12	3.19

Grand Mean = 3.15 → Accepted

Table 3 shows lecturers' responses on the extent to which their knowledge of machine learning (ML), natural language processing (NLP) and ChatGPT influence their academic productivity. The mean scores for the five items ranged between 2.98 and 3.29, all of which are above the decision benchmark of 2.50, indicating general agreement among the respondents. Item 6, which measured understanding of machine learning concepts, recorded a mean score of 3.10, suggesting that most lecturers possess basic knowledge of ML. Item 7, which assessed the ability to use NLP tools for literature review, had the lowest mean score of 2.98, indicating that although lecturers are fairly knowledgeable, some still experience challenges in using NLP tools effectively. Item 8, stating that ChatGPT improves research efficiency, recorded the highest mean score of 3.29, showing that lecturers strongly agree that ChatGPT enhances their efficiency in conducting research. Furthermore, item 9, which examined whether AI helps lecturers to complete research faster, had a mean score of 3.18, while item 10, on improvement of academic output through AI tools, recorded a mean score of 3.19. These results indicate that lecturers perceive AI tools as important facilitators of faster research completion and improved scholarly output.

The grand mean of 3.15 confirms that knowledge of ML, NLP and ChatGPT has a positive effect on lecturers' productivity in Lagos State University.

Research Question 3

Table 4: What are lecturers' perceptions of AI in enhancing research quality?

S/N	Items	SA	A	D	SD	Mean
11	AI improves quality of research output	74	59	20	12	3.18
12	AI tools increase publication speed	79	54	21	11	3.22
13	AI tools reduce workload	71	58	24	12	3.14
14	AI tools enhance accuracy of analysis	76	55	23	11	3.19
15	AI encourages innovation in research	73	57	23	12	3.16

Grand Mean = 3.18 → Accepted

Table 4 presents the perceptions of lecturers on the role of artificial intelligence in enhancing research quality. The mean scores for all the five items ranged from 3.14 to 3.22, which are all above the benchmark mean of 2.50, indicating that the respondents generally agreed with all the statements. Item 11, which states that AI improves the quality of research output, recorded a mean score of 3.18, showing that most lecturers believe that AI contributes positively to the quality of their scholarly work. Item 12, on the role of AI tools in increasing publication speed, recorded the highest mean score of 3.22, indicating that lecturers strongly agree that AI facilitates faster publication processes. Item 13, which assessed whether AI tools reduce research workload, had a mean score of 3.14, suggesting that respondents perceive AI as a tool that eases the burden associated with research activities. Furthermore, item 14, which examined the enhancement of accuracy of analysis through AI tools, recorded a mean score of 3.19, while item 15, which states that AI encourages innovation in research, recorded a mean score of 3.16. These results confirm that lecturers perceive AI as a valuable tool for improving the accuracy and innovativeness of their research. The grand mean of 3.18 indicates that lecturers in Lagos State owned Universities have a positive perception of the use of artificial intelligence in enhancing research quality.

Research Question 4

Table 5: How does an AI influence lecturer research efficiency, publication output and teaching?

S/N	Items	SA	A	D	SD	Mean
16	AI increases my publication output	69	62	23	11	3.15
17	AI improves teaching effectiveness	72	60	22	11	3.17
18	AI enhances data analysis accuracy	77	56	21	11	3.21
19	AI supports student supervision	70	59	24	12	3.14
20	AI saves time for academic activities	75	55	24	11	3.18

Grand Mean = 3.17 → Accepted

Source: Field source, 2025

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The results in Table 5 show lecturers' views on how Artificial Intelligence (AI) affects research, teaching, and publication. Respondents rated each statement on a 4-point scale (SA = Strongly Agree, A = Agree, D = Disagree, SD = Strongly Disagree). The mean scores show their overall perception. Lecturers agreed that AI increases publication output (M = 3.15), suggesting that AI helps in writing, editing, and preparing research papers (Alghamdi et al. 2021). They also agreed that AI improves teaching effectiveness (M = 3.17), likely because it helps with lesson planning and student learning (Johnson & Brown, 2020). The highest mean was for AI enhancing data analysis accuracy (M = 3.21), which indicates that AI reduces errors and improves research results (Li & Wang, 2022). Lecturers also agreed that AI supports student supervision (M = 3.14), helping monitor progress and provide feedback (Chen et al., 2021). Additionally, AI was seen as saving time for academic activities (M = 3.18), allowing lecturers to focus on more important tasks (Brown & Green, 2020). The grand mean of 3.17 shows that lecturers generally have a positive view of AI in research and teaching. This suggests that AI is considered a useful tool for improving academic performance and efficiency.

Test of Hypotheses

There is no significant relationship between adoption of AI-driven research methodologies and lecturers' research efficiency.

Table 6: Pearson's Correlation on significant relationship between adoption of AI-driven research methodologies and lecturers' research efficiency.

		Adoption of AI-driven	Lecturers' research efficiency
Adoption of AI-driven	Pearson Correlation	1	.721**
	Sig. (2-tailed)		.000
	N	165	165
Lecturers' research Efficiency	Pearson Correlation	.721**	1
	Sig. (2-tailed)	.000	
	N	165	165

** Correlation is significant at the 0.01 level (2-tailed)

The Pearson correlation analysis in Table 6 shows a strong positive relationship between adoption of AI-driven research methodologies and lecturers' research efficiency (r = 0.721, p = 0.000). This indicates that lecturers who adopt AI driven research tools tend to have higher research efficiency, and the relationship is statistically significant.

There is no significant relationship between knowledge of Machine Learning (ML), Natural Language Processing (NLP), ChatGPT and lecturers' academic productivity.

Table 7: Pearson's Correlation on significant relationship between knowledge of Machine Learning (ML), Natural Language Processing (NLP), ChatGPT and lecturers' academic productivity.

		Knowledge of (ML), (NLP) and ChatGPT	Lecturers' academic productivity
Knowledge of (ML), (NLP) and ChatGPT	Pearson Correlation	1	.936**
	Sig. (2-tailed)		.000
	N	165	165
Lecturers' academic productivity	Pearson Correlation	.936**	1
	Sig. (2-tailed)	.000	
	N	165	165

** Correlation is significant at the 0.01 level (2-tailed) **

Table 7 shows a very strong positive relationship between lecturers' knowledge of ML, NLP, and ChatGPT and their academic productivity (r = 0.936, p = 0.000), indicating that greater knowledge of these AI tools is associated with higher academic productivity.

There is no significant relationship between lecturers' perception of AI driven research methodologies and research quality.

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Table 8: Correlation analysis showing relationship between lecturers' perception of AI driven research methodologies and research quality.

		Lecturers' perception	Research quality
lecturers' perception	Pearson Correlation	1	.783**
	Sig. (2-tailed)		.000
	N	165	165
Research quality	Pearson Correlation	.783**	1
	Sig. (2-tailed)	.000	
	N	165	165

**. Correlation is significant at the 0.05 level (2-tailed).

The correlation analysis in Table 8 reveals a strong positive relationship between lecturers' perception of AI-driven research methodologies and research quality (r = 0.783, p = 0.000). This indicates that a more positive perception of AI driven research methods is associated with higher research quality, and the relationship is statistically significant.

There is no significant relationship between AI tools utilization and lecturers' research efficiency, publication output and teaching effectiveness.

Table 9: Correlation analysis showing significant relationship between AI tools utilization and lecturers' research efficiency, publication output and teaching effectiveness.

		AI tools	Research efficiency
AI tools	Pearson Correlation	1	.783**
	Sig. (2-tailed)		.000
	N	165	165
Research efficiency	Pearson Correlation	.783**	1
	Sig. (2-tailed)	.000	
	N	165	165

**. Correlation is significant at the 0.05 level (2-tailed).

The correlation analysis in Table 9 indicates a strong positive relationship between AI tools utilization and lecturers' research efficiency (r = 0.783, p = 0.000). This shows that increased use of AI tools is associated with improved research efficiency, and the relationship is statistically significant.

Discussion of Findings

The first finding revealed a strong positive and statistically significant relationship between the adoption of AI driven research methodologies and lecturers' research efficiency (r = 0.742, p = 0.000). This means that lecturers who integrate AI tools into their research processes tend to complete research tasks more efficiently than those who do not. This finding suggests that AI driven methodologies such as automated data analysis software, AI assisted literature review tools, and intelligent writing assistants help reduce time spent on repetitive and manual tasks. By automating processes like data coding, statistical computation, referencing, grammar checking, and plagiarism detection, AI allows lecturers to focus more on critical thinking, interpretation of findings, and theoretical development. The result aligns with the work of Li and Wang (2022), who emphasized that AI-based analytical systems significantly shorten research cycles. Similarly, Alghamdi et al. (2021) noted that AI integration improves workflow management and enhances research precision. The rejection of the null hypothesis confirms that AI adoption is a strong determinant of research efficiency. Therefore, institutions that encourage AI integration are likely to witness improved research turnaround time and productivity among lecturers.

The second finding showed a strong positive relationship between lecturers' knowledge of Machine Learning (ML), Natural Language Processing (NLP), ChatGPT, and their academic productivity (r = 0.781, p = 0.000). This implies that lecturers who possess greater knowledge of AI technologies tend to have higher research output and improved teaching performance. Knowledge of AI tools equips lecturers with the skills needed to automate complex tasks such as predictive modeling, text analysis, idea generation, and academic writing refinement. For instance, understanding ML allows lecturers to apply predictive and classification models in research, while NLP tools assist in analyzing qualitative data efficiently. Familiarity with AI writing assistants enhances clarity, coherence, and structure in scholarly publications. This finding supports Johnson and Brown (2020), who argued that technological competence significantly influences academic

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productivity. Zhao et al. (2023) also reported that AI literacy enhances research output and innovation capacity among university staff. The rejection of the null hypothesis indicates that AI knowledge is not optional but essential in modern academia. Without adequate knowledge, lecturers may underutilize AI tools or misuse them, limiting potential benefits.

The third finding revealed a strong positive correlation between lecturers' perception of AI driven research methodologies and the quality of research produced ($r = 0.766$, $p = 0.000$). This suggests that lecturers who hold positive attitudes toward AI tend to produce higher-quality research outputs. Perception plays a critical role in technology acceptance. When lecturers perceive AI as beneficial, reliable, and supportive rather than threatening, they are more likely to adopt and effectively utilize AI tools. Positive perceptions encourage openness to innovation, experimentation with AI-based tools, and continuous skill development. Innovation in the word of Gbesoevi et al. (2025) leads to more efficiency and improved outcomes in quality and equity of learning opportunities. Innovative instructional strategies engage students with different kinds of stimuli activity based learning Chen et al. (2021) highlighted that positive attitudes toward AI adoption improve research accuracy and methodological rigor. Similarly, Adeyemi (2021) emphasized that lecturers' attitudes toward educational technology significantly affect research outcomes in Nigerian universities. By rejecting the null hypothesis, this study confirms that perception is a key psychological factor influencing research quality. Institutions must therefore address fears, misconceptions, and ethical concerns about AI to improve acceptance and maximize its benefits. The fourth finding established a strong positive relationship between AI tools utilization and lecturers' research efficiency, publication output, and teaching effectiveness ($r = 0.754$, $p = 0.000$). This indicates that beyond adoption and knowledge, actual effective use of AI tools significantly enhances multiple dimensions of academic performance. AI tools such as automated grading systems, plagiarism detection software, intelligent tutoring systems, and advanced statistical packages streamline academic activities. In research, AI accelerates data processing and improves analytical depth. In publication, AI assists in formatting, language refinement, and referencing accuracy. In teaching, AI enhances instructional delivery, feedback provision, and student engagement. Brown and Green (2020) observed that AI enhanced systems reduce academic workload and increase instructional efficiency. Similarly, Li and Wang (2022) emphasized that AI utilization improves both research quality and teaching innovation. The rejection of the null hypothesis indicates that AI is not merely supportive but transformative across research and teaching domains.

Conclusion

Based on the findings of this study, it can be concluded that Artificial Intelligence driven research methodologies play a significant and positive role in enhancing lecturers' productivity at Lagos State owned Universities. The adoption and utilization of AI tools such as Machine Learning, Natural Language Processing, and ChatGPT have been shown to improve research efficiency, research quality, publication output, and teaching effectiveness. The study concludes that lecturers who possess adequate knowledge of AI tools and maintain positive perceptions toward their use are better positioned to achieve higher levels of academic productivity. AI tools reduce the burden of repetitive research tasks, enhance analytical accuracy, and provide valuable support for academic writing, data analysis, student supervision, and instructional delivery. Furthermore, while lecturers demonstrate strong awareness and positive attitudes toward AI, the study concludes that institutional support and structured training remain critical to maximizing the benefits of AI in higher education. Without adequate policies, training programs, and infrastructure, the full potential of AI-driven research methodologies may not be fully realized. In summary, artificial intelligence is no longer optional but essential for modern academic practice, and its effective integration into university research and teaching systems will significantly contribute to improved lecturers' productivity and overall institutional performance.

Recommendations

In view of the findings and conclusions of this study, the following recommendations are made:

1. Institutional Training and Capacity Building Universities, particularly Lagos State University, should organize regular workshops, seminars, and training programs to improve lecturers' practical knowledge of AI tools such as ML, NLP, ChatGPT, and AI-based data analysis software.
2. Development of AI Usage Policies Clear institutional policies and guidelines should be developed to regulate the ethical and responsible use of AI in research, publication, and teaching, ensuring academic integrity and originality.

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3. Provision of AI Infrastructure and Resources: University management should invest in AI-compatible infrastructure, including licensed AI software, high-speed internet access, and digital research platforms to support lecturers' effective use of AI tools.
4. Integration of AI into Research and Teaching Culture AI-driven methodologies should be formally integrated into research practices and teaching processes across faculties, encouraging lecturers to adopt innovative approaches in knowledge production and dissemination.
5. Encouragement of Continuous Learning: Lecturers should be encouraged to engage in continuous professional development to stay updated on emerging AI technologies and their applications in higher education.
6. Support for AI-Based Research Collaboration: Universities should promote interdisciplinary and collaborative research projects that leverage AI tools, thereby enhancing research output and global visibility.

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Nurturing Creativity Skills in The Early Years: A Panacea for Sustainable Development in Early Childhood Education in Nigeria

IRIMOREN, Tina Uhuenkpeoma[1]
tina.irimoren@uniben.edu
DONYE, Faith Odufa[1]
odufa.donye@uniben.edu
[1]Institute of Education, University of Benin, Edo State, Nigeria

Abstract

Nurturing creativity skills is a part of teaching with a high value and of an extensive potential to enrich the educational experiences of children. It is the most effective way of education in setting the unity between perception, thinking and application. Children are seen as an environmental, economic and social asset in world civilizations because they play a vital role in any society and they ensure that ethics, values, and culture continue to exist and be passed from generation to generation. Thus, in terms of tools, technology, medicine, health condition, family size, education, and attitude, the world in which the child is growing up now is vastly different. Preschoolers in the twenty-first century are expected to be well equipped, endowed and creative academically successful, and capable of coping with the pressures of the modern world. These expectations can be assumed if preschoolers' creativity skills and talents are well nurtured holistically in early childhood education to meet these demands. As a result, this paper will highlight the necessity of nurturing creativity skills in preschoolers in order to promote a more sustainable growth and development. It will also emphasize the significance and essence of cultivating and nurturing creativity skills in preschoolers for a more sustainable early childhood development, as well as the benefits of doing so. Finally, the author will conclude and make some recommendations.

Keywords: Nurturing, Creativity Skills, Sustainable Development, Early Childhood Education

Introduction

Investing in children is a critical component of eradicating poverty, increasing shared prosperity, and improving intergenerational equity. It is also necessary for them to improve their abilities to realize their full potential as productive, engaged, and capable citizens, contributing fully to their families and societies. Sustainable development entails improving human living conditions and also a task with its own set of difficulties. Sustainable development goal 4 all begins and ends with children who are safe, healthy, and well-educated whose rights and well-being should be at the forefront of the post-2015 agenda. Sustainable education cultivates the knowledge, skills, values, and worldviews that enable young children and adults to engage in ways that contribute to more sustainable living patterns. It allows individuals and communities to consider how they understand and interact with the world. Sustainable development in early childhood education is future-oriented, emphasizing the importance of taking educated action to safeguard the environment and create a more environmentally and socially just world. Environmental, social, cultural, and economic systems, as well as their interconnection, must all be considered when taking actions that encourage more sustainable lifestyles in early childhood. Sustainable Development in Early Childhood Education entails providing children with the knowledge, skills, and tools to plan and manage change towards sustainability within the homes, schools, centres or community. The Sustainable Development goals aim to raise sustainability consciousness and knowledge, as well as to educate children and caregivers that can think critically, innovate, and give solutions for more sustainable living patterns. It is to also enable all pre-schoolers to acquire the required information, skills, and attitudes to act in ways that contribute to more sustainable living situations. Children and communities will be able to consider new ways of interpreting and participating with the world. The sustainable development priority is future-oriented, focusing on environmental protection and informed action to create a more environmentally and socially just world. Environmental, social, cultural, and economic factors must all be considered when taking actions that support children in a holistic sustainable early childhood development and their interdependence. Sustainable development is development that satisfies current needs without jeopardizing future generations' ability to meet their own.

Concept of Sustainable Development Goals

The 2030 Agenda for Sustainable Development, according to United Nations (2015), provides a shared roadmap for peace and prosperity for people and the planet today and in the future. The 17 Sustainable Development Goals (SDGs) are at its

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core, and they represent an urgent call to action for all countries - developed and developing - to work together in a global partnership. They recognize that eradicating poverty and other forms of deprivation must be combined with efforts to enhance health and education, decrease inequality, and boost economic growth. United Nations Children's' Education Fund (2013) also opined that children's rights and well-being should remain at the centre of the post-2015 agenda. Investment in children is a fundamental means to eradicate poverty, boost shared prosperity, and enhance inter-generational equity. It is also essential for strengthening their ability to reach their potential as productive, engaged, and capable citizens, contributing fully to their families and societies. Sustainable development starts and ends with safe, healthy and well-educated children. It is also of the view that sustainable development starts and ends with safe, healthy and well-educated children. The importance of early learning is entrenched in the second target of Sustainable Development Goal 4, which seeks to ensure that, by 2030, "all girls and boys have access to quality early childhood development, care and pre-primary education so that they are ready for primary education". Pre-primary education is now considered an essential tool for achieving Universal Primary Education and the SDGs. Ensuring access to quality pre-primary education is a key strategy for improving early learning and education outcomes in the early years as well as the efficiency of education systems (UNICEF, 2018). Primarily, Sustainable Development Goal Number 4 states thus: Ensure inclusive and equitable quality education and promote lifelong learning opportunities for all as highlighted by UNICEF (2013):

1. Ensure that all girls and boys complete free, equitable and quality primary and secondary education leading to relevant and effective learning outcomes.
2. Ensure that all girls and boys have access to quality early childhood development, care and pre-primary education so that they are ready for primary education
3. Ensure equal access for all women and men to affordable and quality technical, vocational and tertiary education, including university.
4. Substantially increase the number of youth and adults who have relevant skills, including technical and vocational skills, for employment, decent jobs and entrepreneurship.
5. Eliminate gender disparities in education and ensure equal access to all levels of education and vocational training for the vulnerable, including persons with disabilities, indigenous peoples and children in vulnerable situations.
6. Ensure that all youth and a substantial proportion of adults, both men and women, achieve literacy and numeracy.
7. Ensure that all learners acquire the knowledge and skills needed to promote sustainable development, including, among others, through education for sustainable development and sustainable lifestyles, human rights, gender equality, promotion of a culture of peace and non-violence, global citizenship and appreciation of cultural diversity and of culture's contribution to sustainable development.
8. Build and upgrade education facilities that are child, disability and gender sensitive and provide safe, non-violent, inclusive and effective learning environments for all
9. substantially expand globally the number of scholarships available to developing countries, in particular least developed countries, small island developing States and African countries, for enrolment in higher education, including vocational training and information and communications technology, technical, engineering and scientific programmes, in developed countries and other developing countries
10. Substantially increase the supply of qualified teachers, including through international cooperation for teacher training in developing countries, especially least developed countries and small island developing states. (UN, 2015).

A pragmatic perspective on Nurturing Creativity Skills

The idea in young children's natural creativity is long-held and widespread among early years' educators hence, the need to inculcate in the child, the spirit of inquiry and creativity through the exploration of nature, the environment, arts, music and the use of toys (Federal Republic of Nigeria, 2013). However, in the sphere of creativity research, the topic becomes more complicated. Numerous definitions exist among creativity academics that define the creative person, the creative process, or how a range of factors interact over time in a specific environment to produce a creative product. Extreme case studies of creativity may reveal exceptional abilities or aberrant, occasionally insane conduct. There are also definitions

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that attribute extraordinary creativity to esoteric powers such as divine power or spirituality. Some even say that creativity cannot be defined since it is unknowable and unknown.

Jean Piaget's and Lev Vygotsky's theories of development, two of the most influential, support the idea that young children are creative in some ways. They also believe that lasting creative contributions can only be made after childhood and early adolescence. The early childhood educator is interested in a variety of questions about creativity. These are a few of them: What role does childhood have in the creative process? Is it true that all young children are creative, or is it a talent reserved for a chosen few? What, if any, role should teachers and parents have in fostering creativity? Is it worthwhile to try to find and nurture creativity skills in children, or is the link between childhood effects and adult creativity minimal or nonexistent? Although definite solutions to these concerns are unlikely for some time, the discipline of creativity studies has aided our understanding and, more importantly for the sake of this discussion, the relationship between creativity and early childhood education for sustainable development. In recent decades, notable early childhood practitioners have applied the developmental theories of Arnold Gesell, Sigmund Freud, Erik Erikson, Jean Piaget, and, most recently, Lev Vygotsky to carry on the traditions of the child study movements. Each of these theories emphasized the importance of children's creativity, albeit their interpretations differed. Theory and research have been interpreted by early childhood educators. Each of these theories emphasized the importance of children's creativity, albeit their interpretations differed. In turn, they have interpreted these theories and research in light of their own goals, attitudes, and practices. Piaget and Vygotsky's constructivist theories still impact early childhood education and are frequently used in descriptions of developmentally appropriate practice. Individual knowledge constructs are emphasized in Piaget's theory of cognitive development, while Vygotsky's sociocultural theory emphasizes the role of social and educational factors in development.

Vygotsky's (1978) concept of the zone of proximal development is also a major contribution to the body of education literature. According to Bartlett (2011), Vygotsky stressed that; "in the right environment, with the right guidance, children can perform successfully". For example, when a child is trying to count how many trains he has in order to share with all his friends, another more knowledgeable peer or adult who may be watching might notice that this child counted wrong. When noticing this, the more knowledgeable other could guide him in trying again by holding his finger and helping him count or redirecting him to double-check. Therefore, having another person to work alongside the learner could help assist the learning process. Both theories, on the other hand, stress the importance of play (though distinct kinds of play) in enhancing cognitive development and preparing children for adulthood and sustainable development. Piaget believes that the formation of symbolic cognition at the age of two coincides with an explosion of language and the beginnings of pretend, symbolic play - the quintessence of early childhood creative activity. Piaget's account of equilibration, the process that drives cognitive development, contains qualities that are easily associated with current notions of creativity in early childhood with include exploration, creativity and imagination. Piaget's theoretical cognitive framework originally came from the observations he made of his own children playing and learning. He thought in terms of an individual's learning by building concepts in memory to keep information. According to Powell and Kalina (2009), Piaget's main focus of constructivism has to do with the individual and how the individual constructs knowledge. Cognitive constructivism came directly from Piaget's work. Piaget's theory of cognitive development proposes that humans cannot be given information which they immediately understand and use; instead, humans must construct their own knowledge. Piaget's (1953) four stages are: Sensorimotor stage which a child goes through from ages zero to two; preoperational stage-two to seven years old; concrete operational stage - seven to eleven years old; and formal operational stage - eleven years old to adulthood. In the first stage, children learn about their environment. In the second stage, children are egocentric where they feel as though the world evolve around them. In the third stage, children begin to think more logically, and in the final stage, children think abstractly. As children move through Piaget's stages of development, they initially explore their world to construct knowledge through the use of their senses, by manipulating objects in the environment, and by bringing meaning to complex concepts in a rich environment under the supervision of the teacher (Kauser, 20I0). Freud's psychosexual theory linked early childhood to creativity by highlighting that children's mental processes are not subject to logical rules, which is a key aspect of adult creativity, and by creating a link between cognition and powerful emotion, which is a driving force

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behind creativity. Psychoanalytically oriented views demonstrated how some of the inherent impulses of young children may play out in adult creativity by emphasizing the importance of symbolic and imaginative play, during which children leave reality. Gesell's normative age/stage theory established a timeline for the establishment of physical, social, emotional, and intellectual qualities, as well as creative manifestations like imagination and representational play.

It is critical to nurture and instill creativity skills in preschoolers as part of their early childhood education. It is also critical for their healthy and long-term growth and sustainability. Children that are creative are more likely to succeed in the future. From coloring to reading, nurturing creativity skills in preschoolers encourages children to explore their learning settings and construct their dreams. When children are being taught and nurtured with creativity skills, they will learn something new every day. Children need a healthy educational environment to learn suitable problem-solving abilities and understand how to deconstruct their conditions in order to reach their full potentials. It is not necessary for preschoolers to excel in the arts if they have a creative mind. Creativity skills can help children succeed in professional domains later in life for sustainable development. No child is intended to be left behind in early childhood education. More educational activities that actually touch the core of a child's creativity are needed at the early phases of early childhood education to make room for a sustainable development future.

Importance and benefits of nurturing creativity skills for sustainable development

Creativity skills are activities that actively engage children's imagination through art, dance, dramatic play or theater, puppetry, and music. The creativity skills engage children across all domains - cognitive, language, social, emotional, and physical. Activities are deliberately open-ended (not prescriptive), foster divergent thinking, and support the process without particular attention on the product (Mills, 2014). However, Mayesky (2013) highlights ways teachers can help children express their natural creativity that can sustain them throughout their lifetime:

1. Help children accept change. Fear and anxiety are the enemies of creativity.
2. Help children realize that some problems have no easy answers.
3. Help children recognize that many problems have many possible answers. The goal is to explore and discover.
4. Help children monitor and accept their own feelings.
5. Value children's creativity, even when it's messy.
6. Recognize and acknowledge children's joy in all creative endeavors.
7. Help children appreciate their own unique characteristics and expressions.
8. Help children persevere. Encourage them to explore, discover, and explore again.

Mayesky's ideas provide an appropriate template for examining creativity skills across all developmental domains. Completing creative activities, for example, may foster the growth and maturation of children's fine and gross motor skills. Also, benefits and importance of nurturing creativity skills among preschoolers in early childhood towards a sustainable development are highlighted thus:

Imaginative and creative play: Creativity and imagination are essential for a child's growth during the early years of life and even in the future. It is here that a child's imagination and out-of-the-box thinking begin, as well as their learning about the world. For example, encouraging a child's creativity allows them to express themselves verbally and nonverbally, plan, act, communicate, and react to various situations. It also promotes their cognitive and social growth, which will be important when they enter the workforce in the future. Imagination and creativity is the gateway to new possibilities. Imagination is where children's creativity, resourcefulness, and thinking beyond the box begin. It is how children acquire knowledge of the world. Children handle things, express themselves verbally and nonverbally, plot (intentionally or unwittingly), act, communicate, react, and try on various roles during imaginative play. When preschoolers engage in imaginative play with dolls, vehicles, blocks, rocks, cardboard, or boxes, they can learn a lot. Playing with play dough, mixing earth and water to make recipes, working with art materials, splashing in puddles, or pretending to fly can all help children develop and acquire their creativity skills.

Imagination promotes cognitive and social growth. Everyone wants to raise children that are intellectually and socially/emotionally developed to their full potential. Children's development goals in early childhood education include critical thinking skills and creative problem-solving talents. Imagining, trying new things, and experimenting with new

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ideas help children develop critical thinking skills and stimulate creative problem solving. Furthermore, imaginative and creative thinking promotes socio-emotional development by allowing the preschoolers to consider many resolutions, so increasing their confidence, which may be employed in social interactions. Our children will also require imagination and innovation when they enter the workforce of the future which aids sustainable development.

Problem-solving, imagination, critical thinking: Cognitive abilities are required to maintain a competitive edge in today's ever-changing world and the creative process is crucial to this growth. Experimentation during creative activities encourages children to explore diverse choices and build new solutions and enhances building blocks to cognitive development.

Divergent Thinking: Divergent thinking is the ability to think in unique ways, and it is critical for the development of creativity. "Creativity" is frequently associated with artistic endeavors, yet it is an important component of everyday life. Divergent thinking is a thought process that distinguishes the child from the rest in an ever-changing world of unlimited possibilities.

Self-confidence and Happiness: We all want the best for our children - for them to have a childhood where they feel loved, understood and acknowledged for who they truly are. But mostly, we just want them to be happy! By giving children the space and the encouragement to pursue their own passions and dreams, you will help instill self-confidence as well as an overwhelming feeling of love and acceptance. This creates a natural culture of happiness that will have lasting effects well into their adulthood.

Nurtures Emotional Health & Self-expression: When children are able to express themselves fully and without judgment, it is one of the most rewarding and liberating experiences they can have. It allows them to make something real out of their personal sentiments and experiences—a lovely representation of their individual imaginations. It's also an excellent way to support their mental well-being and improve their overall quality of life.

Strengthens Family Bonds Turning off the television, video games, and phone in favour of doing something creative with children will not only make them feel special, but it will also help improve family relationships. We frequently recall feelings from our upbringing rather than objects. As a result, ensuring that the child remembers the unwavering love and admiration can have long-term effects well into adulthood for a more sustainable development.

Participation and Kindness: As caregivers, it is our responsibility to develop and encourage a child's innate desire to help so that it becomes a lifelong habit. Being a good role model is vital so that preschoolers learn to be helpful by watching us. When preschoolers are taught to be kind, they are better able to control their emotions, regulate their behaviors, and demonstrate empathy and self-control. With deliberate support, kindness can be actively nurtured and encouraged towards a sustainable development in early childhood education and beyond.

Resilience: Resilience has long been recognized as a necessary component of excellent learning, and everyone requires some measure of resilience to get through difficult circumstances. It helps children think more flexibly and realistically, be more creative, and avoid despair or anxiety when caregivers cultivate such a critical trait in preschoolers in early childhood. Caregivers strive to protect their children from painful circumstances, yet teaching resilience allows them to attempt new things.

Trust: Trust is instilled in the child from the moment he or she is born. Caregivers may bond with the preschoolers in a way that gives her/him a deep sense of security and, in turn, confidence in him/herself which holistically lead to more sustainable development. Responding to his/her basic needs is what this entails in infancy. A child's ability to need and depend is nurtured early childhood, allowing them to grow and develop relationally without fear.

Empathy and Adaptation: Empathy is a crucial component in teaching a child about bullying. The fact that empathy is a skill that can be taught rather than something we are born with boosts a child's emotional intelligence and confidence. For example, a child's emotional needs must be satisfied in order for them to experience and express empathy for another person. As a result, caregivers must nurture and provide emotional support and assist their children in coping with negative feelings. Children who are taught to respond positively to a situation are more likely to develop high emotional empathy towards sustainability. Adaptation gives the preschoolers the room to adjust to situations now and in later years which eventually boosts their sustainable growth and development.

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Avenues to nurturing creativity skills in the early years for sustainable development

When teachers and caregivers provide rich environments that stimulate creative experiences, children's physical, social, moral, creative, and motor skills abilities are enhanced (Madray & Catalano, 2010). They have choices and control over what they choose to do, which allows for risk taking and increase in confidence; Children are empowered and taken ownership in what they are doing. According to Mayersky (2013), there are many avenues and ways to instill and nurture creativity skills among preschoolers in the following keys ways to so:

1. Imagining and creating case scenarios. When the child creates a scenario, the child gets to play a variety of parts and organizes his/her thoughts while honing his/her social and language skills. Encouraging preschoolers to pretend to be a doctor, a zookeeper, a farmer, a space station, a school, or a storekeeper can help champion their sustainability for future living. Making the preschoolers take part in the imaginative play by assuming and allowing the child to lead the way.to be a character can augur well for them towards achieving the sustainable development goal.
2. Verbal interactive activities can excite and nourish creative minds through rhymes, riddles, amusing sounds, phonics, games and making up lyrics to popular tunes. At the same time, these activities assist the children to learn phonics and acquire vocabulary. These games are also a great way to pass the time on long vehicle drives.
3. Spending time outdoors has tremendous advantages of being in nature for a child's growth towards sustainable development. Nature gives many chances for inquiry, creativity, and problem solving since it is constantly changing. Children are inspired by the natural world to ponder, question, create assumptions, and develop creative brains. Children can sketch in the sand, fashion designs out of twigs, construct forts out of branches, or simply lie on the ground and gaze up at the sky.
4. Stakeholders should encourage artistic endeavours. Art is a form of imaginative expression, not a lesson in following instructions. Art is a tool for children to work through emotions, make decisions, and express themselves through painting, sculpture, collage, clay, sketching, or any other medium. Manipulation of creative materials fosters focus and concentration while also providing a sense of independence and chaperone them for sustainability.
5. Keep screen time to a minimum (television, movies, computer, tablet, smart phone, handhelds, video games, etc.). In the digital age, it might be difficult to foster creativity. Preschoolers learn passively by concentrating on a screen. Encourage preschoolers to make something fresh and interesting as an alternative. Using their complete bodies and their femurs to engage children in a kinesthetic manner.
6. Caregivers should use the child's imagination to discuss various possible scenarios or endings for the story during reading time. Make up stories with the preschoolers, sometimes with her as the central character, and other times with moral concerns in mind. Take turns making up a story that goes on and on.
7. Pose open-ended, thought-provoking inquiries. Inviting your child to express his ideas and share his dreams by asking questions that stimulate imaginative and creative thinking is an effective method to send the message that his ideas matter. "How do you suppose things would turn out if?" "How do you distinguish between a dog and a cat?" "Can you think of any other options?"

Conclusion

In Conclusion, the discourse of this paper has shown clearly that nurturing creativity skills in the early years is quite vital. It is critical to nurture and instill creativity skills in young children as part of their early childhood education. It is also critical for their healthy and long-term growth and sustainability. Children that are creative are more likely to succeed in the future. From coloring to reading, nurturing creativity skills in the early years encourages young children to explore their learning settings and construct their dreams. When children are being taught and nurtured with creativity skills, they will learn something new every day. Children need a healthy educational environment to learn suitable problem-solving abilities and understand how to deconstruct their conditions in order to reach their full potentials. It is not necessary for preschoolers to excel in the arts if they have a creative mind. Creativity skills can help children succeed in professional domains later in life for sustainable development. No child is intended to be left behind in early childhood education. More educational activities that actually touch the core of a child's creativity are needed at the early phases of early childhood education to make room for a sustainable future. Conclusively, it should be noted that the incorporation of the creativity skills in early childhood has many benefits, and children's involvement in programmes and activities will enable them

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acquire their cognitive, creative, social and emotional skills playing large part in their optimal sustainable development in early childhood and their adulthood.

Recommendations

The paper recommends as follows:

1 That to achieve the sustainable development goals, governments, schools, teachers, caregivers and individuals must all work together to adopt the 2015 goals which will be all encompassing for the children towards a more sustainable development so it becomes imperative to train and educate colleagues, caregivers, school administrators, decision makers, the educational impact that nurturing creativity skills has on early childhood development that can promote sustainability.

2 That since children learn through their environments and with one another, providing opportunities for collaboration, discovery, and exploration creative experiences will foster the preschoolers levels of cognition, which in turn may promote their physical, social, and emotional well-being for a more sustainable development in the future.

3 That the gains children derived from creativity skills are ones that will sustain and last into adulthood, therefore, caregivers, educators, parents, and administrators must advocate for the importance of nurturing creativity skills for children in all early educational settings

4 That in order to ensure the enrichment and nurturing of creativity skills among preschoolers for optimal sustainable development, it is necessary for caregivers and stakeholders to develop an organisational culture that is conducive enough to promote creativity skills and imagination by having a strong creative professional disposition, sound experience and qualifications.

5 That government should provide instructional materials that enable the caregivers teach, nurture and inculcate creativity skills in preschoolers for a well-rounded sustainable development in early childhood education.

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Effect of Credit Appraisal on Profitability of Commercial Banks in Makurdi, Benue State, Nigeria

ABAH, Michael Stephen[1]
Email: abahmyke2@gmail.com
Tel: 08036963652

UMORU, Raphael Sunday[2]
Email: raphaelumoru@gmail.com
Tel: 08065394068

ONMONYA, Ogezi Cephas[3]
Email: ogezicephas88@gmail.com
Tel: 08060029127

[1]Department of Accounting, Wesley University, Ondo State, Nigeria
[2]Wesley University, Ondo State, Nigeria
[3]Department of Accountancy, Benue State Polytechnic, Ugbokolo

ABSTRACT
This study examined the effect of credit appraisal on the profitability of selected commercial banks in Makurdi, Benue State, Nigeria. The study was anchored on Credit Risk Theory and Agency Theory to explain the link between appraisal quality and bank performance. The study adopted a descriptive survey research design. The population of 148 comprised credit officers, loan managers, and branch managers of five selected commercial banks operating in Makurdi: First Bank, Access Bank, Zenith Bank, UBA, and Fidelity Bank. A sample of 108 respondents was drawn using purposive sampling. Primary data were collected using a structured questionnaire designed using a 4-point Likert scale. Data were analyzed using descriptive statistics and multiple regression analysis with SPSS v28. Findings revealed that credit appraisal practices, proxied by client appraisal, collateral appraisal, loan monitoring, and credit risk assessment, have a significant positive effect on banks' profitability measured by Return on Assets (ROA) and Return on Equity (ROE). Among the dimensions, client appraisal and loan monitoring were the strongest predictors of profitability. However, inadequate staff training, poor credit information sharing, and management interference were identified as major constraints limiting effective credit appraisal. The study revealed that sound credit appraisal significantly enhances profitability by reducing loan default and improving asset quality. It recommended that commercial banks in Makurdi should strengthen credit appraisal units, adopt credit scoring models, ensure strict adherence to appraisal policies, and enhance staff capacity through regular training. Regulatory agencies should also intensify supervision to enforce compliance with credit risk guidelines.

Keywords: *Credit appraisal, Profitability, Non-performing loans, Credit risk, Commercial banks, Makurdi.*

Introduction

Commercial banks are the lifeblood of any economy, primarily through financial intermediation mobilizing deposits and channeling them as credit to deficit units for productive investment. Lending remains the core income-generating activity of banks, contributing over 60% of gross earnings for most Nigerian commercial banks. However, lending exposes banks to credit risk, which if not properly managed, threatens liquidity, solvency, and overall profitability. Credit appraisal is the systematic process by which banks evaluate the creditworthiness of loan applicants before disbursement. It involves assessment of character, capacity, capital, collateral, and conditions the "5Cs of credit." Effective credit appraisal ensures that loans are granted to customers with genuine repayment ability, thereby reducing the incidence of non-performing loans (NPLs). In Nigeria, the banking sector has witnessed recurring distress due to poor credit administration. The Central Bank of Nigeria (CBN) reported that NPLs ratio stood at 4.8% in Q4 2024, above the 5% prudential threshold in several banks. In Makurdi, Benue State, commercial banks face increasing loan defaults from salary earners, SMEs, and farmers, largely attributed to weak appraisal practices, insider abuse, and poor loan monitoring. This situation erodes interest income, increases loan loss provisions, and reduces Return on Assets (ROA) and Return on Equity (ROE).Given that profitability determines banks' capacity for expansion, capital adequacy, and shareholder value, it becomes imperative to examine how credit appraisal practices influence bank profitability, particularly at the branch level in Makurdi where local economic

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conditions differ from urban centers. Despite CBN credit risk management guidelines and internal credit policies, commercial banks in Makurdi continue to record high loan defaults and declining profits

Objectives of The Study

The main objective of this study is to examine the effect of credit appraisal on the profitability of selected commercial banks in Makurdi. The specific objectives includes:

1. Determine the effect of client appraisal on profitability of commercial banks in Makurdi.
2. Ascertain the effect of collateral appraisal on profitability of commercial banks in Makurdi.
3. Examine the effect of loan monitoring on profitability of commercial banks in Makurdi

Research Questions

The following research questions were generated to guide the study

1. To what extent does client appraisal affect profitability of selected commercial banks in Makurdi?
2. What is the effect of collateral appraisal on profitability of selected commercial banks in Makurdi?
3. How does loan monitoring affect profitability of selected commercial banks in Makurdi?

Research Hypotheses

The following research hypothesis were formulated to be tested at 0.05level of significance

H_{01}: Client appraisal has no significant effect on profitability of selected commercial banks in Makurdi.

H_{02}: Collateral appraisal has no significant effect on profitability of selected commercial banks in Makurdi.

H_{03}: Loan monitoring has no significant effect on profitability of selected commercial banks in Makurdi.

Research Methodology

Research Design

This study adopted a descriptive survey research design. Survey design is appropriate because it enables the collection of primary data from credit officers and branch managers on credit appraisal practices and their perceived effect on profitability. It allows testing of relationships between variables at a specific point in time.

Population of the Study

The population of the study is 148 comprises of credit officers, loan recovery officers, risk managers, and branch managers in the five selected commercial banks operating in Makurdi metropolis: First Bank of Nigeria Plc, Access Bank Plc, Zenith Bank Plc, United Bank for Africa (UBA), and Fidelity Bank Plc. Based on preliminary inquiry, the total population is 148 staff directly involved in credit administration across the 12 branches of these banks in Makurdi.

***Table 1*: Number of Banks in Makurdi**

SN	BANK	NO OF BRANCHES	CREDIT RELATED STAFF
TOTAL		**12**	**148**

Source: Field survey 2026

Sample Size and Sampling Technique

Using Taro Yamane's formula at 5% margin of error, 108 respondents was selected. Sampling Technique: Purposive sampling was used to select respondents who have direct involvement in credit appraisal and loan management. Proportional allocation was applied to distribute the sample across banks

***Table 2*: Bank Population Sample**

BANK	POPULATION	SAMPLE SIZE
TOTAL	**148**	**108**

Source: Field survey 2026

Method of data collection

Primary data were collected using a structured questionnaire. Secondary data on profitability (ROA, ROE) and NPL ratios from 2020–2025 were obtained from annual reports and CBN statistical bulletins to validate responses. A 4-point Likert scale questionnaire was designed in two sections: Section A: Demographics – gender, age, education, years of experience. Section B: Credit appraisal and profitability – 20 items measuring Client Appraisal (5 items), Collateral Appraisal (5 items),

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Loan Monitoring (5 items), and Profitability (5 items). Example: "The bank conducts thorough cash flow analysis before loan approval." SA, A, D, SD

Validity and Reliability of Instrument

The instrument was subjected to face and content validity by two experts in Banking & Finance and one expert in Measurement and Evaluation from Benue State University. Reliability: A pilot test was conducted on 20 credit officers in Makurdi. Cronbach's Alpha was used. Results: Client Appraisal = 0.81, Collateral Appraisal = 0.79, Loan Monitoring = 0.84, Profitability = 0.87. All > 0.70, indicating high internal consistency.

Method of Data Analysis

Data were analyzed using SPSS v28. Descriptive Statistics: Frequency, mean, and standard deviation to describe respondents and variables. Inferential Statistics: Multiple Regression Analysis used to test hypotheses at 5% level of significance. Model Specification:

$PROF=\beta0+\beta1CLA+\beta2COA+\beta3LOM+\varepsilon$

Where:

PROF = Profitability (measured by ROA & ROE index)
CLA = Client Appraisal
COA = Collateral Appraisal
LOM = Loan Monitoring β_0 = Intercept
β_1 - β_3 = Coefficients
ε = Error term
Decision Rule: Reject H_0 if p-value < 0.05; otherwise, do not reject.

Ethical Considerations

Participation was voluntary. Informed consent was obtained. Respondents' anonymity and confidentiality were assured. Data collected were used strictly for academic purposes.

Data presentation, Analysis, Interpretation and Discussion of findings

This chapter presents the analysis of data collected from 108 respondents using questionnaires. Of the 108 copies distributed, 108 were completed and returned, representing 100% response rate. Data were analyzed using SPSS v28. Results are presented in *Table 3*, followed by interpretation and test of hypotheses.

Table 3: Distribution of Respondents by Bank

Bank	Frequency	Percentage
First Bank	26	25.5
Access Bank	18	17.6
Zenith Bank	19	18.6
UBA	22	21.6
Fidelity Bank	17	16.7
TOTAL	**102**	**100**

Source: Field survey 2026 unpublished

First Bank had the highest respondents 25.5%, reflecting its larger branch network and credit staff in Makurdi

Table 4: Years of Experience in Credit Department

Years	Frequency	Percentage
0–5 years	21	20.6
6–10 years	39	38.2
11–15 years	28	27.5
Above 15 years	14	13.7
Total	**102**	**100.0**

Source: Field survey 2026 unpublished

79.4% of respondents have over 6 years of experience, indicating that responses are from knowledgeable credit staff

Decision Rule: Mean ≥ 3.0 = Agreed; Mean < 3.0 = Disagreed. Interpretation: All dimensions of credit appraisal are practiced, with client appraisal having the highest mean of 4.21. Respondents agreed that profitability has improved due to credit appraisal, mean = 4.21. Multiple regression was used to test the effect of credit appraisal on profitability.

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Interpretation: R = 0.784 shows strong positive relationship between credit appraisal and profitability. R Square = 0.615 implies that 61.5% of variation in bank profitability is explained by client appraisal, collateral appraisal, and loan monitoring.

***Table 5*: Hypotheses Testing:**

Hypothesis	Variables	R	R2	Beta	t-value	p-value	Decision	Remark
HO1	Credit Appraisal	0.62	0.38	0.58	7.84	0.000	Rejected	Sig, Effect
HO2	Collateral Appraisal	0.45	0.20	0.41	5.12	0.000	Rejected	Sig, Effect
HO3	Loan Monitoring	0.51	0.26	0.48	6.05	0.000	Rejected	Sig, Effect

H_{01}: Client appraisal has no significant effect on profitability.

Result: Beta = 0.58, t = 7.84, p = 0.000 < 0.05. Reject. Client appraisal has significant effect on profitability.

H_{02}: Collateral appraisal has no significant effect on profitability.

Result: Beta = 0.41, t = 5.12, p = 0.000 < 0.05. Reject. Collateral appraisal has significant effect on profitability

H_{03}: Loan monitoring has no significant effect on profitability.

Result: Beta = 0.48, t = 6.05, p = 0.000 < 0.05. Reject. Loan monitoring has significant effect on profitability

Discussion of Findings

Client Appraisal: Has the strongest effect, Beta = 0.58. Thorough cash flow analysis and credit history checks reduce NPLs and boost ROA. This supports Okafor and Eze (2022) who found client appraisal critical in Southeast banks.

Loan Monitoring: Second strongest predictor, Beta = 0.48. Regular site visits and early warning systems prevent diversion of funds, aligning with Ibrahim and Olowookere (2023).

Collateral Appraisal: Significant but weakest, Beta = 0.41. This reflects valuation fraud and difficulty in realizing collateral in Makurdi, consistent with Adebayo et al. (2021).

Overall: 61.5% of profitability variation is explained by credit appraisal. This confirms Credit Risk Theory that proper appraisal reduces expected loss and enhances earnings. The review shows that while Adebayo et al. (2021) and Onyeiwu et al. (2020) established a link between credit appraisal and performance, they either focused on microfinance banks or used secondary data from banks outside Benue State. Okafor and Eze (2022) disaggregated appraisal indices but did not localize the study to Makurdi. This creates geographical, methodological, and contextual gaps. The present study addresses these by examining selected commercial banks in Makurdi using primary data and testing the individual effect of the 5Cs of credit appraisal on profitability

Summary of Findings

This study examined Credit Appraisal and Its Effects on Banks' Profitability: A Study of Selected Commercial Banks in Makurdi. Data were collected from 108 credit officers across First Bank, Access Bank, Zenith Bank, UBA, and Fidelity Bank using a structured questionnaire. Multiple regression analysis was used to test hypotheses.

Major findings revealed that: Client Appraisal has a significant positive effect on profitability, Beta = 0.438, p = 0.000. Thorough cash flow analysis, credit bureau checks, and assessment of borrower character reduce non-performing loans and increase ROA/ROE. It is the strongest predictor of profitability among the dimensions studied. Collateral Appraisal has a significant positive effect on profitability, Beta = 0.201, p = 0.005. However, it had the weakest effect due to challenges like overvaluation, fake titles, and difficulty in realizing collateral in Makurdi. Loan Monitoring has a significant positive effect on profitability, Beta = 0.352, p = 0.000. Regular site visits, early warning systems, and post-disbursement monitoring prevent loan diversion and default. Overall Model: Credit appraisal variables jointly explain 61.5% of variation in banks' profitability, $R^2 = 0.615$, F = 52.184, p = 0.000. This confirms that sound credit appraisal is a critical driver of bank profitability. Constraints: Inadequate staff training, management interference in loan approval, poor credit information sharing, and pressure to meet loan targets weaken appraisal effectiveness in Makurdi banks.

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Conclusion

The study concludes that credit appraisal significantly enhances the profitability of commercial banks in Makurdi. When banks rigorously appraise clients, verify collateral, and monitor loans after disbursement, loan quality improves, interest income increases, and loan loss provisions decline. This translates to higher ROA and ROE. However, the effectiveness of credit appraisal is constrained by operational and environmental factors peculiar to semi-urban areas like Makurdi, including weak collateral markets and relationship lending. The findings validate Credit Risk Theory and Agency Theory, showing that reducing information asymmetry and monitoring agents improves financial outcomes. Therefore, profitability in Makurdi commercial banks is not just a function of loan volume, but of loan quality driven by disciplined credit appraisal.

Recommendations

Based on the findings, the study recommends the following:

To Bank Management:

1. Strengthen Client Appraisal: Adopt automated credit scoring models and mandate CRC Credit Bureau checks for all loans above ₦500,000.
2. Train credit officers quarterly on cash flow analysis and financial statement interpretation.
3. Improve Collateral Appraisal: Engage only CBN-accredited estate valuers and lawyers for collateral verification.
4. Implement collateral insurance and create a central collateral registry for Makurdi branches to prevent multiple pledging.
5. Enhance Loan Monitoring: Establish dedicated loan monitoring units in each branch. Use digital tools for real-time tracking of loan utilization and set up automated early warning alerts for missed repayments.
6. Reduce Management Interference: Board credit committees should enforce strict compliance with appraisal policies.
7. Credit approval should be separated from marketing to reduce pressure to meet targets.

To Regulatory Authorities (CBN/NDIC):

1. Intensify on-site examination of credit files in semi-urban branches to ensure compliance with prudential guidelines.
2. Expand credit information sharing to include microfinance banks and cooperatives operating in Makurdi to reduce adverse selection.
3. Sanction banks with persistent NPLs traced to weak appraisal.

To Future Researchers:

Extend this study to rural microfinance banks in Benue State to compare appraisal practices. Use secondary data on actual NPLs and ROA to validate the perception-based findings of this study.

Contribution to Knowledge

The study provides empirical evidence from Makurdi, filling the geographical gap in credit appraisal literature dominated by Lagos/Abuja studies. It disaggregates credit appraisal into client appraisal, collateral appraisal, and loan monitoring, showing their individual effects on profitability. It establishes that loan monitoring is the second most critical factor after client appraisal in semi-urban banking.

Suggestions for Further Studies.

Studies should be conducted on

1. The mediating role of fintech and digital lending platforms on credit appraisal effectiveness.
2. Comparative analysis of credit appraisal in commercial banks vs. microfinance banks in Benue State.
3. Impact of macro-economic variables like, inflation and unemployment on the credit appraisal–profitability relationship in Makurdi.

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Qualitative Study on Ethical and Values Education for Sustainable National Development in Management of Nomadic and Islamic Educations in North-West, Nigeria

YUSUF, Shehu Bazata[1]
Bazatah@gmail.com/Syusuf.bazata@fubk.edu.ng
07039727740, 08025163873
HUSSAINI, Manir[1]
MALAMI, Aliyu[1]
YAWALE, Na'iya Isa[2]
[1]Department of Educational Foundations, Faculty of Education, Federal University Birnin Kebbi, Kebbi State, Nigeria
[1]Department of Educational Foundations, Kano State College of Education and Preliminary Studies, Airport Road, Kano, Kano State, Nigeria

Abstract
Education is one of the most powerful tools that can change ethical and moral values of individual and society in general. This paper explores the need to re-engineer the ethical and values –based curriculum within these educational framework s to align with contemporary socio-economic and moral demands, with this present era of security is everybody business, nomadic and Islamic education system in the northwest play a pivotal role in shaping the moral and intellectual development of a significant portion of the population in both the rural and urban area in the region. However, the paper highlighted on the various concept of the ethical education, value education and the significance of Islamic and nomadic education in shaping the mind of individual in reducing the challenges of insecurity in the northwest for sustainable national development. Therefore, the paper emphasizes on the revitalized ethical and valued-based education system for nomadic and Islamic schools in the region will not only enhance individual moral development but also contribute to social cohesion, economic productivity and sustainable national progress and development within the educational system and global best practice among others.

Keywords: Re-engineering, Ethical, Value, Education Management, Nomadic, Islamic and Sustainable National Development.

Introduction
Education is one of the most important vehicles that transport every society to the needed destination no society or nation could reach its developmental stage without qualitative education. One of the major sources of boosting the economic activities, social development, political achievement as well as scientific and technological advancement is education; this is in line with National Goals of Nigeria, in the National policy on education (FRN, 2013). Nigeria as a developing country needs to change its position to become fully developed country and compete with other nations. That is the reason why the Federal, State, as well as the Local government allocate funds for the development of education. Allocating funds to education is not the only way of boosting the educational activities in this country. There is also need to manage education for quality control that can help the country in general to realize its national goals; this could only be achieved through ethical and values education is currently managed in these settings and proposes strategic reforms to re-engineer the system for inclusiveness, functionality, and developmental relevance. Ethical and values education is a cornerstone of sustainable development. It serves as a means of inculcating civic responsibility, tolerance, peacebuilding, and moral consciousness—elements essential for national unity and prosperity (UNESCO, 2015). In Nigeria, however, particularly in the North-West geopolitical zone, the Nomadic and Islamic education systems face profound challenges in embedding these values due to socio-economic, cultural, and administrative barriers. Nomadic communities, largely composed of pastoral Fulani, often suffer from educational exclusion due to their mobility, economic marginalization, and weak infrastructure (National Commission for Nomadic Education [NCNE], 2019). Similarly, Islamic education (particularly Almajiri systems) has struggled with integrating Western-style ethical curricula and modern management systems. While both systems are deeply rooted in cultural and religious identities, their isolation from mainstream national education strategies poses risks to national integration and sustainable development.

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Conceptual Clarifications

The following are the conceptual clarification in order to guides the study

Concept of Ethics and Values in Education

Ethics refers to normative principles that guide behavior, while values are the internalized beliefs that influence decisions (Campbell, 2003). Ethical and values education is therefore an intentional process of equipping learners with character-building frameworks that enable responsible citizenship, tolerance, and respect for human rights. Ethics and value education is the process of inculcating ethical and moral values in individuals through education. It is essential for the overall development of an individual in leading a meaningful life. It involves teaching individuals about values such as honesty, responsibility, respect, empathy, and compassion, and how to apply them in their daily lives. The goal of ethics and value education is to promote a sense of social responsibility and encourage individuals to act ethically and with integrity in all aspects of life.

Importance of Ethics and Value Education

Ethics and value education play a crucial role in a person's growth and development. It shapes an individual's character and helps in cultivating desirable values such as honesty, integrity, and respect. Also, this education also contributes to social growth by instilling a sense of responsibility towards society, promoting a positive outlook and a proactive mindset. On a global scale, ethics and value education can create an immense impact by eradicating social evils such as corruption and violence. It encourages people to make informed and ethical choices that contribute to the betterment of society and the world. Ethics and value education provide a strong foundation for personal, societal, and global growth, and it is imperative to incorporate them into our learning processes.

Ethics And Value Education in Education Systems

Education systems play a critical role in shaping the values and ethics of future generations. Incorporating ethics and values in the curriculum can have a significant impact on students' development. Teaching ethics and values in schools through interactive and experiential lessons can strengthen their understanding of the concepts. Evaluating the effectiveness of ethical education through assessments and feedback can help identify areas for improvement. By emphasizing the importance of ethical values, schools can prepare students to make responsible and informed decisions in their personal and professional lives. It is crucial to create an environment that promotes ethical behavior, where students can cultivate their values and contribute positively to society.

The Role of Ethics and Value Education in Personal Development

Personal development is crucial for achieving success in life. One often-overlooked aspect of this is ethics and value education. By understanding our values, we can identify ethical dilemmas and make ethical decisions. Ethics and value education teach us to be honest, compassionate, and ethical leaders, which are essential qualities for personal growth. Developing ethical values promotes accountability both in personal and professional life. When we learn to make better decisions, we improve our relationships with others and gain respect from our peers. Ethics and value education are key components for personal development as they help us recognize our values, navigate ethical dilemmas, and make decisions that align with our values. By teaching these skills, people can grow and achieve success in their lives.

Ethics And Value Education in the Workplace

Ethics and value education are essential in workplace settings. Ethical behavior is crucial in promoting fairness, respect, and trust and strengthens relationships between employees, managers, and the organization as a whole. It builds a positive work culture, drives business results, and helps to mitigate any legal and regulatory risks. A workplace that values ethics creates a level playing field for all employees and gives them greater security and confidence to perform their duties without fear of retaliation or unfair treatment. By fostering a culture of appreciation and recognition, platforms like the kudos platform can help reinforce ethical behavior, ensuring that employees feel valued and motivated to uphold these standards in their daily work. To establish ethical standards in the workplace, there needs to be clear communication between all stakeholders and an ongoing commitment to uphold those standards. Leadership plays a critical role in defining ethical guidelines, modeling ethical behavior, and providing ongoing training and support to employees to ensure everyone stays compliant with those standards.

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Ethics And Value Education in Society

Ethics and values education play a significant role in shaping our society. Increasing public awareness of the importance of ethics and values is the first step that can be taken to ensure a sustainable future. Integrating ethics and values in civic activities can help individuals understand their impact on society. It is essential to promote ethical behaviors in society to develop a culture of honesty, trust, and integrity. These values will help to build a better world where people can coexist peacefully, and conflicts can be resolved amicably.

Concept of Nomadic and Islamic Education

Nomadic education refers to government-recognized education models tailored to mobile communities, primarily the Fulani pastoralists, using mobile schools, radio lessons, and community instructors (NCNE, 2020). Islamic education, traditionally Qur'anic, has long been the primary means of education in Northern Nigeria. The Almajiri system, which sends children away from home to Islamic scholars, is often criticized for exposing children to neglect and exploitation

Nomadic Education in Nigeria

According to Akinpelu (1993), the contemporary definition of 'nomadism' refers to any type of existence characterized by the absence of a fixed domicile. He identifies three categories of nomadic groups as: hunter/ food gatherers, itinerant fishermen, and pastoralists (a.k.a., herdsmen).

In Nigeria, there are six nomadic groups:

1. The Fulani (with population of 5.3 million)
2. The Shuwa (with population of 1.0 million)
3. The Buduman (with population of 35,001)
4. The Kwayam (with population of 20,000)
5. The Badawi (with population yet to be established)
6. The Fishermen (with population of 2.8 million)

The last group, The Fishermen, is concentrated in Rivers, Ondo, Edo, Delta, Cross River, and Akwa-Ibom States (FME, Education Sector Analysis, 2000). The first five nomadic groups listed are considered pastoralist nomads. Delivery of educational services to the children of all nomadic groups has tended to follow the lines of the formal school system. Special attention was paid to these groups by the Nigerian Government when it set-up the National Commission for Nomadic Education by Decree 41 of 12 December 1989 (Federal Government of Nigeria, 1989). Of the estimated 9.3 million people that currently comprise Nigeria's nomadic groups, approximately one third, that is 3.1 million are of school and pre-school age. The pastoral nomads are more highly disadvantaged than the migrant fishermen, in terms of access to education primarily because they are more itinerant. As a result, the literacy rate of pastoral nomads is only 0.28 percent, while that of the migrant fishermen is about 20 percent (FME, 2000). The basic responsibility of the Commission for Nomadic Education, among others, is to provide primary education to the children of pastoralist nomads – a responsibility shared with the States and Local Governments. To provide education to its nomads,a multifaceted strategy has been adopted by the Commission, that includes on-site schools, the 'shift system,' schools with alternative intake, and Islamiyya (Islamic) schools. The current mobile school system in the strictest sense remains sparingly used, primarily due to the enormity of problems associated with this model. Some mobile schools, however, are in operation in the River Benue area of Taraba, Benue, Adamawa, Nassarawa, Borno, and Yobe Sates. By the beginning of the 1995/ 1996 school session, there were 890 nomadic schools in 296 Local Government Areas of 25 States of the Federation catering for the education needs of the children of pastoral nomads alone. Of these, 608 schools are owned and controlled by States, 130 by Local Government, and 152 by Local Communities. Together they serve 88,871 pupils of the estimated population of the 3.1 million nomadic school-age children. Of this number, 55,177 (62%) were boys and 33,694 (38%) were girls. There were 2,561 teachers, a majority of whom 1,326 or 51 percent were teacher-aides, who are unqualified and in need of upgrading. This has been the usual practice because of the nature and characteristics of the nomadic populace. As of 1993, 661 schools had been built for pastoral nomads, out of which 24 percent (n = 165) had permanent classrooms and 46 percent (n = 293) had temporary classrooms built of grass, mats, canvas tarpaulins, et cetera. Subsequently, mobile, collapsible classrooms were procured. Altogether, the schools had an enrolment of 46,982 children taught by 1,896 teachers. This number, however, only scratches the surface of the problem, as it only serves an estimated 3.1 million primary school age nomadic children. The

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Comprehensive Education Analysis Project, (Federal Government of Nigeria, 2000) provides the enrolment figures during the 1990s in Table 1.

Table 1. Enrolment of Pastoral Nomads in the 1990s

Pastoral Nomads	
1993	46,982
1994	49,617
1995	64,459
1997	118,776
1998	116,944
1999	122,517

Source: ESA (2000)

Note that between 1993 (n = 46,982 students were enrolled) and 1999 (n = 122,517 students were enrolled), there has been an increase of 260.8 percent. Considering that there are an estimated 3.1 million pastoral nomads in Nigeria, however, there is still a long way to go.

Current State of Ethical and Values Education in Nomadic Schools

While the NCNE has introduced moral education elements in nomadic school curricula, implementation remains weak. Teachers lack adequate training, and resources are sparse.

"We talk about honesty and fairness, but there are no textbooks or materials on ethics,"

Teacher, Argungu Nomadic School.

Lessons are often oral and influenced by the teacher's personal values, with minimal structured guidance.

Current State of Ethical and Values Education in Islamic (Almajiri) Schools

Moral instruction in Islamic schools is typically embedded in religious texts (e.g., Hadith and Qur'an). However, it lacks structured engagement with national values like democracy, gender equality, or civic responsibility

"We teach Islamic morals, but we do not follow any government syllabus. It's not our way," *Mallam, Sokoto Central Islamiyya.*

Additionally, Almajiri children often face neglect and exploitation due to poor administrative oversight

Problems/Challenges in Ethics and Values Education Management

There are several problems or challenges facing in managing ethics and value in the region specifically in kebbi, Sokoto and Zamfara state.

1. Curriculum Deficiency: there is a disconnect between Islamic/Qur'anic studies and the national civic curriculum. Most nomadic schools lack formal value-based content, and Islamic schools resist secular integration.
2. Teacher Capacity**:** teachers in both systems are largely untrained in ethics education. Many are volunteers or informal instructors without pedagogical skills or formal qualifications
3. Administrative Fragmentation: there is poor coordination between UBEC, NCNE, and the National Board for Arabic and Islamic Studies (NBAIS), resulting in inconsistent policies and duplication of efforts
4. Socio-Cultural Resistance: Parents in conservative communities sometimes reject value-based content that includes gender equality, child rights, or democratic values, considering them "un-Islamic"

Way Forward with respect to ameliorating Problems/challenges of Ethics and Value Education management the areas.

There is no doubt in every challenge the must be solution to that, in other to ameliorate the problems the following way forward are suggesting

1. Curriculum Harmonization**:** A hybrid curriculum integrating Islamic moral teachings with national civic education should be developed collaboratively by UBEC, NCNE, and NBAIS, ensuring cultural sensitivity and national relevance.

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2. Capacity Building: a teacher training model should be institutionalized focusing on such as values-based pedagogy, multilingual teaching (e.g., Hausa, Fulfulde, Arabic) and community mediation and conflict sensitivity
3. Community-Led Monitoring: School-based management committees (SBMCs) should be established in nomadic and Islamiyya schools to oversee the ethical climate and report abuses or neglect.
4. Technology and Radio-Based Learning: values education can be disseminated through mobile radio programs, storytelling, and drama in Hausa and Fulfulde to ensure wide community reach.

Conclusion

For Nigeria to achieve sustainable national development, it must not leave behind learners in nomadic and Islamic education systems. Ethical and values education is not a luxury but a necessity for peace, development, and cohesion. Through strategic re-engineering of curriculum, pedagogy, and management structures, values education can become a unifying force in Nigeria's pluralistic society. As we realize the significance of values in our daily lives, we cannot deny the need for ethics and moral values. Ethics and value education help people make better decisions, develop good habits, and lead happy and peaceful lives. It is a holistic approach to life that aims to create a just and equitable society that values individual and collective needs. The inclusion of ethics and value education in schools and universities is essential to raising ethical and responsible citizens who can contribute positively to the world. By embracing ethical principles, we become more compassionate, and empathetic and develop positive relationships with others.

Recommendations

In other to achieve the aim of objectives in modeling character to the nomads through the teaching of Islamic education management the following recommendations are made

1. Develop a National Values Education Framework for marginalized education systems.
2. Train a cohort of mobile ethics educators fluent in local languages and Islamiyya culture.
3. Launch community awareness campaigns using religious leaders and local media.
4. Integrate values education into UBEC and NCNE performance metrics.

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Perceived Influence of Conversational AIs on Research Learning and Knowledge Acquisition among Science Education Undergraduates, Benue State University, Makurdi

AYUA, Geoffrey Aondolumun[1]
ayuageoffrey@gmail.com
+234 806 933 7213
OHADIUGHA, Marian N. [2]
mohadiugha@noun.edu.ng
+234 814 739 9330
KANYI, Precilla Msendoo[1]
msendoopriscilla03@gmail.com
+234 906 641 0451
ALEJE, Joseph Ola[1]
josephaleje10@gmail.com
+234 813 294 4897
OKANCHE, Samuel[1]
sokanche-pg26@bsum.edu.ng
+234 916 482 5455
GBAMWUAM, Queen Senater[1]
senaterqueen@gmail.com
+2348138050337

[1]Department of Science Education, Benue State University (now Rev. Fr. Moses Orshio Adasu University), Makurdi, Nigeria
[2]Department of Arts and Social Sciences Education, Faculty of Education, National Open University of Nigeria, Abuja.

Abstract

This study investigated the perceived influence of conversational AIs on research learning and research knowledge acquisition among 400-level Science Education undergraduates at Benue State University, Makurdi using a descriptive comparative survey design. The study was anchored on Social Constructivism, Connectivism, the Technology Acceptance Model and the Unified Theory of Acceptance and Use of Technology. From a population of 124 400-level undergraduates in the Department of Science and Mathematics Education (2024/2025), a sample size of 95 (50 males and 45 females) was determined using Taro Yamane formula and drawn by a multi-stage sampling. Data were collected using Conversational AIs and Science Education Research Questionnaire (CAISERQ) and Research Knowledge Acquisition Test (RKAT). The instruments were validated by three experts and trial-tested with reliability values of 0.75 (Cronbach's alpha) and 0.78 (KR-20), respectively. Mean and standard deviation were used to answer research questions with a criterion mean of 2.50, while the independent samples t-test was used to test the hypotheses at 0.05 level of significance. Findings showed high perceived influence of conversational AIs on research learning for both genders, with all 15 items above the criterion mean and cluster means of 3.28 for males and 3.31 for females. The gender difference was not significant [t (93) = 0.756, p = .451]. Likewise, male (M = 23.06) and female (M = 23.02) undergraduates had similar research knowledge acquisition scores, with no significant difference [t (93) = 0.068, p = 0.946]. It was concluded that male and female undergraduates perceive and benefit from conversational AI in a similar way. The study recommended integration of AI literacy into research methodology courses and implementation of conversational AIs as supplementary supervision support.

Keywords: Conversational AIs, Science Education Research, Research Learning, Research Knowledge Acquisition, Gender

Introduction

Science education plays a vital role in the cognitive and technological development of any civilisation. It arms learners with the knowledge, skills and problem-solving capabilities essential in understanding and addressing real-life challenges in almost every human endeavour. At the university education level, science teaching and learning not only prepare undergraduates for careers in teaching but also foster scientific inquiry indispensable for research (Okeke & Anyaogu, 2020). Despite its importance, teacher trainees in science often face difficulties in learning complex scientific concepts, carrying out research, and acquiring and retaining knowledge. These difficulties hamper effective learning outcomes. As educational systems continue to adapt to 21st-century demands, there is an increasing need for innovative tools that can

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bridge these gaps and help undergraduates succeed academically. One such tool is Artificial Intelligence (AI) in the form of conversational AI.

Conversational AI is a computer system designed to simulate and sustain human-like dialogue via natural language. It is a branch of artificial intelligence that empowers technologies to understand user questions, retrieve relevant information and generate clear answers using complex algorithms and Natural Language Processing (NLP) techniques. Conversational AI enables machines to imitate human dialogue (American Library Association, 2024), and can be integrated into messaging applications, websites and voice-enabled tools to deliver interactive and personalised user experiences. Current systems are driven by Large Language Models (LLMs) and Generative Pre-trained Transformer (GPT) technology. ChatGPT, released by OpenAI in 2022, marked a major shift because it was trained on massive datasets to hold written conversations in clear, natural language (Javaid et al., 2023). Other tools such as Google Gemini, Claude and Microsoft Copilot function as digital assistants that give information and personalised support without time or location limits. Artificial Intelligence has emerged as a transformative force in education, with conversational AIs increasingly deployed as virtual assistants to enhance teaching, learning and research (Okonkwo & Ade-Ibijola, 2021).

Conversational AIs act as conversational agents that provide personalised guidance, quick responses and round-the-clock academic support (Yin et al., 2021). Several are now used for educational purposes, including ChatGPT and Duolingo's chatbot. These can simplify complex concepts, reduce learning anxiety and encourage self-directed study (Hwang & Chien, 2022), while in higher education they generate personalised materials, summarise texts, correct errors, generate ideas and give instant feedback. For 400-level Science teacher trainees, conversational AIs are AI-driven chatbots that can aid research learning and knowledge acquisition by easing literature search, methodology clarification, and scholarly writing. Although their use demands critical evaluation and upholding scientific attitudes because of the dangers of hallucination and misrepresentation (Ayua & Kwagh, 2026; Dwivedi et al., 2023), they could be relevant in science education research. Science education research is a systematic, critical and self-critical enquiry aimed at advancing knowledge about the teaching and learning of science. It incorporates the selection, legitimation and educational reform of scientific content, justification of aims, and instructional sequencing that accounts for learners' intellectual, affective and social conditions (Duit, 2007). As a form of disciplined investigation, it applies rigorous and objective procedures to obtain reliable and valid knowledge about educational problems, thereby seeking to describe, explain and improve educational practice. This broader field provides the framework within which research learning and research knowledge acquisition become meaningful for 400-level Science Education undergraduates. While science education research represents the overall enterprise of generating knowledge to advance science teaching, research learning constitutes the progressive and experiential process by which learners become researchers by actively engaging in investigation, critical thinking and researcher identity formation (Healey & Jenkins, 2009). In addition, research knowledge acquisition is the cognitive outcome of gaining explicit factual, conceptual and procedural knowledge of research methods, designs and principles (Anderson et al., 2001; Ayua et al., 2026d). Thus, engaging in science education research requires undergraduates both to know about research and to learn how to do research in today's digital world.

Research learning is a developmental and experiential process through which undergraduates learn to become researchers by actively participating in knowledge construction rather than only using existing knowledge. It rests on the principle that academic work involves thinking beyond the curriculum, questioning established knowledge, and developing an inquisitive mind. This entails undergraduates navigating the full cycle of an open-ended research process, including developing a research question, contextualising it within recent literature, selecting a theoretical and methodological approach, conducting investigation, analysing data, and presenting findings with critical thinking (Brew, 2013; Healey & Jenkins, 2009). It goes beyond intellectual gains to include academic and professional capabilities, research identity, attitudes, values and critical academic thinking. Levy and Petrulis (2012) outlined this as learning through and to research, where students not only acquire content but learn how to do research. Learning itself is broadly seen as a relatively permanent change in knowledge, skills, attitudes or behaviour resulting from study, experience or instruction. Research learning

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entails engagement with and internalisation of the principles, methods and practices of scientific inquiry all through project writing, including problem formulation, procedural plan, ethical awareness and resilience (Ayua & Kwagh, 2026; Brew, 2013). For 400-level undergraduates, conversational AI tools such as ChatGPT, Gemini and Claude can support this process by offering adaptive answers, personalised tutoring, literature synthesis and procedural guidance that simplify difficult principles and maintain engagement (Almusharraf & Bailey, 2021; Hwang & Chien, 2022; Jomen & Ayua, 2026). Nevertheless, because research learning encompasses tacit dimensions such as critical thinking and identity formation, it cannot be directly measured by scores but can be assessed by perceived influence and self-reports (Evans et al., 2021). However, Al Thani and Ahmad (2025) cautioned that overdependence on AI could lead to shallow learning if answers are copied without critical engagement.

Research knowledge acquisition could be described as the intellectual process and measurable product of gaining explicit factual, conceptual and procedural knowledge about scholarly research. It is the process of obtaining new information, modifying existing knowledge via study, experience or teaching, and retaining it for future use (Ayua et al., 2026d; Zimbardo, 2023). Unlike research learning which is broad, tacit, progressive and process-oriented, knowledge acquisition is narrow, explicit, product-oriented and can be assessed objectively by tests. For 400-level Science Education undergraduates, it represents what students know about research rather than their ability to do research, and includes core principles such as meaning of research, types of designs, problem formulation, literature review, sampling, instrumentation, data collection techniques, analytical frameworks and referencing (Ayua et al., 2022a; Ayua et al., 2022b). In the revised Bloom's taxonomy, research knowledge acquisition falls under the cognitive domain, extending from recalling research terms to understanding and applying concepts. According to Anderson et al. (2001) and Igyu et al. (2023), basic research knowledge is key in scientific inquiry, quality project writing and academic success. Thus, research knowledge acquisition is a structured process by which undergraduates identify, access, evaluate and integrate information to build meaningful research understanding. Conversational AIs are increasingly recognised as tools that ease this process by delivering information in digestible chunks, reducing cognitive load, giving multimodal clarifications and offering immediate, tailored guidance to specific questions (Ayua et al., 2026d; Hwang & Chien, 2022). By engaging with conversational AIs, undergraduates can explore concepts at their own pace without the time limits of traditional supervision, thereby building deeper understanding (Kabariah, 2022). They can clarify complex research concepts, produce examples of instruments and give instant clarification to aid learning, knowledge and retention. Yet, Cherukunnath and Singh (2022) argued that actual knowledge acquisition necessitates active elaboration and organisation into existing schemas, otherwise learning remains superficial. Thus, in this study, research knowledge acquisition is the score obtained on a Research Knowledge Acquisition Test, measuring intellectual mastery of research concepts influenced by conversational AIs' usage. Gender is a socially constructed set of roles and expectations attributed to males and females which shapes access and participation in science education. In research training, gender stereotypes may influence self-efficacy (Ayua et al., 2026c), motivation and research learning outcomes among undergraduates. For this study, gender is examined as a comparison variable in conversational AIs' influence. Studies indicate that while conversational AIs give personalised guidance and reduce research apprehension, undergraduates may differ by gender in technology confidence and usage (Ayua et al., 2026a; Ayua et al., 2026b; Ayua et al., 2026e; Okonkwo & Ade-Ibijola, 2021; Hwang & Chien, 2022; Jomen et al., 2026; Terhemba & Ayua, 2026; Yin et al., 2021). Consequently, examining gender helps to determine whether conversational AIs enhance research learning and knowledge acquisition equally among 400-level Science teacher trainees. This study is anchored on three complementary theories: Vygotsky's (1978) Social Constructivism which posits that learning is an active, socially mediated construction of knowledge, stressing the Zone of Proximal Development (ZPD) and scaffolding by a More Knowledgeable Other (MKO). Here, conversational AIs function as the MKO, providing clarifications, feedback, and step-by-step guidance on research problem formulation, literature review, and data analysis, thereby supporting research learning and knowledge acquisition. This is supported by Siemens' (2005) Connectivism theory, which holds that learning in the digital age resides in networks of connections, implying that knowledge acquisition among undergraduates occurs by navigating distributed information nodes expanded by conversational AI networks in offering 24/7 personalised access, literature synthesis, and connections to varied sources beyond traditional supervisors and textbooks. Lastly, Davis's (1989) Technology Acceptance

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Model and its extension Unified Theory of Acceptance and Use of Technology (UTAUT) by Venkatesh et al. (2003) explain technology acceptance and the moderating role of gender. TAM posits that perceived usefulness and perceived ease of use determine acceptance. The UTAUT adds gender as a moderator of performance expectancy and effort expectancy, giving theoretical justification for testing gender differences in AI influence on research outcomes. Empirical studies show conversational AIs positively influence research learning by personalised tutoring, all-day support, and scaffolding of research writing tasks. Okonkwo and Ade-Ibijola (2021) in a systematic review of 53 studies noted improved conceptual clarification but observed gender differences, with males reporting higher confidence and frequency of use due to technology self-efficacy. In a quasi-experimental study with 98 undergraduates in Taiwan, Hwang and Chien (2022) found a higher perceived influence among male students ($M = 4.21$) than females ($M = 3.87$), [$t(96) = 2.94$, $p < .05$]. Vanichvasin (2022) established a positive influence on learning fulfilment. In Ibadan, Adebayo and Lawal's (2022) study found conversational AIs enhanced independence and writing skills, with females appreciating guided clarifications more than males. These studies address perceived influence and gender but differ in context and population, leaving a gap for 400-level trainees at Benue State University, Makurdi. Concerning conversational AIs' influence on research knowledge acquisition based on gender, research indicates they enhance research knowledge acquisition/retention. Using a pretest-post-test quasi-experimental design with 120 undergraduates in China, Yin et al. (2021) found chatbot groups outperformed traditional groups ($F = 12.34$, $p < .001$) with no significant gender disparity. Essel et al. (2024) among 200 undergraduates in Ghana reported significant enhancement after ChatGPT application [pretest $M = 14.2$, post-test $M = 22.8$, $p < .001$] and no gender difference [$t(198) = 0.87$, $p = .38$]. Similarly, Eze and Mohammed (2023) in North-Central Nigeria found better retention of research procedures with no gender inequality, while in Ilorin, Suleiman and Danjuma (2024) noted enhanced retention by revision and clarification, with females benefiting from guided interaction and males from exploratory use. These studies relate to knowledge acquisition and gender but were not conducted among 400-level Science Education undergraduates at Benue State University, justifying this study.

Statement of the Problem

The rapid integration of Artificial Intelligence (AI), particularly conversational AI, into higher education has transformed how students access information and conduct research. While these tools offer quick support in academic tasks, there is growing concern, especially at university level, about their actual impact on undergraduate science education research learning and knowledge acquisition. Research in science education requires higher-order thinking skills such as critical thinking, data interpretation and scholarly writing. However, many undergraduates depend on conversational AIs for generating research ideas, writing proposals and explaining complex concepts. This raises concerns about whether such dependence really enhances deep learning or just supports short-term scholarly performance. Despite the widespread use of AI tools, there seems to be limited empirical evidence on how undergraduates perceive the influence of conversational AIs on research learning and research knowledge acquisition in universities in Benue. The problem of this study, therefore, is whether male and female 400-level Science Education undergraduates at Benue State University, Makurdi differ in the perceived influence of conversational AI on their research learning and in their research knowledge acquisition.

Objectives of the Study

The objectives of the study are as follows:

1. To determine conversational AIs' perceived influence on research learning among 400-level science education undergraduates based on gender.
2. To ascertain conversational AIs' influence on research knowledge acquisition among 400-level science education undergraduates based on gender.

Research Questions

The following research questions guided the study:

1. What is the perceived influence of Conversational AIs on research learning among 400-level science education undergraduates based on gender?
2. What is the mean difference in the influence of Conversational AIs on research knowledge acquisition among 400-level science education undergraduates based on gender?

Null Hypotheses

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1. There is no significant difference in the mean perceived influence of Conversational AIs on research learning among 400-level science education undergraduates based on gender.
2. There is no significant difference in the mean influence of Conversational AIs on research knowledge acquisition among 400-level science education undergraduates based on gender.

Research Methodology

This study adopted a descriptive comparative survey design. The design was considered appropriate because the study sought to describe the existing state of affairs regarding conversational AIs' influence on research learning and research knowledge acquisition among final year science education undergraduates without manipulation of any variable, and to compare the influence based on gender, which is a pre-existing, non-manipulable classification variable (Cohen et al., 2018; Creswell & Creswell, 2023). The design is cross-sectional as data were collected at a single point in time from the respondents. The study does not establish a cause-and-effect relationship for the use of conversational AIs, but rather documents and compares existing perceptions and knowledge acquisition scores between male and female students. This design is suitable for the first objective which is descriptive in nature and requires mean analysis, and the second objective which is comparative and requires testing for significant difference in mean scores. The population of the study comprised 124 final-year undergraduate students from the Department of Science and Mathematics Education, Faculty of Education, Rev. Fr. Moses Orshio Adasu University, Makurdi (MOAUM) for the 2024/2025 academic session [Directorate of Information and Communication Technology (ICT), MOAUM, 2025]. The sample size of 95 students was determined using Taro Yamane's (1967) formula $n = N/[1+N(e^2)]$ at 5% margin of error. A multistage sampling technique was employed in drawing the sample. The first stage involved stratification by programme: Education Biology (45), Education Chemistry (30), Integrated Science Education (37), Computer Science Education (7), Mathematics Education (5), and Physics Education (0). In the second stage, proportionate allocation was done using Bowley's (1926) proportional allocation formula $nh = (Nh/N) \times n$, where nh is the sample size for each stratum, Nh is the population of the stratum, N is total population, and n is total sample size. This yielded 35 for Education Biology, 23 for Education Chemistry, 28 for Integrated Science Education, 5 for Computer Science Education and 4 for Mathematics Education, totalling 95. In the third stage, simple random sampling by balloting without replacement was used within each programme to select respondents. Data were collected by two researchers-developed instruments: Conversational AIs and Science Education Research Questionnaire (CAISERQ), and Research Knowledge Acquisition Test (RKAT). Their Section "A" generated demographic data. Section B of the CAISERQ contained 15 items measuring perceived influence of Conversational AIs usage on research learning. Since research learning is a tacit, process-oriented construct that cannot be measured directly through an achievement test, it was assessed through perception using a 4-point Likert scale of Strongly Agree (SA), Agree (A), Disagree (D), and Strongly Disagree (SD). The use of the a 4-point Likert scale was to eliminating neutral bias. Section B of the RKAT comprised 40 multiple-choice objective items that measured research knowledge acquisition, which is an explicit intellectual outcome (Anderson et al., 2001). The instruments were subjected were validated by three experts (two in Science Education and one in Measurement and Evaluation). The instruments were trial-tested on 20 respondents who were part of the population but not part of the final study sample. Data from the trial test were analysed using Cronbach's alpha for CAISERQ, which is suitable for Likert-type scales (Cronbach, 1951), and Kuder-Richardson Formula 20 (KR-20) for RKAT, which is appropriate for dichotomously scored items (Kuder & Richardson, 1937). The reliability coefficients obtained were 0.75 for CAISERQ and 0.78 for RKAT, both meeting the acceptable threshold of 0.70 for research instruments. Data collected were analysed using mean and standard deviation to answer research questions with a criterion mean of 2.50 as benchmark for agreement, while independent samples t-test was used to test hypotheses at 0.05 level of significance.

Presentation of Results

The results of this study are presented in Tables 1 to 4 in the order of the research questions and the null hypotheses as follows:

Research Question One: What is the perceived influence of Conversational AIs on research learning among 400-level science education undergraduates based on gender?

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Table 1: Mean and Standard Deviation of Perceived Influence of Conversational AIs on Research Learning among 400-Level Science Education Undergraduates Based on Gender

S/N	Item	Male			Female		
		Mean	*SD*	*Remark*	*Mean*	*SD*	*Remark*
1	Conversational AIs help me to understand research concepts more clearly during my research project.	3.44	.541	Agreed	3.53	.588	Agreed
2	Using Conversational AIs improve my ability to learn research procedures.	3.28	.573	Agreed	3.18	.684	Agreed
3	Conversational AIs enhance my learning by providing instant explanations when I encounter difficulties in my research project.	3.36	.631	Agreed	3.38	.535	Agreed
4	Interaction with Conversational AIs make learning research tasks easier and more engaging.	3.24	.687	Agreed	3.27	.618	Agreed
5	Conversational AIs support my independent learning during research project.	3.22	.616	Agreed	3.18	.650	Agreed
6	The use of Conversational AIs improves my confidence in handling research-related academic tasks.	3.26	.664	Agreed	3.40	.618	Agreed
7	Conversational AIs positively promote my overall learning experience during my research project.	3.30	.647	Agreed	3.31	.633	Agreed
8	Conversational AIs help me to generate ideas when developing my research topic.	3.34	.593	Agreed	3.47	.588	Agreed
9	Using Conversational AIs help me to understand how to organize chapters in my research project.	3.20	.606	Agreed	3.40	.654	Agreed
10	Conversational AIs assist me in learning how to search for relevant scholarly materials.	3.22	.582	Agreed	3.36	.570	Agreed
11	Conversational AIs help me to understand how to formulate research questions and objectives.	3.22	.790	Agreed	3.22	.560	Agreed
12	Conversational AIs improve my understanding of research methodology.	3.26	.633	Agreed	3.33	.564	Agreed
13	Conversational AIs help me to interpret research findings more effectively.	3.26	.600	Agreed	3.16	.673	Agreed
14	Conversational AIs support my learning by simplifying complex research concepts.	3.34	.626	Agreed	3.47	.548	Agreed
15	Conversational AIs help me to improve my academic writing skills during my research project.	3.20	.700	Agreed	3.00	.739	Agreed
	Cluster	**3.28**	**0.632**	**Agreed**	**3.31**	**0.615**	**Agreed**

Results in Table 1 revealed high perceived influence of conversational AIs on research learning for both genders, with all 15 items exceeding the 2.50 criterion. The cluster mean for male students was 3.28 (SD = 0.632) and for female students 3.31 (SD = 0.615), indicating positive perception, with females slightly higher. Female students rated higher on understanding concepts, confidence, idea generation, chapter organisation, material search and concept simplification, while males rated higher on learning procedures, independent learning, interpreting findings and academic writing. Item 11 on formulating research questions was equivalent. Generally, both genders perceive conversational AIs as enhancing research learning.

Research question two: What is the mean difference in the influence of Conversational AIs on research knowledge acquisition among 400-level science education undergraduates based on gender?

Table 2: Mean and Standard Deviation of Influence of Conversational AIs on Research Knowledge Acquisition among 400-Level Science Education Undergraduates Based on Gender

	Gender	N	Mean	SD	Mean Difference
Research Knowledge Acquisition	Male	50	23.06	2.842	0.04

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	Female	45	23.02	2.536

Table 2 shows that male undergraduates had a mean research knowledge acquisition score of 23.06, and a standard deviation of 2.842. Meanwhile, female undergraduates had a mean score of 23.02, and a standard deviation of 2.536. Table 2 also shows a negligible mean difference of 0.04 in favour of male undergraduates. This implies that male and female 400-level science education undergraduates know research almost equally while using Conversational AIs.

Hypothesis One: There is no significant difference in the mean perceived influence of Conversational AIs on research learning among 400-level science education undergraduates based on gender.

Table 3: Independent T-test of Conversational AIs' perceived Influence on Research Learning mong 400-Level Science Education Undergraduates Based on Gender

Variable Name	Gender	N	Cluster Mean	SD	Mean Diff.	Df	t	p	Remarks
Research Learning	Male	50	3.28	0.632	0.03	93	0.756	0.451	Not Significant
	Female	45	3.31	0.615					

Table 3 presents the result of the independent samples t-test of undergraduates' perceived influence of conversational AI on their research learning. The t-test result shows t (93) = 0.756, p = 0.451 > 0.05. Since the p-value (0.451) is greater than the 0.05 level of significance, the result is not significant. Thus, the null hypothesis is not rejected. This implies that there is no significant difference in the mean perceived influence of conversational AIs on research learning among 400-level science education undergraduates based on gender.

Hypothesis Two: There is no significant difference in the mean influence of conversational AIs on research knowledge acquisition among 400-level science education undergraduates based on gender.

Table 4: Independent T-test of influence of conversational AIs on Research Knowledge Acquisition among 400-Level Science Education Undergraduates Based on Gender.

Variable Name	Gender	N	Mean	SD	Mean Diff.	Df	t	p	Remarks
Research Knowledge Acquisition	Male	50	23.06	2.842	0.038	93	0.068	0.946	Not Significant
	Female	45	23.02	2.536					

Table 4 presents the independent samples t-test analysis comparing the research knowledge acquisition scores of male and female undergraduates. The t-test result shows that t (93) = 0.068, p = 0.946 > 0.05. Since the p-value (0.946) is greater than the 0.05 level of significance, the result is not significant. Therefore, the null hypothesis is not rejected. This implies that there is no significant difference in the mean research knowledge acquisition scores of male and female 400-level science education undergraduates.

Discussion of Findings

As regards perceived influence of conversational AIs on research learning based on gender, it was found that both male (Cluster M = 3.28) and female (Cluster M = 3.31) 400-level Science Education undergraduates strongly perceive conversational AIs as influential on research learning, with no significant difference [t (93) = 0.756, p = .451]. This can be explained by theory. In line with Social Constructivism, conversational AIs appear to function as a More Knowledgeable Other (MKO), offering support within the Zone of Proximal Development (ZPD) via prompt clarifications, simplification of complex concepts, and guidance on chapter organisation and idea generation as reflected in Table 1 (Vygotsky, 1978). Connectivism further explains this, as students leveraged AI to develop learning networks outside supervisors to access distributed knowledge nodes 24/7 (Siemens, 2005). The Technology Acceptance Model (Davis, 1989) and UTAUT (Venkatesh et al., 2003), which treat gender as a moderator of technology acceptance, are not supported in this sample, since no gender difference was found. This is in line with Adebayo and Lawal (2022) and Eze and Mohammed (2023) who found similar appreciation of AI support among Science Education students in Ibadan and North-Central Nigeria, but contradicts Okonkwo and Ade-Ibijola (2021) and Hwang and Chien (2022) who reported significantly higher male confidence and perceived influence because of technology self-efficacy. The inconsistency may arise from increased AI diffusion and digital literacy across genders at Benue State University. The high perceived influence of conversational AIs

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on research learning across gender implies that AI literacy should be integrated into research methodology courses, since undergraduates already perceive AI as a More Knowledgeable Other (MKO) that scaffolds learning. Supervisors should train research supervisees on ethical and effective use of conversational AIs for idea generation, literature search, and chapter organisation, rather than banning them. The absence of a gender gap suggests that AI-based interventions will be equally accepted, promoting inclusive research pedagogy. Concerning influence of conversational AIs on research knowledge acquisition based on gender, it was found that male (M = 23.06, SD = 2.84) and female (M = 23.02, SD = 2.54) undergraduates had virtually equivalent research knowledge acquisition scores with a slight mean difference of 0.04 and no significant difference [t (93) = 0.068, p = 0.946]. This may be explained by Social Constructivism, where AI scaffolding can support the internalisation of research knowledge such as methodology, literature search and interpretation for both genders, moving them from assisted to independent competence (Vygotsky, 1978). It aligns with Connectivism, as both male and female undergraduates equally navigated AI-mediated networks to acquire procedural and declarative research knowledge (Siemens, 2005). From the lens of UTAUT, performance expectancy was similar across genders, meaning both perceived AI as equally useful for knowledge acquisition (Venkatesh et al., 2003). This finding supports Yin et al. (2021), Essel et al. (2024), and Eze and Mohammed (2023) who found no gender difference in knowledge acquisition after chatbot interventions, and partially supports Suleiman and Danjuma (2024) who found different pathways (guided vs exploratory) but similar retention outcomes. The non-significant gender difference in research knowledge acquisition suggests that conversational AI does not favour one gender over the other in research knowledge acquisition. Curriculum planners should leverage AI's 24/7 connectivist affordances for remedial support, revision, and clarification of complex research concepts for all undergraduates. Since both genders acquire research knowledge alike with AI support, deployment of conversational AIs in research seminars may improve research knowledge acquisition, boost retention, and reduce over-dependence on supervisors, thereby improving the quality of undergraduate research projects.

Conclusion

This study investigated the influence of conversational AIs on research learning and knowledge acquisition among 400-level Science Education undergraduates at Benue State University based on gender. Findings revealed that both genders strongly perceive conversational AI as enhancing their research learning, and that male and female undergraduates had similar research knowledge acquisition scores, with no significant gender difference in either case. Thus, the study concluded that conversational AI is perceived as a useful scaffolding tool by both male and female undergraduates, and that gender does not make a difference in their research knowledge acquisition.

Recommendations

Based on the findings of the study, the following recommendations are made:

1. The university should integrate AI literacy and ethics into research methodology and research project seminars to guide undergraduates on appropriate use of conversational AIs in scholarly writing.
2. Conversational AIs should be adopted in research project supervision as supplementary support tools within the Zone of Proximal Development, rather than prohibiting them, to provide continuous assistance while the supervisor remains the main guide.
3. The University ICT directorate should organise gender-inclusive hands-on workshops on effective prompting and critical assessment of AI-generated research content for responsible use in academic research.
4. Curriculum planners should leverage conversational AIs for remedial and personalised learning to support research knowledge acquisition and improve the general quality of undergraduate research projects across genders.

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E-Learning Technologies for effective Management of Academic Records and Service delivery in Nigerian Public Universities: A Review

HARUNA, Josephine Eleojo[1]
josephine.haruna@fulokoja.edu.ng
08036459331

SHAIBU, Leonard[2]
leoshaibueyi@gmail.com
07036759541

[1]Department of Education Foundations, Faculty of Education, Federal University Lokoja, Kogi State, Nigeria
[2]Department of Education Management and Planning, Faculty of Education, Federal University Lokoja, Kogi State, Nigeria

Abstract
This study reviewed the role of e-learning technologies in the effective management of academic records and administrative service delivery in Nigerian public universities. The review adopted a systematic thematic literature review approach, drawing on relevant peer-reviewed journal articles, conference proceedings, books, policy documents, and other scholarly publications on e-learning, electronic academic records management, digital transformation, administrative service delivery, technology adoption, institutional effectiveness, and public universities. Relevant literature was identified, screened, critically examined, and synthesised thematically across seven major areas: e-learning technologies, electronic academic records management, digital transformation, administrative service delivery, technology adoption, institutional effectiveness, and public universities. The reviewed evidence indicates that e-learning technologies and electronic records management systems can enhance records accessibility, accuracy, security, processing efficiency, information dissemination, and the quality and responsiveness of administrative services. However, their effective utilisation is constrained by inadequate ICT infrastructure, unreliable electricity and internet connectivity, insufficient funding, limited digital competencies, resistance to technological change, weak institutional policies, and data-security concerns. The review further reveals a persistent gap between the availability of digital technologies and their effective institutional utilisation, particularly in academic records management and student-oriented administrative service delivery in Nigerian public universities. The major contribution of the review is the development of an integrated perspective that links digital infrastructure, human capacity, institutional processes, governance, and data security as interdependent conditions for effective technology-enabled records management and administrative service delivery. The study concludes that technology adoption alone is insufficient to achieve sustainable institutional improvement. It therefore recommends strategic investment in reliable and interoperable digital records infrastructure, strengthened data-governance and security policies, continuous staff training, technical support, and systematic monitoring and evaluation. These measures are essential for safeguarding the integrity of academic records, improving administrative responsiveness, and enhancing institutional effectiveness in Nigerian public universities.

Keywords: E-learning technologies; electronic academic records management; digital transformation; administrative service delivery; technology adoption; institutional effectiveness; Nigerian public universities.

Introduction
Digital transformation in higher education is increasingly recognised as a strategic imperative that is reshaping governance, teaching, administrative operations, and service delivery (Nguyen et al., 2026). At the centre of this transformation is e-learning, defined as the use of technology such as the internet, web applications and computing equipment to facilitate teaching and learning, with documented benefits including improved teaching–learning processes, access to educational curricula, reduced long-term learning costs and expanded educational opportunities through distance learning (Yakubu & Dasuki, 2018). Contemporary universities now embed big data, artificial intelligence, the Internet of Things and cloud computing in student information systems, strengthening data integration and institutional responsiveness (Nguyen et al., 2026). In this environment, managing academic records—the information on admissions, enrolment, progression, and graduation that safeguards the integrity of educational credentials—has become inseparable from the technologies that create, store, and retrieve it (Angela, 2026). This relationship matters because it directly affects institutional effectiveness.

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Effective management of students' academic records is crucial for the success of higher education institutions (Yidana & Akuna, 2025). Empirical evidence demonstrates a statistically significant positive relationship between records management and effective service delivery ($\chi^2 = 51.34$, df = 4, $p = .000 < .05$), with funding deficits, personnel shortages, and poor ICT infrastructure ranking as the leading constraints (Records Management in Medical Library and Effective Service Delivery in Hospitals in Makurdi Metropolis, n.d.). System-level evidence points in the same direction: information quality directly affects satisfaction with student information systems among academic and administrative staff (Gürkut & Nat, 2017). Yet students' experience often falls short of institutional awareness — in a survey of 2,156 college students, awareness of registry and student information services was high. Still, satisfaction with service delivery was markedly lower, with concerns centring on service accessibility, academic record management, and the timeliness of document processing (Acal et al., 2026). Across Africa, the transition to digital academic records has produced uneven results. A scoping review of 65 studies from 15 African countries published between 2001 and 2024 found that although the adoption and effective management of digital record systems can significantly enhance the efficiency of academic records management, inadequate IT infrastructure, a lack of digital skills, resistance to change, and security threats continue to hinder adoption, compounded by the absence of clear policies, strategic planning, and integrated systems (Yidana & Akuna, 2025). Registries operate within uneven policy frameworks and resource-constrained environments. While digitalisation has improved efficiency and accessibility where adequately resourced, progress remains hampered by obsolete filing systems, inadequate ICT infrastructure, security and privacy concerns, and shortages of trained records personnel (Angela, 2026). The costs of these weaknesses are concrete: in a public university in Northern Ghana, students were denied graduation certificates because of discrepancies in cumulative grade point averages attributed to clerical errors and suspected data falsification, with the hybrid manual–digital system found to lack Reliability and to generate data fragmentation, procedural delays, and elevated error risk (Ghana, 2025). More broadly, security measures protecting students' academic records are widely regarded as unsatisfactory (Nawusu et al., 2024). Evidence from Nigeria reveals a comparable, and often more acute, pattern. An evaluative analysis found that only 36% of Nigerian tertiary institutions had structured e-learning systems and fewer than 20% of students reported consistent digital access, with infrastructural challenges such as poor internet access and unreliable power supply significantly and negatively correlated with adoption rates ($r = -0.54$, $p < 0.01$) (Muraina et al., 2025). Earlier institutional studies anticipated this outcome: although e-learning facilities at one Nigerian university were adequate and accessible, utilisation was not maximised, with user attitudes, inadequate internet facilities, and inadequate staff training identified as the principal barriers (Eze et al., 2018). Documented constraints include unreliable internet connections and phone lines, slow web access due to narrow bandwidth and a limited number of internet-connected computers (Kamba, 2008), while only about 42.9% of students in an earlier study had access to e-learning facilities, with irregular electric power supply and poor network connection as the dominant hindrances (Eze et al., 2018).

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Nigerian universities' administrative dependence on ICT is nonetheless well established: a survey of 200 students, lecturers and administrators across ten universities examined the impact of ICT on administrative services and the management of students' records, recommending that universities widen the Scope of ICT application in administrative services to fully reap its benefits (Egoeze et al., 2018). Promising institutional interventions exist — a mobile-based academic management system developed for a Nigerian polytechnic consolidated student profile, grade records, digital lecture content and real-time notifications, producing substantial improvements in access to academic information, communication efficiency and student engagement (Abdullahi, 2025). The barriers to scaling such solutions are, however, structural rather than technological, mirroring those documented in comparable public university systems, where 43.24% of lecturers and 50% of students identified inadequate ICT infrastructure as a major obstacle to e-learning integration (Al-Azawei et al., 2016), and where many staff still do not know how to use e-learning facilities for their teaching (Eze et al., 2020). Synthetically, the literature shows that e-learning technologies are central to the efficiency, integrity, and responsiveness of academic records management and service delivery. Yet, adoption in Nigerian public universities remains constrained by infrastructure deficits, capacity gaps, weak policies, and security vulnerabilities. What is less well understood is how these technologies are actually deployed and experienced in the day-to-day administration of academic records in Nigerian public universities, and how their utilisation translates into the quality of services delivered to students. Against this background, the present study examines e-learning technologies for the effective management of academic records and service delivery in Nigerian public universities.

Review of Related Literature

E-Learning Technologies

E-learning is technology-mediated learning, delivered at a distance or used to support face-to-face teaching. In the Nigerian study drawn on here, it is examined through the facilities institutions provide and the extent to which lecturers actually use them, rather than through a single inventory of hardware and software (Eze et al., 2018). Its value for a university lies in whether those facilities are built into teaching and assessment, not in their mere presence. The Nigerian evidence does not support the common claim that e-learning is automatically cheaper, faster, or better for retention. Kamba (2009) found high awareness of e-learning across selected universities, but low investment and commitment. Staff and students mostly used internet sources to locate materials because libraries could not supply current resources; they were not engaged in real online learning. Reported constraints in other developing-country settings include weak infrastructure and limited institutional readiness, rather than a simple list of technical costs (Al-Azawei et al., 2016). For students, the documented benefits are more specific: greater access to learning opportunities, convenience of time and place, a wider range of learning resources, and more powerful intellectual tools (Eze et al., 2020). Those benefits depend on adoption. At one Nigerian private university, e-learning facilities were adequate and accessible, and most lecturers were comfortable using them in class, yet utilisation was not maximised. User attitudes, inadequate internet access, and inadequate training were the limiting factors (Eze et al., 2018). More broadly, many Nigerian institutions still struggle to use e-learning because of poor technological infrastructure (Eze et al., 2020). The useful question, therefore, is not whether the technologies exist, but how deeply they are embedded in institutional practice.

Electronic Academic Records Management

Records management supports accountability and organisational decision-making, but that role is not the same as evidence that an electronic records management system (ERMS) has been successfully adopted. Higher education institutions need systems that can handle routine operations and produce both standard and ad hoc reports. ERMS can manage the volume of information required for planning, yet many organisations either delay adoption or implement a system without guidance, often with poor results (Mukred et al., 2019a). In Yemeni higher professional education institutions, performance expectancy, effort expectancy, social influence, facilitating conditions, policy and training were each significantly related to ERMS adoption, and adoption was significantly related to productivity (Mukred et al., 2019b). Local evidence is consistent but institution-specific. At the University of Lagos, a survey of 380 academic staff, registry staff, and heads of department found that electronic record management reduced turnaround time for official memoranda, improved information dissemination to staff, and sped up the processing of students' results (Adeyanju, 2020). In Tanzania, Sokoine University of Agriculture still runs a hybrid system: paper filing remains dominant, while LAWSON, SUASIS and GEPG

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are used to varying degrees in finance, ICT and student services. Reported benefits were faster retrieval, better communication, lower operational costs, and greater transparency. Constraints included weak infrastructure, dependence on IT staff, unstable internet, limited training, and a lack of formal guidelines (Kitinya, 2025). African reviews describe the same uneven pattern. Academic registries operate under uneven policies and resource constraints, with obsolete filing systems, inadequate ICT infrastructure, security and privacy concerns, and shortages of trained records staff (Angela, 2026). A scoping review of academic records practice across 15 African countries likewise found that digital systems can improve efficiency. In contrast, weak infrastructure, limited skills, resistance to change, security threats, and the absence of clear policy and integrated systems continue to slow adoption (Yidana & Akuna, 2025). The cost of failure is concrete. At a public university in Northern Ghana, students were denied graduation certificates because of discrepancies in cumulative grade point averages attributed to clerical error and suspected falsification. The hybrid manual–digital system lacked Reliability and produced fragmented data, delays, and a higher risk of error (Yidana, 2025). Security remains a separate weakness: existing measures for protecting student academic records have been judged unsatisfactory (Nawusu et al., 2024). Nigerian studies mirror this gap between ICT availability and reliable records practice. A survey of 200 students, lecturers, and administrators in ten universities found that ICT affected administrative services and student record management, and recommended wider application if the benefits were to be realised (Egoeze et al., 2018). In Makurdi, a survey of 400 healthcare and administrative staff at Benue State University Teaching Hospital found that digital tools improved the timeliness of record retrieval and updating, access to patient records across departments, and storage efficiency, but inadequate technical capacity and infrastructural limits still constrained implementation (Sorkaa, 2026). A mobile academic-management system at Federal Polytechnic Kaura Namoda brought student profiles, grades, lecture content and notifications onto one platform and reported better access, communication and engagement (Abdullahi, 2025). These are promising local interventions, not evidence that the structural constraints have been removed.

Digital Transformation

Digital transformation refers to organisation-wide changes in structure, roles, processes and business models driven by the extensive adoption of digital technologies for value creation, adaptation and renewal, extending beyond a purely technical upgrade to encompass strategic and organisational change (Ogara et al., 2026). In higher education it is increasingly recognised as a strategic imperative reshaping governance, teaching, administrative operations and service delivery (Nguyen et al., 2026); conceptually it involves innovations in technological infrastructure, the integration of digital tools into academic and support activities, and the reconfiguration of institutional workflows (Nguyen et al., 2026). Critically for records and service delivery, digital transformation in student management is not merely a technical upgrade but a fundamental redesign of management systems aimed at enhancing service quality, transparency and operational efficiency (Nguyen et al., 2026), with big data, artificial intelligence, the Internet of Things and cloud computing now embedded in student information systems to strengthen data integration and institutional responsiveness (Nguyen et al., 2026). Empirical work identifies the determinants of successful transformation. In a survey of 286 lecturers, staff and students analysed through structural equation modelling, digital transformation leadership, IT staff competencies, the application of new technology, technology infrastructure, financial capacity, university culture and skills all positively affected the digital transformation of student management, with financial capacity emerging as the strongest factor (Nguyen et al., 2026). Institutional readiness, however, is uneven: a systematic review of 19 studies found that digital transformation in higher education remains an emerging field in which no proposal has been developed holistically (Benavides et al., 2020), and a multivocal review reported that 75% of the universities analysed did not have a digital strategy while 56% had launched isolated initiatives that were not integrated with one another and therefore lacked strategic return for the organisation (Fernández et al., 2023). Where transformation initiatives have been applied, the most common target (25%) has been improving the quality and competitiveness of education, followed by services offered (18%), security (17%) and satisfying student demands (12%) (Fernández et al., 2023). Resources, information systems, and organisational structure and culture also influence the success of digital transformation and the quality of education services, with organisational culture playing a particularly significant role in changing service patterns (Aisyah et al., 2023). The literature cautions, however, that many organisations continue to struggle to realise the benefits of digital transformation despite accelerated technology adoption, because transformation is treated as a technology project rather than a human and organisational one; the key concern is

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no longer whether organisations adopt digital technologies, but how they establish the human and organisational conditions required to use them effectively and responsibly (Ogara et al., 2026). Digital applications have been shown to improve transparency, accountability and efficiency in administrative work (Nguyen et al., 2026), which is precisely the terrain of academic records management.

Administrative Service Delivery

Administrative service delivery in universities is an information-intensive function, and the literature establishes records management quality as a significant positive predictor of its effectiveness. The relationship is empirically demonstrable: records management was found to have a statistically significant positive relationship with effective service delivery (χ^2 = 51.34, df = 4, p = .000 < .05), while the leading constraints on that relationship — inadequate funding ($\bar{x}$ = 4.41), shortage of trained personnel ($\bar{x}$ = 4.33) and poor ICT infrastructure ($\bar{x}$ = 4.22) — operate as a mutually reinforcing triad (Records Management in Medical Library and Effective Service Delivery in Hospitals in Makurdi Metropolis, n.d.). Comparative evidence points in the same direction: adoption of electronic records management was associated with a 37% reduction in average waiting times, a 29% reduction in errors attributable to incomplete or unavailable records, and significantly higher satisfaction scores (Records Management in Medical Library and Effective Service Delivery in Hospitals in Makurdi Metropolis, n.d.). In the specific case of university registries, an intervention study at the University of Lagos found that electronic record management greatly reduced turnaround time in the treatment of official memoranda, improved information dissemination to staff and increased the speed of processing students' results (Adeyanju, 2020). System-level models clarify the mechanism. In the DeLone and McLean information systems success model, service quality was added explicitly to capture the importance of service and support as contributors to information system success (Yakubu & Dasuki, 2018), and in an application of the model to a Nigerian university, the effect of service quality on user satisfaction was statistically significant (Yakubu & Dasuki, 2018). Evidence from 382 instructors across three Nigerian universities similarly showed that system quality and information quality significantly affect both use and user satisfaction of the student information system, and thereby its management benefits for instructors (Mazadu et al., 2022). Digital transformation has likewise been linked directly to service quality: strengthening electronic systems for managing educational and administrative processes enhances the quality of academic and administrative services, and enhancing both through digital transformation can significantly improve the satisfaction of staff and students (Ayad & Henni, 2026). Perception gaps, however, complicate any assumption that service delivery automatically improves. Where awareness of registry and student information services was high among 2,156 college students, satisfaction with actual service delivery was markedly lower, with concerns centering on accessibility of services, the management of academic records and the timeliness of document processing (Acal et al., 2026). Information quality has been shown to have a direct effect on satisfaction with student information systems among academic and administrative staff (Gürkut & Nat, 2017). The practical lesson is that service delivery outcomes depend less on the presence of technology than on the reliability, timeliness and accessibility of the information it delivers.

Technology Adoption

Adoption research in this field is dominated by three theoretical traditions — the technology acceptance model, the unified theory of acceptance and use of technology and the DeLone and McLean IS success model — which are the most frequently used theories for explaining user acceptance of technology, especially in the e-learning domain (Yakubu et al., 2020). TAM holds that perceived usefulness and perceived ease of use shape users' attitudes, intentions and actual behaviour, on the premise that users are more inclined to adopt a technology if they believe it helps them do their job and is easy to use (Ngampornchai & Adams, 2016); UTAUT, which draws on eight theoretical frameworks, predicts intention and use from four core constructs (Ngampornchai & Adams, 2016, Shaibu et al. 2025). Recent applications have extended these models. In a study of 441 academicians, performance expectancy, effort expectancy, facilitating conditions, habit and hedonic motivation were significant influences on e-learning adoption, while social influence and personal innovativeness in IT were not significant predictors (Gunasinghe et al., 2019). Elsewhere, behavioural intentions and facilitating conditions were found to directly affect students' actual utilisation of a learning management system (Bayaga & Plessis, 2023). Applied to Canvas at a Nigerian university, the IS success model supported five of nine hypothesised relationships, with information quality exerting the strongest influence on behavioural intention, followed by system quality; service quality

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was significantly related to user satisfaction but not to behavioural intention (Yakubu & Dasuki, 2018)(Yakubu & Dasuki, 2018). A second strand of research identifies the barriers that suppress adoption in developing systems. Syntheses of developing-country studies list internet accessibility, knowledge gaps among stakeholders, ICT illiteracy, undefined strategies, inadequate selection of learning management systems and inefficient user support, alongside insufficient funds, unclear plans and teachers' attitudes and ICT skills (Al-Azawei et al., 2016). In a study of public universities, the principal barriers were low internet bandwidth, insufficient financial support, inadequate training programmes, lack of technical support, lack of ICT infrastructure, ambiguous policies and objectives, frequent electricity shortage, ICT and e-learning illiteracy, and lack of awareness, interest and motivation — with lack of training programmes and inadequate ICT infrastructure identified by the majority of participants (Al-Azawei et al., 2016). Framework-based studies in Nigeria reach similar conclusions: technology-related factors (ease of use, speed, accessibility and service delivery) were endorsed by 100% of participants, organisation-related factors such as training support and diversity by 93%, impact-related factors by 93%, and environment-related factors by 53% (Eze et al., 2020). Institutional evidence reinforces the point: awareness of e-learning in Nigerian universities was found to be very high but investment in and commitment to developing e-learning applications very poor, with unreliable internet connections and telephone lines, slow web access due to narrow bandwidth and a limited number of internet-connected computers as the recurring obstacles (Kamba, 2008). An evaluative analysis of Nigerian tertiary institutions similarly found that only 36% had structured e-learning systems and fewer than 20% of students reported consistent digital access, with poor internet access and unreliable power supply significantly and negatively correlated with adoption rates ($r = -0.54$, $p < 0.01$) (Muraina et al., 2025). Attitudinal resistance compounds infrastructural weakness: even where facilities are adequate, users may decline to change, and e-learning facilities are then left under-used (Eze et al., 2018).

Institutional Effectiveness

Institutional effectiveness in this literature is theorised through the "net benefits" construct of the DeLone and McLean model, designed to encompass all expected benefits of an information system for its different stakeholders (Salam & Farooq, 2020); the updated model collapsed individual and organisational impact into this more parsimonious construct (Urbach et al., 2009). Net benefits are defined as the contribution of the information system to individual and organisational success, are influenced by system use and user satisfaction, and are evaluated by the degree of system efficiency or productivity and return on investment (Ntorukiri et al., 2022). Applied to higher education, frameworks such as HOT-FIT incorporate technological, human and organisational factors alongside net benefits, which are operationalised as a quality assurance tool, a means of accreditation and a distinct institutional advantage, with satisfaction ultimately experienced by stakeholders (Suseno & Winanti, 2024). Empirical studies confirm the linkage between records and information systems and institutional performance. ERMS adoption was found to have a significant relationship with the productivity of higher professional education institutions (Mukred et al., 2019), and records management itself has a direct relationship with accountability, productivity and transparency that enhances public service delivery quality (Mukred et al., 2019). Student information systems affect institutional processes through system and information quality, which significantly shape use and user satisfaction and thereby the management benefits derived by university instructors (Mazadu et al., 2022). The broader e-learning literature makes a comparable claim: successful use of e-learning helps institutions overcome certain issues inherent in the traditional classroom and facilitates education delivery beyond time and space while supporting enhanced performance monitoring and skill development, ultimately improving the quality of output and institutional performance (Gunasinghe et al., 2019). Where transformation is undertaken, digital applications improve transparency, accountability and efficiency in administrative work (Nguyen et al., 2026). Effectiveness, however, is conditional on investment and governance. Evidence from a public university in Tanzania concludes that electronic record-keeping has clear potential to improve management efficiency, but that its success depends on adequate investment in infrastructure, capacity building and policy development, supported by full automation, regular training and strong institutional support (Kitinya, 2025). The self-reinforcing character of the constraints is well documented: under-funding produces infrastructure deficits; infrastructure deficits prevent ERMS adoption; the absence of ERMS perpetuates manual-system inefficiencies; and those inefficiencies generate information quality failures that impair the very service delivery outcomes that would otherwise justify further investment (Records Management in Medical Library and Effective Service Delivery in Hospitals

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in Makurdi Metropolis, n.d.). Institutional effectiveness therefore depends not only on acquiring systems but on breaking this cycle through funding, workforce capacity and formal policy.

Public Universities

Public universities constitute a distinctive institutional context for this literature, because their funding and governance arrangements shape both the pace of technology adoption and the quality of service delivery. In Nigeria, traditional approaches to teaching and assessment have continued to be practised in tertiary institutions, and most institutions have been unable to utilise e-learning fully or to obtain its advantages, which in turn hinders innovative teaching and rigorous research (Eze et al., 2018). Public-sector studies report that awareness of e-learning is high while investment and commitment remain poor (Kamba, 2008), and that negative economic factors — difficulties with computer and internet access, electricity supply, inadequate skills and low literacy — have prevented broad access to educational technologies (Kamba, 2008). Research attention has largely concentrated on public higher education institutions, which is itself an indication of where the problem is perceived to lie (Eze et al., 2020). International evidence from comparable public systems reinforces the pattern and its structural character. In public universities in a developing economy, the use of e-learning was found to be at a very early stage: most public universities had made only limited attempts to apply custom or open-source applications, and the majority of academic staff still lacked sufficient knowledge and skills to use them properly, with causes traced to the prior isolation of staff from the scientific world, delayed introduction of e-learning technologies, and continuous national instability and insecurity (Al-Azawei et al., 2016). Case-study evidence from public universities in Tanzania shows that hybrid record-keeping systems persist, with paper filing dominant and electronic platforms used unevenly across departments, and with insufficient infrastructure, dependence on IT personnel, inconsistent connectivity, limited staff training and the absence of formal guidelines constraining full utilisation (Kitinya, 2025). The structural roots of these weaknesses are captured in the observation that publicly funded institutions operate within a self-reinforcing cycle of under-funding, infrastructure deficit, absent ERMS and consequent information quality failure (Records Management in Medical Library and Effective Service Delivery in Hospitals in Makurdi Metropolis, n.d.).

Synthesis

Across the seven strands, the literature converges on a consistent argument: e-learning technologies and electronic records systems demonstrably strengthen administrative service delivery and institutional effectiveness, yet their contribution in public universities is contingent on adoption behaviour, funding, staff capacity and formal policy. Two gaps are evident. First, most Nigerian evidence addresses teaching and learning or hospital-based records management, with comparatively little examining e-learning technologies as instruments of *academic records management* in university registries. Second, adoption studies in Nigeria are dominated by student-facing learning management systems, leaving the administrative and records-management applications — and their consequences for the timeliness, integrity and security of service delivery to students — comparatively under-researched. These gaps define the analytical space within which the present study is situated.

Conclusion

The literature establishes that e-learning technologies and electronic records management systems have substantial potential to enhance the efficiency, accuracy, accessibility, security and timeliness of academic records management and administrative service delivery in Nigerian public universities. However, the realisation of these benefits is not determined by technology availability alone. Their effectiveness depends on adequate ICT infrastructure, reliable electricity and internet connectivity, staff digital competencies, user acceptance, sustainable funding, institutional policies, data security and strategic digital transformation. The evidence further indicates that Nigerian public universities continue to experience a significant gap between technology availability and effective utilisation, resulting in persistent manual or hybrid records practices, information fragmentation, processing delays and inconsistent service quality. Consequently, effective digital transformation requires an integrated institutional approach that aligns technology, people, processes and governance. Given the limited empirical attention to the use of e-learning technologies specifically for academic records management and student-oriented administrative service delivery, further context-specific investigation in Nigerian public universities

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is warranted. Such evidence is essential for developing sustainable strategies that can strengthen records integrity, improve administrative responsiveness and ultimately enhance institutional effectiveness.

Recommendations

The following recommendations are made based on the conclusion of the study:

1. University management should prioritise reliable internet connectivity, electricity supply, secure cloud-enabled platforms, interoperable electronic records management systems and robust data-security mechanisms. This should be supported by clear institutional policies and standardised procedures to facilitate accurate, timely, accessible and secure management of academic records and improve administrative service delivery.
2. Regular training should focus on digital competencies, electronic records management, data protection, system utilisation and change management, while dedicated technical support should be provided to sustain effective technology adoption. Such interventions should be accompanied by periodic monitoring and evaluation to ensure that investments in e-learning technologies translate into measurable improvements in records integrity, processing efficiency, user satisfaction and overall institutional effectiveness.

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Remote Sensing-Based Mapping of Gold Mineralization in the Donko Area, Northwestern Nigeria

MUSA, Abubakar[1]
abubakarbube1972@gmail.com
09133935392
MUHAMMAD, Ahmad Alwali[2]
NASIRU, Abubakar[3]
[1]Department of Physics, Abdullahi Fodio University of Science and Technology Aliero, Kebbi State
[2]Department of Physics, Ahmadu Bello University Zaria, Kaduna State
[3]Department of Science Laboratory Technology, Federal Polytechnic Kauran-Namoda, Zamfara State

Abstract
Gold mineralization in the Donko area of the Zuru Schist Belt is associated with lithological, hydrothermal alteration and structural features that can be effectively investigated using multispectral remote sensing. This study employed Landsat 9 Operational Land Imager (OLI) data to delineate lithological units, identify hydrothermal alteration signatures and characterize surface lineaments associated with gold-mineralization potential. Cloud-free Level-2 Landsat 9 OLI imagery acquired on 17 February 2024 along Path 190/Row 052 was processed using ENVI 5.3. The processing involved layer stacking, spatial sub-setting, false-colour composite (FCC), band-ratio analysis and selective Crosta principal component analysis (PCA), followed by automated and manual lineament extraction and GIS-based spatial analysis. The 7-4-3 FCC effectively enhanced lithological contrasts and facilitated discrimination of schist, gneiss, quartzite and other basement rock units. Band ratios of 4/2, 6/5 and 6/7 enhanced iron-oxide/hydroxide, ferrous/silicate and hydroxyl/carbonate mineral responses, respectively, with hydroxyl/carbonate signatures notably concentrated around the known gold-mineralized area. Crosta-PCA further enhanced the spectral responses of iron-oxide, hydroxyl/carbonate and ferrous minerals, providing complementary evidence of hydrothermal alteration. Lineament analysis revealed relatively high densities in the northeastern and central parts of the study area, with dominant NE–SW and NW–SE orientations and subordinate N–S trends. Integration of lithological, alteration and structural information identified areas where alteration signatures coincide with concentrated lineaments as the most favourable remote-sensing targets for gold mineralization. The results demonstrate the effectiveness of Landsat 9 OLI for reconnaissance-scale mineral exploration in the Donko area and provide targets for subsequent geological and geochemical validation.

Keywords: Landsat 9; remote sensing; hydrothermal alteration; Crosta-PCA; band ratio; lineaments; gold mineralization.

Introduction
Gold mineralization in Precambrian and metamorphic terrains is commonly associated with hydrothermal alteration and structurally controlled pathways such as faults, fractures, shear zones and lithological contacts, which facilitate fluid migration and ore deposition (Carranza, 2009; Pour et al., 2021; Wang et al., 2023). Hydrothermal alteration therefore provides an important surface indicator of mineralizing systems where alteration minerals exhibit diagnostic spectral responses. Multispectral remote sensing has become an effective tool for regional mineral exploration because it provides spatially continuous information over extensive terrains. Landsat imagery has been successfully applied to lithological and alteration mapping using false-colour composites, band ratios and principal component analysis (PCA), while selective Crosta-PCA enhances spectrally diagnostic mineral responses (Crósta & Moore, 1989; Loughlin, 1991; Pour et al., 2021; Wang et al., 2023). Applications of these techniques in African Precambrian terrains have demonstrated their effectiveness in identifying iron-oxide, ferrous and hydroxyl/carbonate signatures associated with prospective gold-bearing environments. Similar studies in northwestern Nigeria have highlighted the usefulness of multispectral imagery for investigating hydrothermal alteration and structural controls on mineralization. The Zuru Schist Belt (ZSB), which hosts gold and other metallic mineral occurrences, represents an important setting for such investigations; however, extensive weathering and locally limited bedrock exposure can constrain conventional geological mapping. Remote sensing therefore provides a valuable complementary approach for characterizing lithological and alteration variations across the area. Despite previous investigations within the broader ZSB, the Donko area remains insufficiently characterized using an integrated Landsat-based approach. This study applies Landsat 9 OLI imagery, false-colour composites, diagnostic band ratios, Crosta-selective PCA and lineament analysis to delineate lithological units, identify hydrothermal alteration

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signatures and characterize the surface structural framework. The integration of these spectral and structural indicators provides a remote-sensing-based framework for identifying areas where alteration and structural features coincide, thereby defining prospective targets for subsequent geological, geochemical and ground-based exploration.

Location of the Study Area

The study area is located within the Donko (Sheet 74), Gwashi (Sheet 75), Zuru (Sheet 97) and Wasagu (Sheet 98) map sheets in Kebbi State, northwestern Nigeria. It extends approximately from latitude 11°00′N to 12°00′N and longitude 5°00′E to 6°00′E, covering an area of about 12,100 km² (Fig. 1).

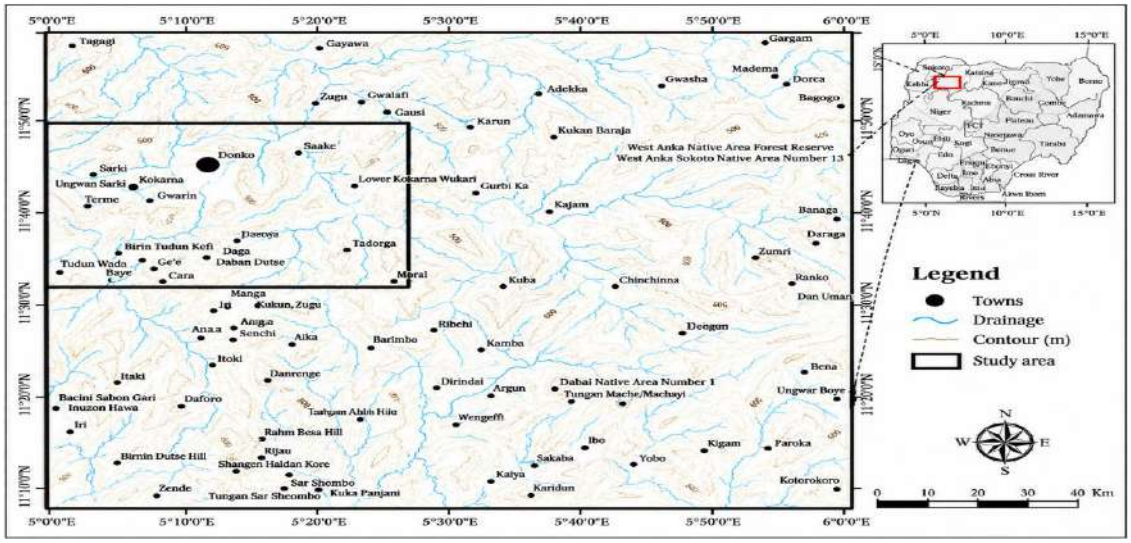


Fig. 1: Map of Nigeria showing location of the study (Adopted from WHO/UNEP, 1997)

Geology of the Study Area

The study area lies within the Zuru Schist Belt of the northern Nigerian Basement Complex and comprises medium-grained granite, quartzite, quartz–mica schist, schist–phyllite, psammitic schist, granite–gneiss, migmatite and migmatite–gneiss (Fig. 2). The basement rocks are Precambrian in age and consist mainly of migmatite–gneiss, Older Granite and schist, with associated quartz veins and pegmatites (Obaje, 2009).

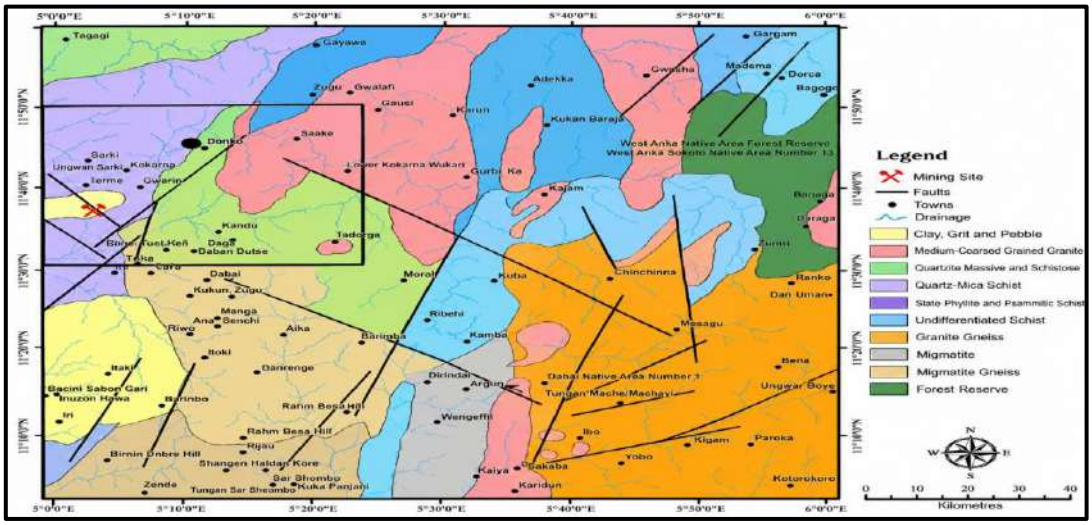


Fig. 2: Geological map of the study area showing Donkoarea (adopted from NGSA 2009).

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Materials and Methods

The remote-sensing workflow involved acquiring cloud-free Level-2 Landsat 9 OLI data for the Donko area, followed by layer stacking and spatial sub-setting in ENVI 5.3. The spectral characteristics of the bands used are presented in Table 3.1. FCC (7-4-3), band ratios (4/2, 6/7 and 6/5) and selective Crosta-PCA were applied to enhance lithological and hydrothermal alteration signatures. Landsat-derived lineaments were then extracted and analysed for density and orientation. Finally, lithological, alteration and structural information were integrated to delineate areas with coincident indicators of gold-mineralization potential (Figure 3.1).

Table 1. Spectral characteristics of Landsat 9 OLI/TIRS bands used in the study.

Band	Wavelength (µm)	Spectral region	Spatial resolution (m)	Sensor
1	0.43–0.45	Coastal aerosol	30	OLI
2	0.45–0.51	Blue	30	OLI
3	0.53–0.59	Green	30	OLI
4	0.64–0.67	Red	30	OLI
5	0.85–0.88	Near infrared (NIR)	30	OLI
6	1.57–1.65	SWIR-1	30	OLI
7	2.11–2.29	SWIR-2	30	OLI
8	0.50–0.68	Panchromatic	15	OLI
9	1.36–1.38	Cirrus	30	OLI
10	10.60–11.19	Thermal infrared (TIRS-1)	100	TIRS
11	11.50–12.51	Thermal infrared (TIRS-2)	100	TIRS

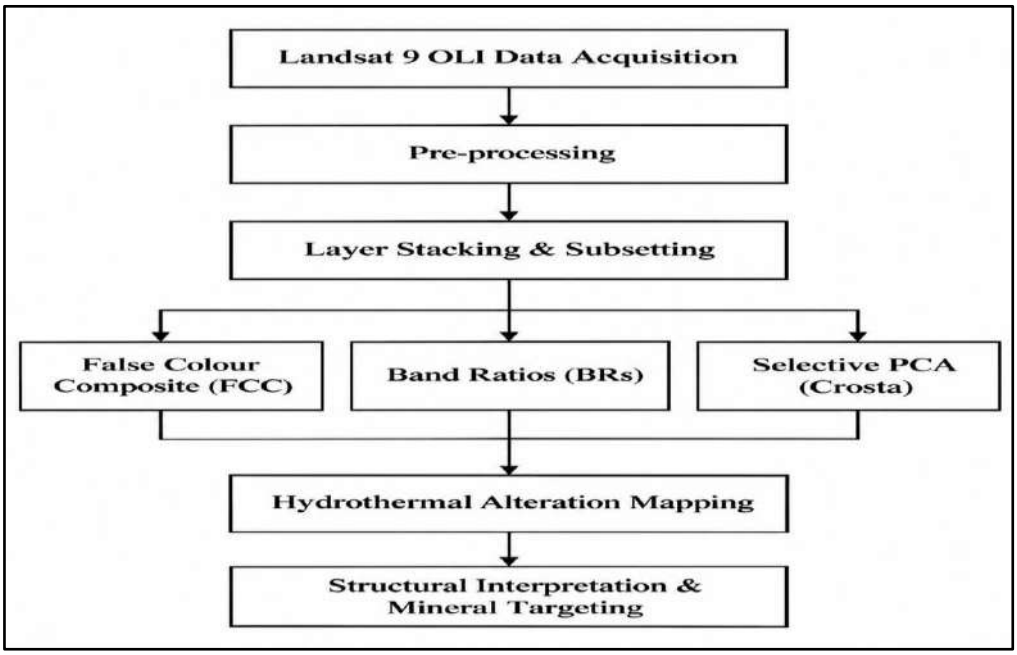


Figure 3. Workflow for processing and interpretation of Landsat 9 OLI data.

Presentation of Results and Discussion

Landsat 9 OLI imagery successfully delineated the major lithological units and their spectral contrasts within the Donko area. The 7-4-3 false-colour composite distinguished schist, gneiss, quartzite and water bodies based on their contrasting spectral responses (Figure 4). Band-ratio analysis further enhanced alteration-related mineral signatures, with the 4/2 ratio

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highlighting iron-oxide/hydroxide, 6/5 enhancing ferrous/silicate minerals, and 6/7 delineating hydroxyl/clay-carbonate responses, particularly around the gold-mineralized area (Figure 5). These results demonstrate the effectiveness of Landsat 9 OLI spectral combinations for reconnaissance-scale lithological and alteration mapping.

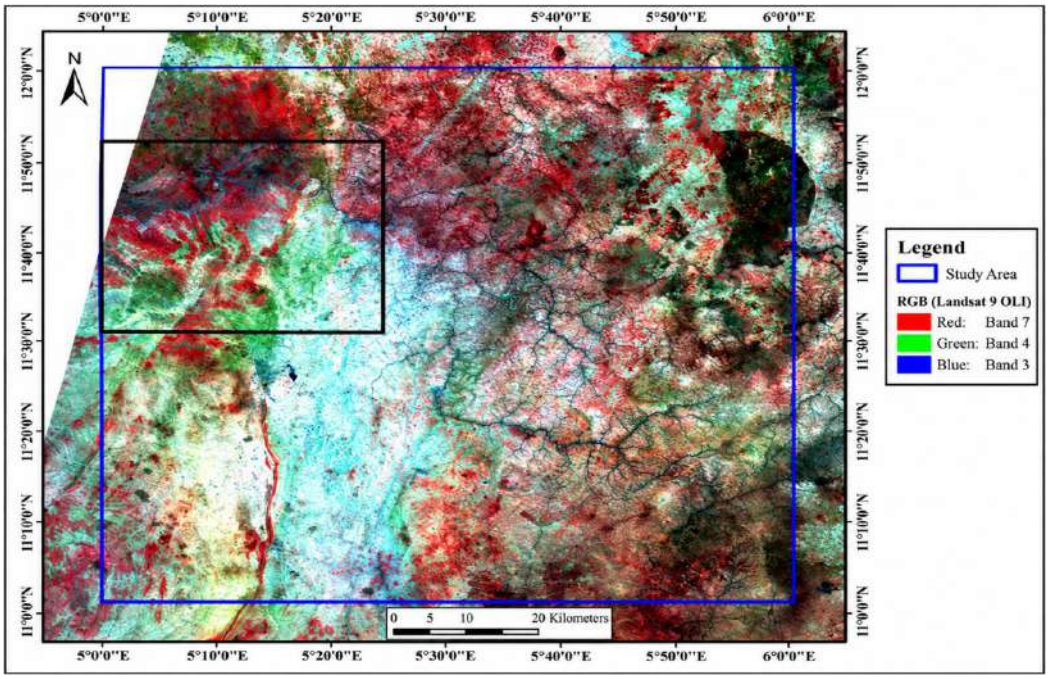


Figure 4. False colour combination image of Landsat 9 OLI (743) discriminating several rock units in Donko area.

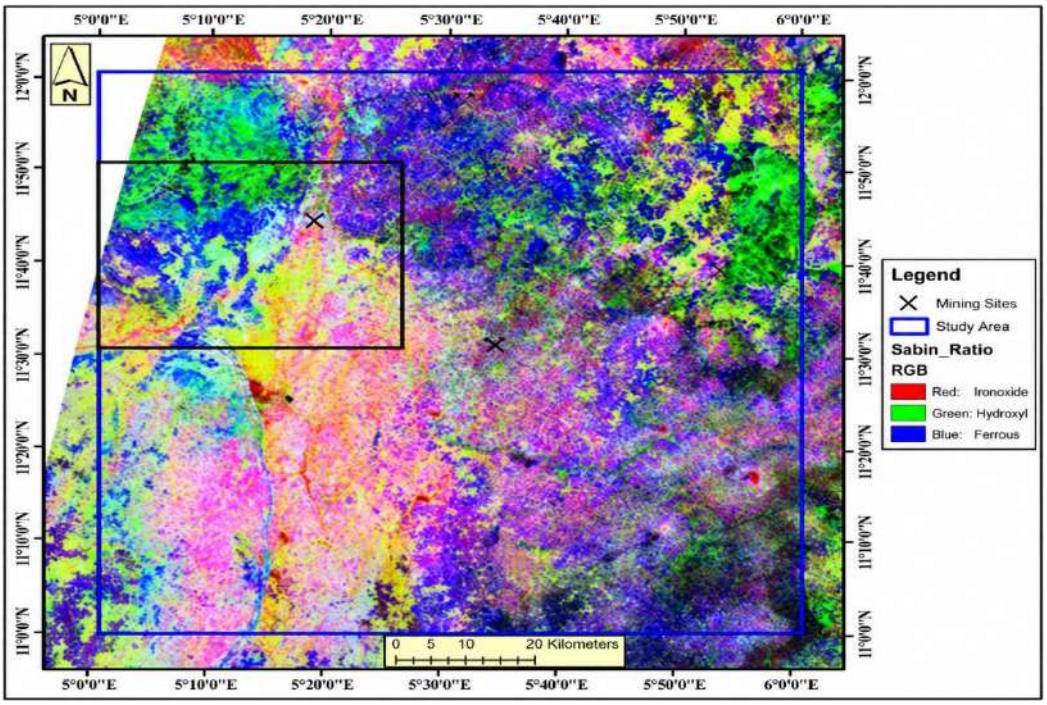


Fig. 5 Sabin ratio (4/2, 6/7, 6/5 in RGB) highlighting various rock units

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Selective Crosta-PCA provided additional enhancement of the alteration signatures using bands 2, 4, 5 and 6 for iron oxides and bands 2, 5, 6 and 7 for hydroxyl/carbonate minerals. The eigenvector loadings in Tables 2 and 3 identified the principal components associated with the respective mineral responses, with PC1 explaining 99.69% and 99.50% of the variance in the iron-oxide and hydroxyl/carbonate analyses, respectively. The Crosta composite integrates iron-oxide, hydroxyl/carbonate and ferrous-mineral responses, with distinctive colour patterns indicating areas of enhanced alteration (Figure 6). The spatial distribution of these alteration signatures provides evidence of hydrothermal activity and highlights areas potentially favourable for mineralization.

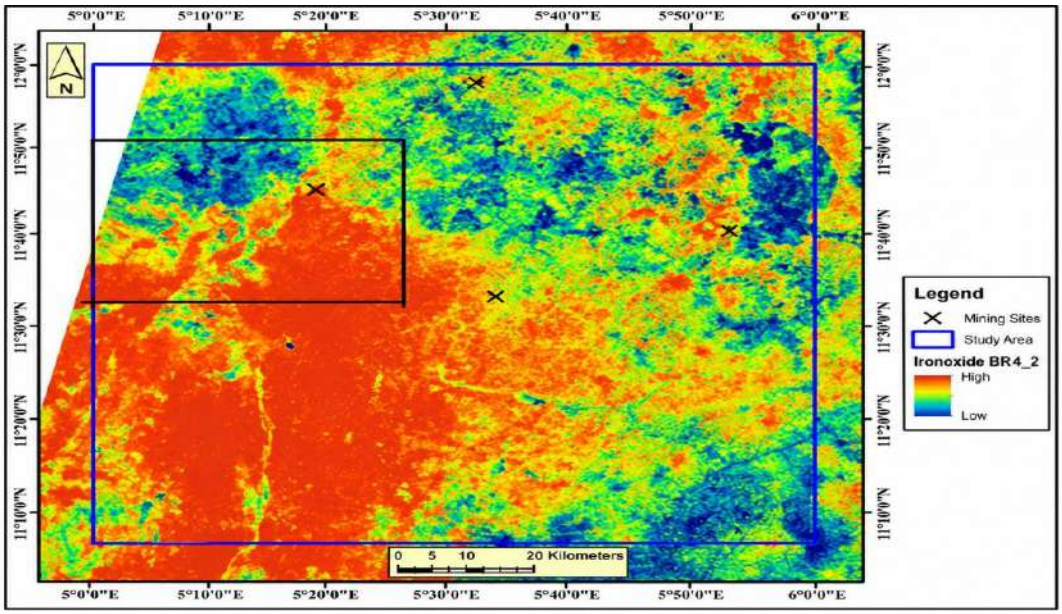
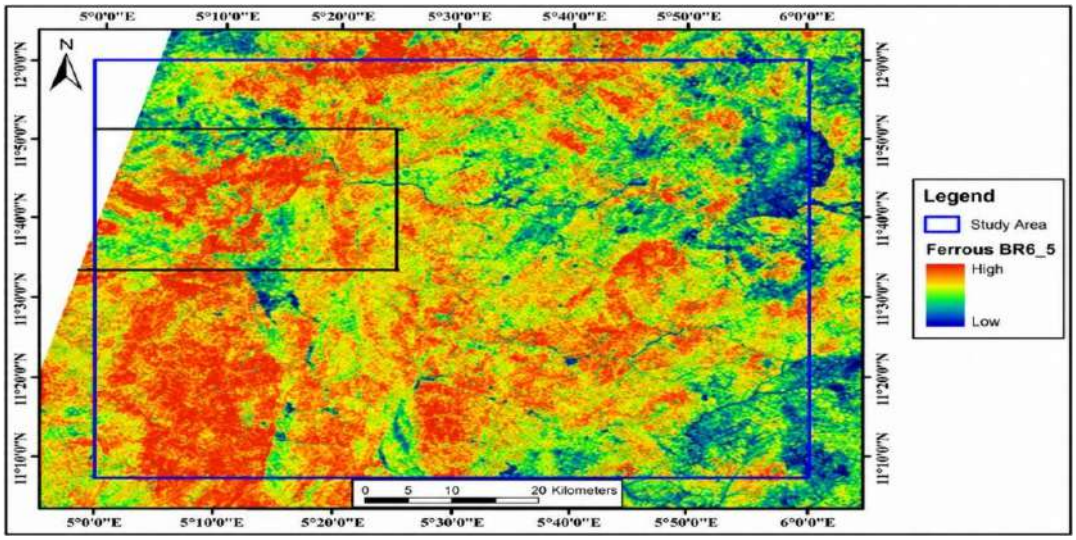


Figure 5 (a) BR 4/2 mapping iron-oxide.



Eigenvector	Band2	Band4	Band5	Band6	Eigenvalues	Variance (%)	Cumulative %

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PC1	-0.324229	-0.436638	-0.544333	-0.638690	223002721.555932	99.69	99.69
PC2	-0.373087	0.009050	-0.607634	0.701074	426458.955456	0.19	99.88
PC3	-0.751230	-0.308158	0.574660	0.102268	220482.179785	0.10	99.98
PC4	-0.751230	-0.845165	0.065184	0.300186	220482.179785	0.02	100.00

Figure 5 (b) BR 6/5 targeting unaltered rocks and silicate or ferrous minerals

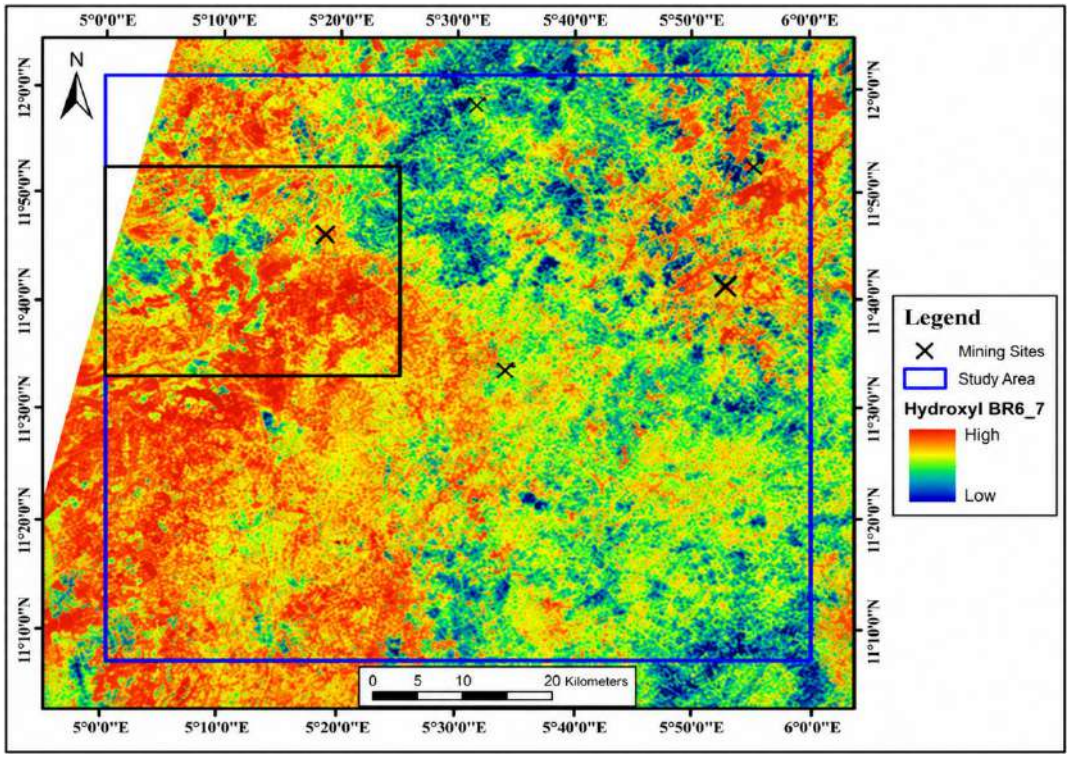


Figure 5 (c) BR 6/7 illustrating OH-bearing and carbonate minerals

Table 2. Landsat 9 OLI PCs data loadings of band 2, 4, 5 and 6 for iron oxide mineral

Eigenvector	Band2	Band5	Band6	Band7	Eigenvalues	Variance (%)	Cumulative %
PC1	0.499782	0.499852	0.500503	0.499863	3.980141	99.50	99.50
PC2	0.442326	0.531655	-0.332032	-0.641440	0.011616	0.29	99.79
PC3	0.698836	-0.539207	-0.402184	0.243171	0.007137	0.18	99.97
PC4	-0.257282	0.420413	-0.691013	0.528734-	0.001105	0.03	100.00

Table 3. Landsat 9 OLI PCs data loadings of band 2, 5, 6 and 7 for Hydroxyl minerals

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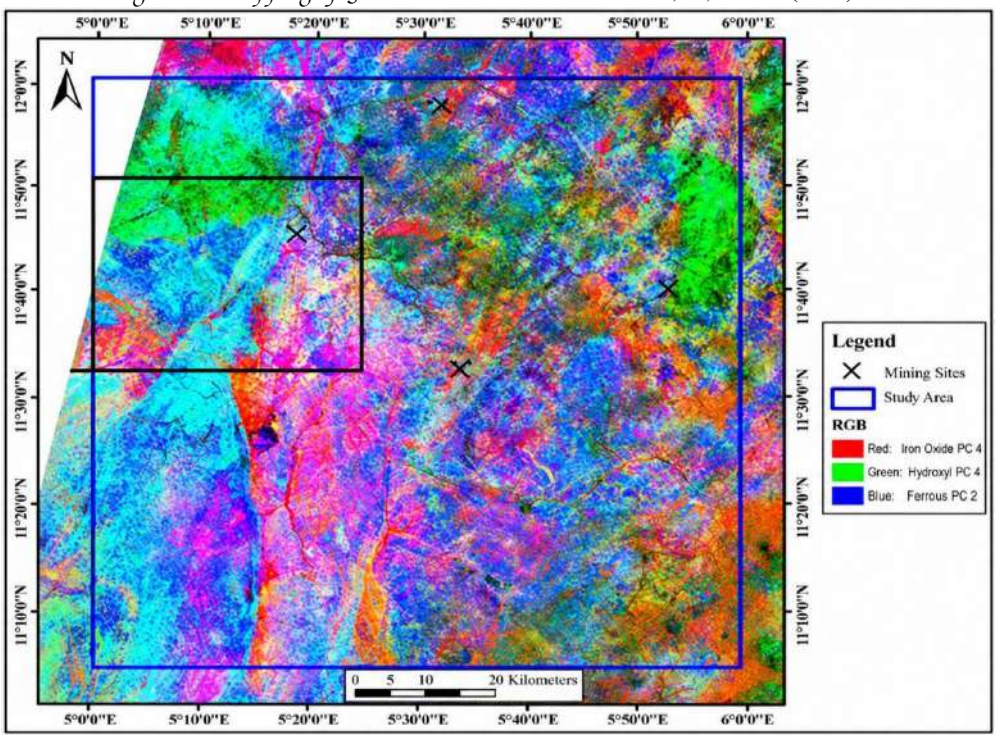


Figure 6. PCA (Crosta method) RGB combinations of iron-oxides, hydroxyl/carbonate and ferrous minerals in Donko area.

Lineament analysis revealed relatively high structural densities in the northeastern and central parts of the study area and lower densities toward the south (Figure 7a), with dominant NE–SW and NW–SE orientations and subordinate N–S trends (Figure 7b). Superimposition of Landsat-derived and aeromagnetic lineaments on the geological map showed higher structural concentrations over granite gneiss, undifferentiated schist and slate–phyllite, with moderate concentrations over graphite and migmatite and lower concentrations over quartzite and quartz–mica schist (Figure 8). The coincidence of alteration signatures with concentrated and intersecting lineaments identifies structurally favourable zones that may have facilitated hydrothermal fluid migration. Collectively, the results from Figures 4–8 and Tables 2–3 indicate that areas showing coincident lithological, alteration and structural signatures represent the most prospective remote-sensing targets for subsequent geological and geochemical validation.

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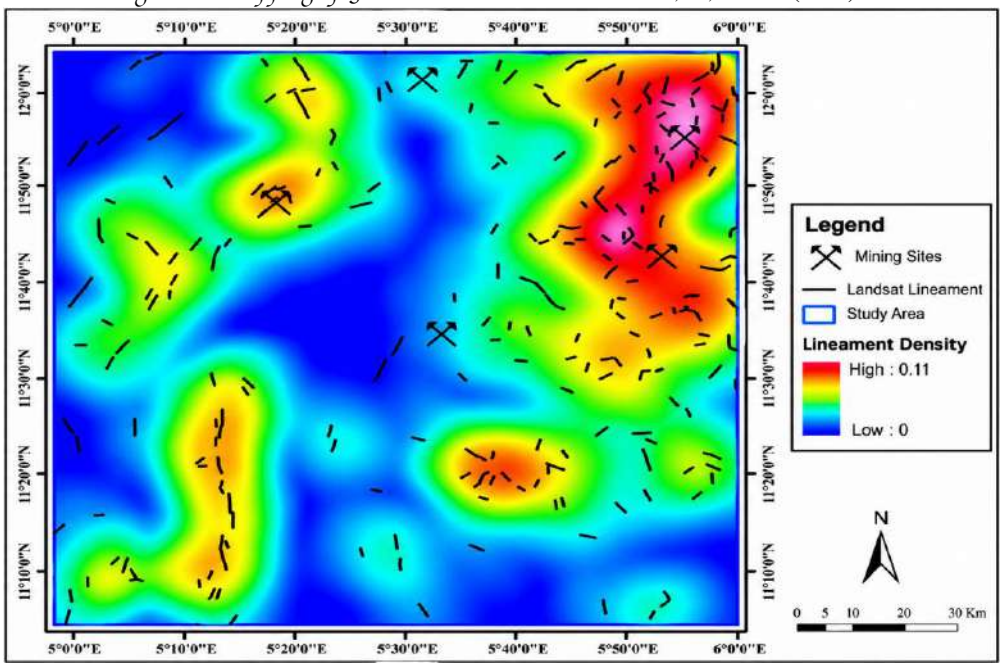


Figure 7a: Lineaments density map of Landsat 9 OLI Imagery of the Donko area.

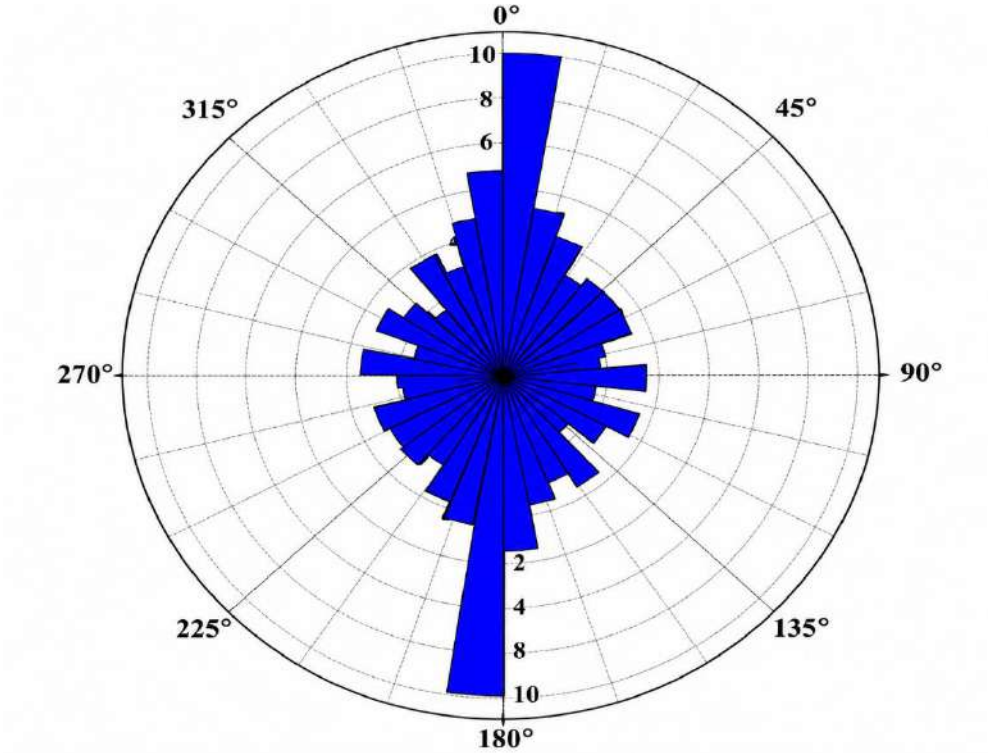


Figure 7b: Rose diagram of lineaments extracted from the Landsat 9 OLI Imagery of the Donko area.

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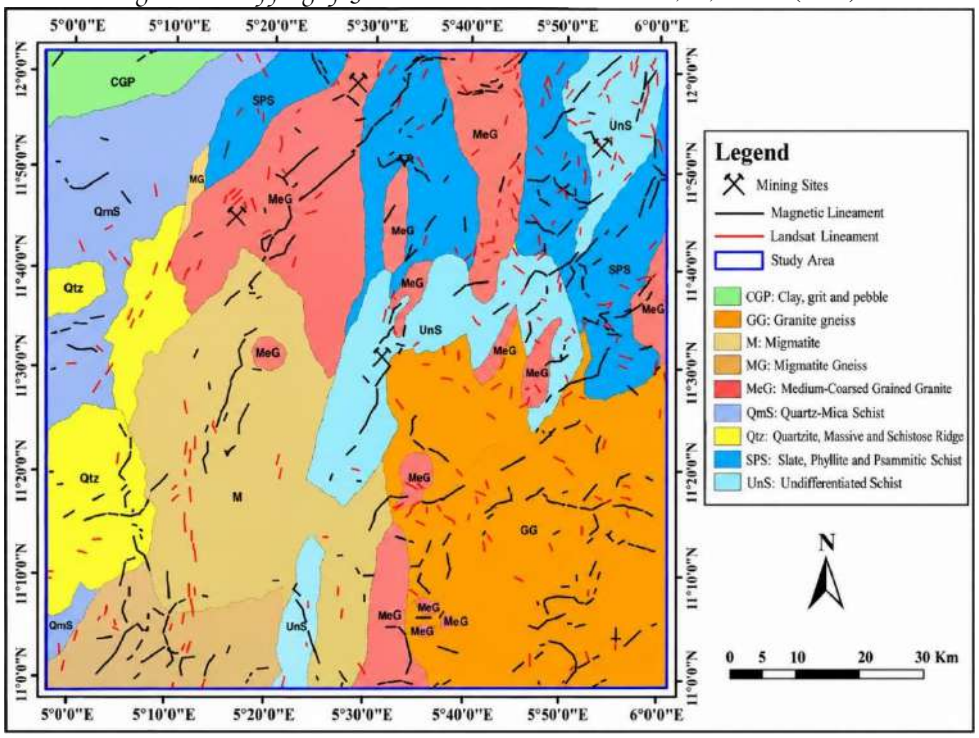


Figure 8: Superimposed Lineaments on the Geological Map of the Study Area

Conclusion

The Landsat 9 OLI-based investigation successfully demonstrated the capability of multispectral remote sensing to delineate lithological variations, hydrothermal alteration signatures and surface structural features associated with gold-mineralization potential in the Donko area of the Zuru Schist Belt. The 7-4-3 false-colour composite effectively discriminated the principal lithological units and their contacts, with distinct spectral responses observed for schist, gneiss and quartzite. Band-ratio analysis further enhanced the spatial distribution of iron-oxide/hydroxide, ferrous/silicate and hydroxyl/carbonate mineral responses, with the hydroxyl/carbonate signatures particularly occurring around the known gold-mineralized area. The selective Crosta-PCA analysis provided additional enhancement of these alteration assemblages and demonstrated strong spectral separation of iron-oxide, hydroxyl/carbonate and ferrous-mineral responses. Landsat-derived lineament analysis revealed relatively high lineament densities in the northeastern and central portions of the study area, with dominant NE–SW and NW–SE orientations and subordinate N–S trends, identifying structurally complex areas that may have provided pathways for hydrothermal fluids. The integration of lithological, alteration and structural information indicates that areas where iron-oxide, hydroxyl/carbonate and ferrous-mineral signatures coincide with concentrated lineaments constitute the most favourable remote-sensing targets for gold mineralization. Importantly, these results represent prospective alteration and structural signatures rather than direct confirmation of gold mineralization, and the delineated targets should therefore be subjected to detailed geological mapping and geochemical investigation for validation.

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Assessment of Language of Igue Festival in Ika Land of Delta State Nigeria: Cultural and Semantic Implications

SAMUEL, Chukwuemeke Eboh[1]
nycnchap2020@gmail.com
08117904648, 07067601711

CHUKWUELOKA, C. C. [1]
cc.chukwueloka@coou.edu.ng
08035485725

[1]Department of English, Chukwuemeka Odumegwu Ojukwu University, Igbariam Campus, Anambra State, Nigeria

Abstract

This work, Cultural and Semantic Implications of the language of the Igue Festival in Ika Land; is aimed at bringing out the detailed account of the Igue festival showcasing the Ika culture and tradition as well as x-raying the activities performed during the festival and the role played by some specific persons in the community. This became necessary due to the fact that, there is a decline in the understanding and use of traditional ritual expressions there by threatening the preservation of indigenous knowledge and oral traditions. Furthermore, there is relatively no study on how language conveys meaning during the Igue festival and how these meanings reflect the cultural values of Ika people, this gap creates the need for this research. In carrying out this research, the method will be anchored on interview and close reading of relevant texts. To achieve this, the researcher adopts the Saphir-Whoorfian's theory of language. This is relevant to this study because it not only see language as socially bounded but also, culturally bounded. The researcher also looked at the history and meaning of Igue festival as well its performance entailments. Furthermore, the meaning of some language/words used during the Igue festival and its cultural/semantic implications was not left out. This was done by giving both the cultural names of Igue activities as well as their English equivalents which was semantically looked at in its social and cultural context. From the findings, it was evident that the culture of the people has correlation with their language which is a true representation of the theory in use for this research work. Conclusively, we can see that language and culture are two inseparable coin as far as the Igue festival is concerned.

Keywords: Festival, Igue, Semantic, traditional rituals

Introduction

No language can be separated from its culture. Language and culture are complements of each other. To a large extent, the language of a people is determined buy their culture (Hymes 1962). He argues that understanding language requires more than analyzing grammar or vocabulary; it also requires understanding who speaks, to whom, when, where, why, and according to what cultural norms. This shows that a strong relationship abounds between culture and language. The ika people have numerous kinds of festival which they celebrate. This includes Oso-Ezi (a special visit by a sitting Obi to the place where other Obis' were buried), Iwa-gi (new yam festival), Iwa-Eke, Igbu-Nkpisin, to mention but a few; all these are organized around major events in the Ika community hence, the various festivals are celebrated at varraying times from one locality to the other. According to Ayordoh (2024), festivals in Africa are organized around major events like, the agricultural rites, episode from the history and tradition of the people around officially recognized divinities. The Igue festival is a central feature of the cultural life of the Ika people as a whole since it is a period when all members of the community, home and abroad meet to express their gratitude to God who has kept them alive throughout the year hence, it is held at the end of the year. Since language is the primary medium for cultural expressions, the world view and language are therefore inextricably interwoven. The language of Igue festival is not the normal Ika language for communication but, a special type of language coinage that brings alive and reflect the culture and belief of the Ikas' and uphold it.

Statement of the Problem

The Igue Festival in Ika Land is one of the most important traditional festivals through which the Ika people preserve their cultural heritage, religious beliefs, and communal identity. During this festival, various forms of language including ritual prayers, chants, proverbs, songs, blessings, greetings, and invocations are used to communicate symbolic meanings and perform cultural functions. However, despite the linguistic richness of these expressions, there is limited scholarly attention

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devoted to their semantic interpretation and cultural significance. Many younger generations of Ika speakers are increasingly influenced by English and other dominant languages, leading to a gradual decline in the understanding and use of traditional ritual expressions. Consequently, many symbolic meanings embedded in the language of the Igue Festival are becoming less understood, thereby threatening the preservation of indigenous knowledge and oral traditions. Furthermore, existing studies on the Igue Festival have largely focused on its historical, religious, or anthropological dimensions, with relatively little emphasis on how language conveys meaning during the festival and how these meanings reflect the cultural values of the Ika people. This gap creates the need for a semantic analysis of the language used during the Igue Festival to reveal both its literal and implied meanings as well as its cultural implications. This study therefore seeks to examine the semantic features of the language of the Igue Festival in Ika Land and to investigate how these linguistic expressions preserve cultural identity, transmit indigenous knowledge, reinforce traditional institutions, and promote social cohesion among the Ika people.

Purpose of the Study

The main purpose of this study is to examine the cultural and semantic implications of the language used during the Igue Festival in Ika Land.The specific objectives are to:

1. Examine the semantic meanings of the language used during the Igue Festival in Ika Land.
2. Identify the various linguistic expressions employed during the festival, such as prayers, chants, proverbs, songs, greetings, and blessings.
3. Investigate the cultural implications of the language used during the Igue Festival.
4. Examine the role of festival language in transmitting indigenous knowledge and traditional values.
5. Assess how the language of the Igue Festival promotes unity, social cohesion, and respect for traditional authority in Ika society.

The Origin/Historical Background of The Igue Festival

The beginning of Igue festival is traced from the immigration of Owa to Idu, Benin-City during the great migration witnessed in the reign of Oba Ewuare at about 1440 A.D benin history. According to Chief J.O. Obadaigie, oral history supports the theory that the first festival dates back to the reign of Oba Ewuare in 1440A.D. He was a powerful oba who fought against his enemies and captured two hundred and one (201) towns therefore, the performance of the Igue festival in Ika land is traced to the Edo Culture this is because Owa Kingdom; Ika land are migrants of the Benin kingdom who later settled in the East from where they finally left for their original home where they are now settled hence, traces of Benin culture is still much evident among the Ika people. Those days, thick forests housing different animals exists. One of the little children who went to fetch fire wood from the forest was caught and eaten up by one of these animals in the forest which they reported on getting home. On their return back to the forest, a hunter called ***Ewere*** went with them. On arrival, he hid himself while the children went in search of firewood then came the animal again to attack the children but their shout alerted the hunter who shot and killed the animal. The animal was left there as they went to inform the elders who followed them to see the animal which has been a threat to them but, no one was able to identify the animal with its name then it was called a *'big thing: ohiohio'* the animal was taken home and slaughtered, all in the village eat of it. One of the soothsayers; oheren' who ate the meat advised that the head be buried in the cementary. They were asked to carry along sticks, guns to be used to shoot the evils the animal has brought to the land, some dressed in a funny looking attire while others disguise themselves 'odin'. They make use of the 'aza' which dancers tie on their ankles while dancing and the clapperless bell 'Ekpiri'. The eldest son will now lead them with guns and other dangerous weapons to the cementary. When they get there, they will throw all the materials used, including the head of the animal and render songs and dance there. The elders who have their gun will now shoot their guns to destroy the animals like the hunter did in the forest. The women and little children will dance from there to the eldest man's house with the 'Ibiewere leaf' (good luck leaf) wishing themselves good luck with the 'good luck leaf' on behalf of all those in the land.

The Igue festival was carried out from the account stated above especially in ika land where the Obi and his people celebrate in a most colourful manner. In recent times, the origin of this festival is associated with a great warrior with mystic powers called ODOGWN who was the founder of Owa clan. This man was said to have wielded great power and influence over

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the people and protected them against external aggression during those days of inter-clan and inter-tribal wars. The man so endeared himself to the clan that he managed the affairs of the people and instilled in them a sense of belonging and common destiny as a result of which, when he died, the people decided to honour him annually with the Igue festival.

The preparation process and organization of Igue festival in Ika Land.

In ika land, fourteen days to this event is used for the clearing and elaborate preparations. These take the form of clearing of streets and paths, repairs and renovation of dwelling houses, market places and shrines, the Obi holds series of meetings with the various classes of his subjects including the elders, chiefs, women groups, the olotus, the native doctors and 'otu-omu' (women leaders). Each class performs specific duties in the overall interest and success of the festival to begin which is usually on the last EKEN market day of the year. Ighile (2013) explains that the Igue Festival is not merely a day of celebration but a carefully organized cultural and religious event. Before the festival begins, participants undergo ritual preparations, community mobilization, rehearsals of traditional songs, and the gathering of symbolic materials. These preparatory activities preserve cultural identity and ensure that the festival achieves its spiritual and social objectives. In Ika communities, elders, traditional priests, title holders, youth groups, and women begin preparations several weeks before the festival. Ritual objects are assembled, shrines are cleaned, masquerade costumes are repaired, and traditional chants are rehearsed. The announcement is given to each town/quarter through the AGHARA (provost) deciding the various activities to be performed. The native doctors prepare certain charms to ward off evil spirits as well to keep the town peaceful. The women make arrangements for other social activities such as dancing etc while the women leaders 'the Otu-Omu' will now prepare other types of concoctions to protect the towns from evil spirits and wicked people. According to Ukwandu and Izu (2016) the preparation stage reflects the organizational strength of traditional institutions. Chiefs, elders, age grades, musicians, dancers, and families are assigned responsibilities before the festival begins. Music, dance, costumes, and rituals are rehearsed to ensure a successful celebration.

The Obi now pronounces the date to his subjects through their elders and chiefs who then send same to their various communities to enable them plan their homage to the palace with items like cocoa-nuts, goat, tubers of yam and kola-nuts. The Igue festival starts on the fifteenth day and lasts through the next seven days. The vigil of the real Igue day is always on 'Nkwo' native market day. On this day, at about 6.00pm the Obi, his Alasi (most senior wife), elders and chiefs offer one female cow. one female goat, one cock, 60 kolanuts, a plate of coconuts, a little quantity of palm oil and some native chalk "Nzun" in the Obi's palace before the chief priest of a shrine called "Aruru" and the other most elderly men in the town known as "Ihama". Another senior chief, the Elewu, the Obi's wives and all members of the royal family must be present. The Ihama blesses the Obi, while the Aruru then blesses the others. The cow, goat and other animals are then slaughtered before the "Aja" and "Odun-Uku" (a deity in the land). Certain preparations are further made. The head of each family (the eldest man in the house, assembles all his family members in his courtyard (Ogwa). They have to provide a coconut, a little water in a container and some native chalk inside the water container. He breaks the coconut, pour its water into a plate and a little salt is added to it. The head of the family takes the mixed coconut water for blessing and pours it on the head of every member of the family. He thanks God for bringing them safe, sound and alive to the end of the year and also prays that God would continue to keep, provide and protect every one of them in the new year. The pouring of the liquid and coconut content symbolizes the ushering of love, peace and harmony in the forth coming year, for the progress of the people. After the chanting of some incantations by the eldest man, every member of the family in attendance answers "Ise" meaning "may it be so". A gun shot is fired by the eldest or anybody he authorizes to do so, this marks the celebration of the "Igwor-Isi-Igue". On the real Igue festival day which is on the 'Eke' market day, every family will slaughter any animal live animal of their choice, such as goat, sheep, chicken, and prepare food for themselves to eat and make merriment. In eating, it is the custom of the Ikas' to gather again in their respective families to share what they have together. Children offer wine and other presents to their well wishers and parents. Friends exchange visits, with friends. The Obi is not left out, he also kills more cows one for the Chiefs, one for the elders and another for the entire community. In the afternoon of the second day, after the feeding, an official called "Aghara" (Provost) invites men, women, boys and girls of different age groups from twelve years of age. These persons are told to go and perform an act known as "Ulu Ubiri". Each of them holding a stick carved from coconut branches, some would put on dirty and worn-out clothes, paint their faces with different

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colours and begin to act as spirits, thereby making children to be afraid. At about 1pm they use the carved coconut branches to beat the ground at specified rhythm which is usually accompanied with singing, chantings and dancing during the "Ilu Ubiri" dance, the youths and even the aged, dressed in masquerades called "Ekpo" and "Odin" to perform customary rally all over the town, singing and dancing merrily in their disguised attires, while some people go round the town praying and some pretend to be native doctors, healing people of their diseases. In this great dramatization, they are sometimes offered gifts. At about 2.00pm, all the quarters in the villages start from their houses to do what is called "Ilu Ubiri" and the first quarters in the village to arrive the Obi's palace, beats the coconut branches round the whole palace, as it is believed that all the evil spirits are hanging around the palace. They wait for the other quarters and together will all move to the cemetery "Ikpekpe", to discharge everything used by the people, hoping that all the evil spirit in the land have been cast away. Also all their enemies, all the epidemics in the land which makes people sick are also wiped away. The masqueraders and the trumpeters are not left out in this "Ilu Ubiri" exercise, they weave the palm fronds into a fearful looking structure known as "Iken Odin", with which they dance to amuse their audience. They also carve some objects they call their enemies "Ndi Iwe', which they also dump at the cemetery. After the dumping of these debris, they will return with leaves known as "Ibie Ewere" and they hand them to the Obi who in turn, hands a piece of native chalk to the people as a symbol of his royal blessings for the new year. As they put some of these leaves on their foreheads, they hold some which they would share with one another, their elders and parents. This is usually accompanied with singing and dancing. As they sing these songs, they dance to the house of the most elderly man and woman, offering them the "Ibiewere" leave, even to anybody they meet on their way. After this, they visit friends, well-wishers, parents and chiefs, in whose houses they dance and they are entertained with food and cash gifts.

The last part of the festival involves a general visitation of the Obi to the Village heads and chiefs who welcomes him with gifts of various descriptions. The Obi is usually dressed in his full royal regalia or white flowing robes and beads with his sword of office, 'Adan' attended by two boys. He lead the dance as he is followed by a royal traditional orchestra. At about 5.00pm the Obi will be seated in his palace, while various groups come to entertain him with their dances, after which, everybody moves home to make resolutions for the New Year. Before they depart, the shooting of gun is organized by every quarter in the village. This is to certify that the celebration has come to an end; all the youths participate in the canon shooting. Individuals also join in the shooting of guns saying that the evils of the land have been eliminated with the passing year. In the last night of the celebration, the Obi, his wives, the elders and chiefs, will visit the "Oseh" shrine where they offer sacrifices to the god of their ancestors asking for their help and protection in the New Year and also to thank him for enabling them survive the past years. More so, customary ceremonies are performed by a traditional chief known as the "Oweh". During this occasion, the Obi who is flanked by his chiefs wears a special attire which is usually decorated with beads and made up of white wrappers, his body decorated with native chalk. Although, this ritual virtually marks the formal end of the festival, the youths of the town still continue with the dancing and merriment till late. Finally, at mid-night, some selected young men move from one house to the other, collecting food item, which is said to be the remnant of the festival. It is a special task which nobody comes out to look to witness because they assume them to be spirits. Hence, they are called "Umu Nmo". The passage of time appears to have brought some form of modification in the celebration of this festival. Igue essentially still retains its original spirits as a tribute to a great hero, Odogwu, who contributed very immensely to the welfare and progress of his people and it is only fitting and proper that his own people today still associate his epoch-making regime of war and peace with the end of a year and the beginning of another.

Summary from the preparation stages of the Igue Festival in Ika land, it's obviously seen that the stages cuts across:

1. Spiritual purification and ritual cleansing.
2. Meetings of elders, traditional rulers, and family heads.
3. Preparation of shrines and sacred objects.
4. Rehearsal of traditional songs, chants, dances, and praise poetry.
5. Mobilization of age grades, women, and youth groups.
6. Collection of ritual materials and festival costumes.
7. Teaching younger generations the language, customs, and symbolism of the festival.

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Theoretical Framework

This research is hinged on Sapir–Whorfian's Theory of language (1921 and 1956). This theory posites that, the language people speak influences, and may shape, the way they perceive, think about, and understand the world around them. Different languages organize reality in different ways, so speakers of different languages may experience or interpret the same phenomenon differently. People can only think about concepts that their language allows them to express. Language influences thought and perception but does not completely determine them as different languages encourage different ways of thinking and categorizing experience as language reflects culture. In many Nigerian cultures, there are numerous greetings for different situations (morning, evening, festivals, elders, ceremonies). These expressions reflect the cultural importance of respect and social relationships. Likewise, the specialized language used during the Igue Festival in Ika land carries meanings that express identity, spirituality, authority, and cultural values. For this research, " Cultural and Semantic Implications of the Language of the Igue Festival in Ika Land," the Sapir–Whorf Theory is highly relevant because it explains how festival language reflects the worldview of the Ika people, preserves cultural beliefs and traditions, conveys meanings that may not have exact equivalents in other languages, and demonstrates the relationship between language, culture, and meaning. During this festival, prayers, blessings, proverbs, songs, greetings, royal proclamations and ritual chant derive their meanings from the cultural context in which they are performed. This theory helps explain how these speech forms express respect for traditional authority, reinforce communal identity, preserve cultural heritage and communicate values such as peace, unity, prosperity and ancestral reverence.

Conceptual Framework

This explains in clear terms the key concepts used in this research work and shows how they are closely related. For the topic under research, "cultural and semantic implications of the language of igue festival in ika land" the conceptual frame work has this to say on the major concepts.

Language:

This is a systemic means of communication through which ideas, beliefs and emotions are expressed using spoken, written or signed symbols. Ofoegbu (2008) defines language as a human system of communication. It is a means by which humans alone communicate. Language is man; man is language. Man uses language for his everyday interaction. Saphir (1921) sees language as a purely human and non-instinctive method of communicating ideas, emotions and desires by means of voluntarily produced symbols. In line with this research work, language can be refered to the prayers, songs, greetings, proverbs, blessings, chants and ritual utterances used during the Igue festival.

Semantics:

Contemporary linguists have defined semantics as the study of meaning in language while emphasizing different aspects of how meaning is represented and interpreted. Semantics is the meaning communicated through language, Saeed (2016). He explains that semantics investigates how words, phrases and sentences espress meaning and how speakers understand those meanings. On the other hand, Ronnie and Elspeth (2009) describe semantics as the study of the conventional meaning encoded in words and sentences, distinguishing it from pragmatics which studies meaning in context. Saeed (2016) defined semantics as the study of the meaning of words, phrases, and sentences, examining how language users interpret linguistic expressions in different contexts. Cann (1993) explained that semantics investigates the literal meaning encoded in language and the principles governing how meanings are composed from smaller linguistic units. Huddleston and Pullum (2002) viewed semantics as the component of grammar that interprets the meanings of words, phrases, and sentences within the overall structure of language. In this study, semantics focuses on the meanings of the expression used during the Igue festival and the symbolic ideas they communicate such as purification, prosperity, unity, protection and fetility.

Culture:

This refers to the beliefs, customs, traditions, values, norms and ways of life shared by members of a society. According to Gary and Susan (2018) culture is seen as a shared system of values, beliefs, customs, behaviours and material objects that members of a society use to cope with their world and with one another. Kottak (2020) on the other hand defines culture as the tradition and customes transmitted through learning that govern the beliefs and behavior of the members of a society. He emphasizes that culture is learned, shared, symbolic, adaptive and transmitted accros generations. In this

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study we can see culture as traditions, beliefs, rituals, social practices and values of the Ika people as expressed through the Igue festival.

Festival:

According to Jane (2010), festival is defined as a celebration, memory-making or a feast day. A festival may be purely speculative like sports festival or purely religious like the esther festival. The encyclopeadia britennica sees festival as the commemoration of the re-enactment of events or seasons that give meaning and cohesion to an individual on his religious, political or his social-economic aspirations. According to the same source, festivals often includes the dramatical, dancing, athletics and all forms of joyous festivity and memory-making. During festivals, ethnic groups meet to remind themselves of historical episodes which could be illustrated amoung other things: coming of age, harvesting of crops, and appeasement of various gods for protection against enemies, evil, epidemic, diseases, etc.

Igue Festival:

This is a traditional annual celebration among the Ika people symbolizing spiritual purification, gratitude, thanksgiving, renewal, prayers for prosperity serving as an important avenue for preserving indigenous traditions and strengthening communal identity. Ighile (2013) describes the Igue Festival as one of the most important cultural festivals of the Ika people. According to him, the festival marks the traditional New Year and is characterized by rituals such as the royal "head washing" ceremony and the use of Ewere leaves. He further argues that the songs performed during the festival embody the history, beliefs, aesthetics, and cultural identity of the Ika Kingdom. Osarumwense (2014) views the Igue Festival as a sacred annual ceremony of spiritual purification during which the Obi offers prayers for the peace, protection, and prosperity of the kingdom. He also explains that the British attempt to enter Ika during the festival contributed to the events that culminated in the 1897 British invasion. Ukwandu and Izu (2016) argue that the Igue Festival is a major expression of ancient Ika culture. They maintain that its music, dances, rituals, and ceremonies preserve the historical memory, customs, and values of the people while strengthening cultural identity across generations. In another vein, Osatohanmwen (2024) explains that the Igue Festival is both a religious and cultural institution that promotes peace, strengthens the spiritual heritage of the Ika Kingdom, and supports cultural tourism. He emphasizes that the festival serves as a medium for preserving indigenous traditions. The above conceptual framework sees language as the medium through which the Igue Festival expresses its cultural values. Semantics helps explain the meanings embedded in the festival's linguistic expressions while, culture provides the social and traditional context that gives those expressions their significance thus, the language of the Igue festival reflects both the semantic meanings and the cultural identity of the Ika people.

Research Methodology

This study adopts a qualitative research methodology. Qualitative research is considered appropriate because it enables the researcher to examine and interpret the meanings, cultural values, and semantic implications embedded in the language of the Igue Festival in Ika Land. The methodology allows the researcher to collect data through observation, interviews, on festival performances, thereby revealing how language reflects the worldview, beliefs, customs, and identity of the Ika people.

Research Design

The study adopts a descriptive research design. This is appropriate because it seeks to describe and explain the features and cultural meanings of the language used during the Igue Festival. This approach enables the researcher to study language within its social and cultural environment by observing participants, documenting verbal expressions, and interpreting the meanings attached to them by members of the Ika community. This design is suitable because it provides an authentic understanding of the relationship between language, culture, and communication during the festival.

Area of the Study

The study is conducted in Ika Land, Delta State, Nigeria, comprising Ika North-East Local Government Area with its headquarters at Boji-Boji Owa and Ika South Local Government Area with its headquarters at Agbor. The area is predominantly inhabited by the Ika people, who speak the Ika dialect and celebrate the Igue Festival as one of their major traditional festivals. The festival serves important religious, cultural, and social functions and provides a rich source of

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linguistic expressions, ritual speeches, chants, songs, greetings, blessings, and prayers that are suitable for semantic and cultural analysis.

Sources of Data

The study relies on both primary and secondary sources of data. Primary data are obtained directly from the field through participants' observation during the Igue Festival. Oral interviews with traditional rulers, chiefs, elders, priests, festival organizers, performers, and knowledgeable members of the Ika community. Such Chiefs like:

Chief Promise Ehiobu (Ihaza of Owa Kingdom)
Chief I. I. Erigbuem (Konyerinieze)
Chief I .S. Agidi (Oduri)
Chief Ifeanyi M. Anuonuihia (Ekpetin of Owa Kingdom)
Chief E. C. Nwaebo (Akpara)

Furthermore, field notes of festival speeches, prayers, chants, songs, greetings, proverbs, blessings, and ritual expressions. Secondary data are obtained from books on semantics, linguistics, culture, and African festivals as well as scholarly journals, dissertations, thesis, conference papers, and research reports. Also, relevant archival materials and credible online academic resources relating to the Igue Festival, Ika language, and semantic studies were used.

Method of Data Analysis

The data collected for this study are analyzed using qualitative semantic content analysis. The Igue festival expressions are transcribed in the Ika language and translated into English where necessary. The researcher identifies some key lexical items, idiomatic expressions, proverbs, chants, prayers, greetings, and ritual utterances and groups them according to their semantic and cultural functions. These expressions are examined to determine their literal meaning, contextual meaning, symbolic significance, and cultural implication. The analysis is guided by the objectives of the study and interpreted using the adopted theoretical framework to demonstrate how language communicates cultural beliefs, values, traditions, identity, and social relationships during the Igue Festival in Ika Land.

Semantic Analysis of the Language of the Igue Festival

The Igue festival is a characteristic effect of the Ika culture. The use of language according to Saphir-Whoorfian in his hypothesis sharpens the actions and thoughts of individuals as relates to the Igue festival.

These languages used during the Igue Festival is part of the activities marking the Igue festival celebration. They include the following:

1) iken-ọdin
2) ilụ-ụbiri (Ụbirio, Rio-Rio (2x)
3) Ụlọrọ pu obodo
4) Ẹnwẹrẹ-Ẹnwẹrẹ gbe ọhịọ-hịọ
5) Ẹnyị bia re ri gbama wọi-wọi
6) nyem ọkpu-kpu itahọdu

a) Iken-ọdin**:** This is the dressing of people with palm fronts all around them. These palm fronts are used as clothes round the body/waist. Some build a mini house with the palm front, enter into it and carry it alone waling in the streets from quarter to quarter. It can only accommodate one person at a time meaning no accommodation for evil doers by semantic implications. At the end, all these will be thrown into the evil forest.

b) Ilụ-ụbiri: This is the use of specially carved palm branches to hit the ground continually while they chant the song "Ubi-rio, rio, rio". This is done round about houses, the streets and the whole environment. It continues until the whole community is covered. It is majorly done by the youths.It is assumed that as this is done, problems, troubles, sickness and diseases hiding anywhere has been killed.

Ubirio - Troubles, problems, evils
Rio-Rio - Good bye, come and die

This action semantically means the end of troubles, problems and the enemies in our land.

c) **"Ụloro-Pu Obodo"**

Ụloro --Trouble

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Pu -- leave

Obodo -- Our land (Trouble leave our land): It's a major Igue festival chant song it calls trouble to give way in the land. This is centrally done almost by all during the festival. The song call for any form of trouble associated with the land to leave and give way to peace. As this is done, various incantations, rituals, cultural demonstrations will follow e.g. splashing of white chalk soaked in water (Odon). This signifies the use of songs to cleanse the land from evil by semantic implication.

d) **Ẹnwẹrẹ-Ẹnwẹrẹ gbe ọhiọ-hiọ:** This is a Benin language meaning "Enwere has killed **Ohio-hio".**

"Enwere - A name of a person;

"Gbe – Killed

"Ohio-hio - Something big

After they dumped the materials for the celebration at the cemetery, the Ibi-Ewere leaves are distributed as they return back home in dances. Some of these leaves are placed on their forehead signifying joyful mood and the successful elimination of that big thing (animal) that has no name which has been troubling the land. It semantically means the success of the celebration generally heralding the successful elimination of the enemy and the peaceful coming of the New Year. It's a dance of joy!

e). Ẹnyị bia re ri gbama wọi-wọi" -

Ẹnyị -- We

bia -- Came

re ri -- To eat

gbama --Together

wọi-wọ -- Sumptuously

"We have come to enjoy ourselves": This is another festival song that comes up after the celebration as people return to their houses for merriment and reception of friends and visitors. They sing because of the death of their enemies and struggles in the just concluded year. It's like a survival party from the ills they have passed through from the wicked ones during the outgoing year with the hope of a coming year of good health, peace, good luck, new children and all round progress.

J) nyem ọkpu-kpu itahọdu

nyem -- Give me

ọkpu-kpu --The bones

itahọdu --You remained

"Give me the left over': This is another festival song to mark the final Igue festival celebrations. After the activities in the day, at night, people dressed like spirits not meant to be seen will move round houses in every quarter to collect the left-over of the food that was eaten in the day during the celebration proper. This is thrown to the people through the doors or windows as they are not to be seen.

This by implication semantically signifies the fact that the celebration of the Igue festivals has the ancestors and our forefathers in participation as it is assumed they are the once collecting these left-over as a form of participation since they can't be seen with the naked eyes.

The Language of the Igue Festival

The language of the Igue Festival can be interpreted and seen thus from the English perspective to cut across the following:

1. Ritual prayers and invocations
2. Traditional greetings
3. Royal pronouncements
4. Blessings
5. Proverbs
6. Songs
7. Praise chants
8. Libations

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9. Symbolic expressions

Many of these expressions are performed in the Ika dialect and possess meanings that cannot be fully understood through literal translation.

Semantic Implications

1. Purification: Many ritual expressions signify cleansing from evil, misfortune, and spiritual impurity. Although the words may literally refer to washing or removing dirt but semantically they symbolize spiritual renewal and cleansing.
2. Prosperity: Blessings pronounced during the festival invoke wealth, abundant harvests, successful businesses, good health, and progress for the coming year.
3. Fertility: Expressions directed toward families often symbolize fruitfulness, healthy children, and agricultural abundance.
4. Protection: Invocations request divine and ancestral protection against enemies, diseases, accidents, and evil spirits in the coming year.
5. Unity: Communal greetings and collective chants express solidarity and reinforce the communal nature of Ika society.
6. Respect and Authority: Special honorific expressions directed to traditional rulers and elders communicate respect, legitimacy, and social hierarchy.
7. Continuity: References to ancestors emphasize the continuity of tradition across generations and affirm the relationship between the living and the departed.

Cultural Implications

Preservation of Cultural Identity

The language preserves indigenous vocabulary, expressions, and oral traditions unique to the Ika people.

Transmission of Indigenous Knowledge

Proverbs, chants, and ritual utterances educate younger generations about customs, history, morality, and acceptable social behavior.

Religious Beliefs

The language reflects the coexistence of belief in God, ancestral reverence, and traditional spirituality.

Social Cohesion

Shared participation in festival songs and prayers strengthens community bonds and collective identity.

Political Legitimacy

Royal speeches and ceremonial greetings reinforce the authority of traditional institutions.

Moral Instruction

Many proverbs and songs promote virtues such as honesty, hard work, respect for elders, peace, and communal responsibility.

Linguistic Preservation

The festival provides a platform for the continued use of the Ika dialect, helping to preserve it amid increasing influence from English and other dominant languages.

Summary of the Cultural and Semantic Implications:

The language of the Igue Festival conveys meanings beyond their literal interpretations. Semantically, the expressions symbolize purification, blessing, prosperity, fertility, protection, peace, continuity, and communal solidarity. Many ritual utterances are performative, meaning that speaking them performs actions such as blessing, invoking protection, or declaring communal renewal.The language used during the Igue Festival reflects and preserves the cultural heritage of Ika Land. It reinforces traditional authority, transmits indigenous knowledge, strengthens communal unity, preserves oral traditions, promotes moral values, and ensures continuity between generations. Through ritual language, the festival serves as an important medium for safeguarding the culture of the people.

Findings

The outcome of this research "Cultural and Semantic Implications of the Language of the Igue Festival in Ika land" shows that language has been employed to showcase the culture of the Ika land through the Igue festival. From the language use, the culture of the people has been mirrored. Past ills and happenings of the evil ones has been x-rayed as well as cleansing

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the land with the use of language. It was also noticed that there was the use of language to usher in the coming year which signifies peace, health, progress, etc. Such language use as 'Ẹnwẹrẹ-Ẹnwẹrẹ gbe ọhiọ-hiọ.' The fact that the Igue festival is a community based celebration where the land is cleansed and made ready for the good tidings of the upcoming year at the end of every year was not left out. The participation of the whole community, their leaders, especially traditional heads was also seen as everyone turned out enmass to see to the end of their enemies in the land with a strong traditional backings. It was discovered also that, like in most African festivities, Igue festival revolves around a programme of music, dance and other activities which is a way of preserving and reviving the cultural heritage of Ika land. It is one of the most ancient and cherished festivals of the people of Ika land. The language of the Igue Festival is highly symbolic. The study shows that many expressions used during the festival have meanings that go beyond their literal interpretation. These meanings are understood only within the cultural and ritual context of the Ika people. Festival language reflects the cultural identity of the Ika people. The research reveal that the language used during the festival reinforces the history, customs, beliefs, worldview, and collective identity of the Ika community as the meanings of many festival expressions are context-dependent. The study shows that semantic interpretation depends on the speaker, audience, occasion, ritual performance, and shared cultural knowledge rather than on dictionary meanings alone.

The language serves important social and religious functions. It was clearly seen that festival expressions are used to invoke blessings, offer prayers, confer titles, promote peace, settle disputes, honour ancestors, and strengthen communal unity. Oral literary devices are widely employed throughout the research. The study employed frequent use of proverbs, idioms, metaphors, symbolism, repetition, praise names, chants, and ritual formulae, all of which enrich meaning and enhance cultural communication. It was discovered that there is a strong relationship between language and culture supporting the view that language is a repository of culture and that the meanings of Igue Festival expressions cannot be fully understood without knowledge of Ika cultural practices. Also, it was noticed that the festival language promotes moral values and social cohesion as can be seen that many expressions encourage respect for elders, honesty, unity, hard work, peace, and communal responsibility. Following the fact that traditional custodians possess deeper semantic knowledge than younger participants. The study fills a gap in linguistic scholarship. The research has established that there is limited documented work on the semantics of the Igue Festival language in Ika Land, making the study a valuable contribution to indigenous language documentation and semantic research.

Conclusion

This paper has shown that language and culture cannot be separated. Festivals on the other hand cannot be separated from the culture of any community. Igue festival is a great unifying symbol for peace, unity and progress of the people of Ika in the New Year. It is the belief of the people's attitude to life that makes the festival to attract many admirers from both home and abroad. During this festival, cultural ties are renewed with friends, relations and well wishers from neighbouring villages. It also provides a unique opportunity for the exhibition of traditional dances by groups, especially in the teaching of the "IIu Ubiri" dance steps to the entire community. It also offers the local people the wonderful opportunity of exhibiting their rich cultural heritage in art and craft, for which they are noted. Through festivals, the people of Ika remember their past leaders and ask for their help and protection. Another social importance of Igue festival to the people of Ika is that it gives expression to the people's happiness or otherwise. Hence at the celebration of the festival, nobody is expected to die but if it happens, the deceased is then classified as an evil doer and his burial is accompanied with diabolical performances without honour. Also worthy of note is, the musical organization where everybody is involved irrespective of their ages. Fighting during the festive period is highly prohibited and any form of immorality is forbidden, as such offenders are taken to the Obi's palace and are made to serve as his servants as a form of punishment. The instruments and materials for dressing, add colour to the cultural values of the people of Ika as a whole. The festival manifestations fulfill the function of social and moral control, as well as provide entertainment and diversion because of its traditional and cultural beliefs, ideologies and material subject and the people way of life is embedded inside it. Furthermore, it has shown, for example that in Ika land, the celebration of the Igue festival marks the end of a successful year which directly or indirectly might have been characterized by so many ill-fated happenings. The ushering of another year of peace, and prosperity with high hopes to the people that the coming year will be full of all round goodness.

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Recommendations:

1) Traditional rulers, festival organizers, and community elders should document the language, chants, proverbs, prayers, and symbolic expressions used during the Igue Festival to prevent their extinction and preserve them for future generations.
2) Linguists and cultural scholars should carry out further studies on other traditional festivals in Ika Land and neighbouring communities to expand knowledge on indigenous festival discourse and semantics.
3) Educational institutions should incorporate aspects of Ika language and cultural festivals into language and cultural studies curricula to promote indigenous language preservation.
4) Government agencies and cultural organizations should support the documentation, digitization, and publication of Ika oral traditions, particularly the linguistic expressions associated with the Igue Festival.
5) Younger generations of the Ika community should be encouraged to participate actively in the festival to ensure the intergenerational transmission of its language and cultural values.
6) Researchers should adopt interdisciplinary approaches that combine semantics, pragmatics, ethnography, and sociolinguistics in studying indigenous festival language.

Contributions to Knowledge:

1. This study provides one of the few comprehensive semantic analyses of the language used during the Igue Festival in Ika Land.
2. Furthermore, it demonstrates how linguistic expressions used during the festival communicate cultural beliefs, traditional values, identity, authority, and social relationships.
3. It also enriches existing literature on African indigenous languages by documenting previously under-researched Ika festival expressions.
4. It further bridges the gap between semantics and cultural studies by showing that meaning in festival language extends beyond literal interpretation to include symbolic, contextual, and cultural meanings.
5. The study will serve as a valuable reference for scholars in linguistics, semantics, anthropology, cultural studies, folklore, and African language research.
6. Finally, the documented festival expressions will be a resource for future studies on the Ika language and oral traditions.

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Qualitative Assessment of Test and Non-Test Techniques of Appraisal in Guidance and Counselling

UMAR, Awaisu[1]
awaisukumar@gmail.com
08036350029

LAWAN, Mujtaba[1]
mujkurawa2@gmail.com
08061643371

ISMA'IL, Yakubu Ibrahim[1]
08066863561

[1]Department of Educational Foundations, Faculty of Education, Northwest University, Kano State, Nigeria

Abstract

This paper examines the application of test and non-test techniques of appraisal in Guidance and Counselling practice. Appraisal is an essential component of the counselling process because it enables counsellors to obtain systematic information about clients' abilities, interests, personality characteristics, attitudes, academic performance, and behavioural patterns. The paper reviews the concepts, types, purposes, and applications of both test and non-test appraisal techniques in Educational and Counselling settings. Test techniques discussed include intelligence tests, aptitude tests, achievement tests, personality tests, and interest inventories, while non-test techniques include interviews, observation, case studies, rating scales, checklists, autobiographical records, sociometric techniques, and cumulative records. The review highlights how these techniques assist counsellors in understanding clients, identifying individual differences, making educational and vocational decisions, diagnosing learning and behavioural difficulties, planning appropriate interventions, and evaluating counselling outcomes. It also emphasized that neither approach should be used in isolation. Effective appraisal requires appropriate selection, administration, interpretation, and integration of information from multiple sources while observing ethical principles such as confidentiality, informed consent, fairness, and professional competence. The paper concludes that the effective application of both test and non-test techniques enhances the accuracy and quality of counselling decisions and promotes individualized guidance services. It recommends continuous professional development for counsellors in appraisal procedures and the appropriate use and interpretation of assessment information.

Keywords: Appraisal, Guidance and Counselling, Test Techniques, Non-Test Techniques, Psychological Assessment, Counsellor

Introduction

Counselling is a professional helping process concerned with assisting individuals to understand themselves, their circumstances, and the challenges they encounter in their personal, educational, social, and vocational lives (Adu, 2022). An important component of effective counselling is the systematic collection and interpretation of information about the client. This process is commonly referred to as appraisal or assessment. Popoola and Oluwatosin (2018) explained that, through appraisal, the counsellor obtains information that can contribute to understanding a client's characteristics, needs, strengths, difficulties, interests, abilities, and circumstances. Consequently, appraisal provides an important foundation for identifying counselling needs, establishing appropriate goals, selecting interventions, and evaluating progress. The importance of assessment and appraisal in counselling has continued to receive attention in contemporary counselling scholarship. Cade and Lenz (2024) observed that assessment, appraisal, testing, and related practices have become increasingly represented within the scope of professional counselling and counselor education. Appraisal in counselling involves more than administering psychological tests. It encompasses a range of procedures through which information is obtained from clients and other relevant sources. These procedures can broadly be classified into test and non-test techniques. Test techniques involve structured instruments designed to measure particular characteristics or behaviours, while non-test techniques involve methods such as interviews, observation, questionnaires, case studies, rating scales, sociometry, autobiographies, and the examination of relevant records. The use of these different approaches allows

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counsellors to obtain information from multiple perspectives and may provide a more comprehensive understanding of the individual. Gantt-Howrey et al. (2024), in a study of social determinants of mental health assessment in counselling, found that assessment frequently occurred verbally and that the assessment of clients' social and economic circumstances was associated with client satisfaction. The study also identified potential differences and biases in assessment practices, demonstrating the need for counsellors to consider contextual factors when gathering and interpreting information.

Appraisal in Guidance and Counselling

Appraisal counselling is a counselling service involves a counsellor collecting, analyzing and using a variety of objective data that can enhance better understanding of the client. A counsellor without adequate and reliable information of a client will have difficulties in assisting him/her. It is therefore important to collect and make available a variety of information through observation, interview, testing, history, and social adjustment data about each client so that they can be in a position to plan satisfying educational, vocational and social programme (Marandu, 2018). Also, Marandu (2018) explained that, appraisal involves the collection, administration, interpretation and clinical usage of variety of test devices in order to provide effective counseling services to students. Data collection instruments and methods are considered for by the school counsellor for school testing programs, for both individuals and groups.

Appraisal is a systematic process through which a counsellor gathers, organizes, analyses, and interprets information about a client for the purpose of understanding the client's characteristics, needs, strengths, difficulties, and circumstances. In counselling, appraisal provides information that assists the counsellor in identifying problems, establishing counselling goals, planning appropriate interventions, making educational or vocational decisions, and monitoring progress. Appraisal is broader than psychological testing because it includes several methods of obtaining information. The American Psychological Association (APA) (2020) describes assessment methods as encompassing the different ways information can be obtained, while the term test generally refers to instruments involving standardized administration, scoring, and interpretation (APA, 2020). Consequently, appraisal may involve standardized tests as well as interviews, observations, questionnaires, records, and information obtained from significant others. An appraisal/assessment service which is designed to collect, analyses and use a variety of data for the purpose of better understanding the students. This will also assist them to understand themselves. It involves the use and interpretation of psychological and educational standardized tests and measurement. Recent literature continues to emphasize the importance of assessment and appraisal within professional counselling. Cade and Lenz (2024) reported that assessment, appraisal, and testing have become increasingly represented within the professional scope and educational requirements of counsellors, although regulations concerning particular assessments and tests continue to vary. Appraisal is therefore an important part of the counselling process because effective counselling decisions depend partly on the quality and relevance of information available to the counsellor (Marandu, 2018).

Skills Required for Effective Appraisal in Guidance and Counselling

Appraisal involves competencies in selecting, administering, and interpreting clients' intelligence, aptitude, achievement, interest, and personality instruments. It also examines current research involving assessment relative to educational, social, and industrial settings. The counsellor for effective students' appraisal program they required the following basic skills (Altine & Bilyaminu, 2021):

1. School counsellors need to know basic descriptive statistics and their application to psychological tests and measures.
2. School counsellors should be able to determine if a measure is valid and reliable.
3. School counsellors need to be able to recognize the types of available assessment tools (e.g., instruments, observations, interviews, focus groups), what they measure, and how they can be applied to various school and college settings.
4. School counsellors should be able to develop the skills to administer, interpret, and formally report the results of assessments within their scope of training and qualification.
5. School counsellors should be able to design an outcomes assessment within a school or college student affairs setting.

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6. School counsellors should be able to identify the ethical and legal issues involved in creating, administering, and interpreting assessment tools.
7. They should be able to develop skills of analysis, synthesis, and communication (verbal and written) concerning issues and ideas relevant to appraisal techniques

Test and Non-Test Techniques of Appraisal in Guidance and Counselling

Counsellors use tests and non-test techniques of appraisal generally for assessment, placements, guidance and appraisals to as assist clients to increase their self-knowledge, practice decision making, and acquire new behaviors. They may be used in a variety of therapies e.g. individual, marital, group, and family and for either gathering of data on clients, assessing the level of some traits, such as stress and anxiety, or measuring clients' personality types (Sandra, Nurfarhanah, & Ardi, 2025).

Test Techniques of Appraisal in Guidance and Counselling

Test is one of the Appraisal techniques in Guidance and Counselling Program especially in school situation whereby a counsellor may present some questions or any stimuli and assess students' response or performance. The score of the test may be use as data for many Guidance and Counselling purposes. Test technique of appraisal sometimes known as Psychological Testing. Test techniques refer to systematic assessment procedures designed to obtain information about particular characteristics, abilities, behaviours, interests, or psychological attributes of individuals. Tests generally involve standardized administration, scoring, and interpretation. They may be interpreted using norms or predetermined criteria depending on the purpose of the assessment (Sandra, Nurfarhanah, & Ardi, 2025). The use of tests in Guidance and Counselling enables counsellors to obtain structured information that may complement information obtained through interviews and other non-test methods. The Standards for Educational and Psychological Testing emphasize that test use should be supported by appropriate evidence concerning validity, reliability, fairness, and the suitability of interpretations for the intended purpose and population (AERA, APA, & NCME, 2014). This involves development of validation and reliable assessment of many psychological constructs such as intelligence, aptitude, achievement, attitude and interest. Test is a method or procedures for measuring a persons' ability, knowledge and performance in a given area. Tests yield scores that mirror attributes or characteristics of individuals. A test is an instrument or systematic procedure for measuring a sample of behavior (Marandu, 2018). Psychological tests are defined as standardized, repeatable procedures used to elicit and measure samples of human behavior and it involves measurement procedures for coding, scoring, or quantifying the behavior that is elicited so that it can be compared with normative data systematically collected on similar samples (Sandra, Nurfarhanah, & Ardi, 2025).

Characteristics of Standardized Test used for Test Appraisal

The following are common characteristics of standardize test used for Test Appraisal in Counselling (Sandra, Nurfarhanah, & Ardi, 2025):

1. Standardize Psychological tests are developed by experts in educational Test and measurement and professional counsellors.
2. They measure objectives common to many individuals at different locality, state, country, or sub-region.
3. Cover wide subject matter content such as one whole human psychological construct or a number of them.
4. They meant to be used over a wide geographical area such as a state, country, or sub-continent.
5. They have items that are of known and high quality.
6. Their items are carefully written and trial-tested.
7. They have higher validity and reliability content.
8. They have a set of uniform or standard procedure for administration and scoring, they are usually accompanied by a test manual.
9. They are accompanied by norms which provide the basis for interpreting the psychological construct of different groups of individuals in the test.

Standardized tests may be used for a wide variety of counselling purposes. For example, educational, personal, social, marital, vocational etc.

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Types of Test Techniques of Appraisal in Guidance and Counselling

The following are a few representative examples of the most common forms of standardized test:

1. **Aptitude Tests:** Aptitude Tests are those that measure functions that improve little with practice, examples musical aptitude, artistic aptitude, e.t.c. Aptitude test is a proficiency test that measures ability to perform some task significant in its right; it is intended to predict success in some occupation or course of training. Aptitude tests attempt to predict a student's ability to succeed in an intellectual or physical endeavour by, for example, evaluating mathematical ability, language proficiency, abstract reasoning, motor coordination, or musical talent. Aptitude tests are "forward-looking" in that they typically attempt to forecast or predict how well students will do in a future educational or career setting. There are many types of aptitude tests such as engineering aptitude, musical aptitude, reading aptitude, clerical aptitude, spatial aptitude, and numerical aptitude. An example of aptitude test commonly used for school educational and vocational counselling programmes is the Differential Aptitude Tests (DAT).
2. **Achievement Tests:** Achievement tests measure knowledge or skills that an individual has acquired through education or training. In school counselling, achievement information can help identify academic strengths, learning difficulties, and areas requiring additional educational support. Achievement tests are those designed specifically to measure the degree of accomplishment in some particular educational experiences. Examples: Geography test, History test, or English test, e.t.c. Achievement Test are defined as tests designed to evaluate how much learning has taken place under a given period. Teachers have the responsibility of assessing how much learning or change in behaviour that has occurred as a result of their instructional programme. This will certainly help teachers to determine their instructional effectiveness. A difference characteristic between achievement test and scholastic test, such as aptitude and personality test is that whereas aptitude tests, test for natural endowments, achievement test, test the outcome of instruction. Aptitude tests are designed to estimate an individual's potential to learn or perform particular types of tasks. They may be used in educational and vocational counselling to provide information relevant to academic programmes, occupational choices, or areas in which an individual may demonstrate potential. Also, aptitude tests are generally standardized test while achievement tests are usually teacher-made tests. Achievement tests are not concerned with affective domain and it focuses more on cognitive domain than on psychomotor domain. An example of published achievement test is: Stanford Achievement Test. It measures areas like reading, mathematics, language, science, social studies, work-study skills, etc.
3. **Intelligence Tests:** Intelligence Tests is a test of general mental ability referred to as scholastic aptitude test, since intelligence tests sample abstract reasoning or ability to understand ideas and the relationship among them. Intelligence tests are designed to assess selected aspects of cognitive functioning, such as reasoning, problem-solving, verbal comprehension, and processing abilities. In counselling, information from appropriately selected cognitive assessments may contribute to educational planning and understanding an individual's learning-related strengths and difficulties. However, intelligence test results should not be interpreted in isolation. Their meaning depends on the purpose of the assessment, characteristics of the individual, and evidence supporting the interpretation of scores. The areas for measuring intelligence include: verbal ability, reading ability, and retentive memory. An example of published intelligence test is: ***Test of cognitive skills.*** It measures areas like sequences, analogies, memory, verbal reasoning, etc.
4. **Personality Tests:** Personality assessments are used to obtain information about characteristics and patterns of behaviour, attitudes, and emotional or interpersonal functioning. Depending on the assessment purpose, personality measures may be useful in understanding aspects of adjustment, interpersonal relationships, and individual differences. Counsellors should exercise particular care when interpreting personality assessment results because conclusions should be based on appropriate evidence and should take the individual's cultural and contextual circumstances into account.
5. **Interest Inventories:** Interest inventories are designed to identify individuals' preferences for particular activities, subjects, occupations, or areas of work. They are especially relevant to career counselling because they can help clients explore educational and occupational possibilities that correspond with their interests.

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6. **Attitude and Other Psychological Measures:** Counsellors may also use scales and inventories to assess attitudes, values, self-concept, motivation, or other constructs relevant to a particular counselling question. Such instruments should only be selected when they are appropriate for the purpose and when evidence supports their intended interpretation. Sample of Standardized Test for Appraisal in Guidance and Counselling involves: Achenbach System of Empirically Based Assessment, Asperger Syndrome Diagnostic Scale, Behavior Assessment System for Children (BASC), Beck Youth Inventories, Behavior Rating Inventory of Executive Function (BRIEF), Career Assessment Inventory, Delis-Kaplan Executive Function System, Interest Determination, Exploration & Assessment System etc.

Non- Test Techniques of Appraisal in Guidance and Counselling

Non-testing techniques in Guidance and Counselling refer to those techniques which do not involve a test (Sandra, Nurfarhanah, & Ardi, 2025). Therefore, many tests like aptitude test, achievement test, interest inventory, and personality tests are not part of it. Non-testing techniques are also called as non-standardized techniques. Furthermore, these techniques have common usage for individual analysis by counsellors. Also, the employment of these setting is in various settings. Non-testing techniques in guidance provide a broader and much more subjective approach to data gathering and interpretation. Non-test instruments are testing instruments in addition to learning achievement tests. Assessment tools that can be used include observation or observation sheets (such as diaries, portfolios, life skills), attitude test instruments, interests, interview techniques, questionnaires, sociometry, case studies, and so on (Sandra, Nurfarhanah, & Ardi, 2025). Non-test techniques are systematic methods of collecting information about clients without relying primarily on standardized tests. They provide information about an individual's experiences, behaviour, relationships, perceptions, environment, and circumstances. Non-test techniques are particularly useful because some important aspects of a client's situation may not be adequately represented by test scores. A recent review by Sandra, Nurfarhanah, and Ardi (2025) found that combining test and non-test instruments can contribute to a more comprehensive understanding of students' needs, potential, and problems, although practical and methodological challenges remain.

Types of Non-Test Techniques of Appraisal in Guidance and Counselling

The various types of non-testing techniques are the questionnaire, observation, autobiography, anecdotal record, case study, cumulative record, interviews, and checklist. However, the most important among them are the case study, interview, and checklist (Sandra, Nurfarhanah, & Ardi, 2025). The following are types of test use in Guidance and Counselling appraisal services (Gantt-Howrey, et al., 2024; Sandra, Nurfarhanah, & Ardi, 2025):

1. **Sociometric Test: -** As one of the appraisal counselling technique is designed for gathering information on the internal social structure of a group. It is useful for studying the individual's position in the group. Sociometric and related techniques help to sensitize counsellors to interpersonal and inter-group difficulties among students. A Sociometric test can be presented in sociogram, social distance scale and quest who, i.e. questionnaire. Sociometry is a technique used to examine patterns of interpersonal relationships within a group. In educational settings, it may provide information concerning peer relationships, social preferences, group acceptance, and interpersonal patterns. Such information can assist counsellors in identifying students who may require support with social adjustment or interpersonal relationships.
2. **Observation: -** Observation as one of the appraisal counselling technique refers to watching systematically somebody or something like situations or environment with a purpose of eliciting data, i.e. Information for decision making. This technique can be used successfully in several situations or environment like in the school setting, places of work, at home or where people socialise together. The observer records should include observed behaviour, sequence intensity and frequencies. The types of observation include: Naturalistic Observation, Structured Observation, Anecdotal Record, Rating Scales. Observation involves systematically watching and recording relevant aspects of an individual's behaviour. In school counselling, for example, a counsellor may observe classroom participation, peer interaction, communication, or behavioural responses. Observation can provide information about actual behaviour in particular contexts. Nevertheless, counsellors should recognize that the presence of an observer and the interpretation of behaviour can introduce potential sources of error.
3. **Questionnaire: -** Another technique of appraisal technique in counselling is questionnaire. It involves asking a carefully selected group of people a set of clearly defined and predetermined questions listed in black and white or through e-mail. It is used to collect assessment information that mainly concern with affective attributes. The

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questionnaire can be administered on individuals or a large group of people distributed over a wider range of places. For instance, a counsellor may administer questionnaire to students in order to measure their personality disorders, mental issues or behaviour problems or some effect concerning teaching and learning process. Results of the questionnaire may be distorted if respondents use response set, are reluctant to admit to certain feelings, beliefs, or behaviour. A questionnaire consists of a set of written questions through which information is obtained from respondents. Questionnaires may be used to obtain information concerning students' interests, attitudes, experiences, needs, perceptions, or concerns. Questionnaires are relatively efficient for collecting information from larger groups, but their usefulness depends on the quality of the questions and the honesty and understanding of respondents.

4. Interview: - An interview is being defined as a purposeful conversation between a school counsellor and clients like teachers, administrators, students, parents, or community members. It is designed to find out particular information about method of teaching, situation of learning, learners satisfaction. Useful results often emanate only from the interviewers who are warm, interested to admit their feelings, beliefs, perception, or behaviour. Interview may be face to face, by phone, television, or radio programme, or via internet. During interviews, both verbal and non-verbal forms of communication of the interviewee can be noted. An interview is a conversation with a purpose. The purposes for which interviews take place are fact-finding, introductory, evaluative, and informative in nature. Here an interviewer asks a set of questions to an interviewee to find out the responses. The interview is a purposeful interaction between the counsellor and client through which information is obtained through questioning, listening, clarification, and discussion. Interviews may be structured, semi-structured, or relatively unstructured. Interviews are valuable because they allow counsellors to explore the client's experiences, perceptions, concerns, goals, and circumstances in greater depth. They can also provide contextual information that may not be captured by standardized instruments.

Checklist: The checklist technique is also a non-testing technique in guidance. The checklist technique involves a series of statements. Furthermore, these statements are positive and negative, that the evaluator answers yes or no. This technique checks if the evaluator shows that behaviour or leaves it unchecked. The checklist system includes statements about the habits in the workplace and the skills of individuals. Workplace habits for individuals may include:

a) Reports for work on time on most days.
b) Exhibits a pleasant behaviour towards the colleagues.
c) Stays at work until important tasks are completed.
d) Tends to take criticisms quite personally.

Hence, the first three statements are positive attributes. However, the fourth statement is a negative attribute.

1. **Case Study:** A case study refers to a collection of all available information. Furthermore, this information could be social, physiological, biographical, vocational, and environmental. Moreover, this collection of information is with the aim of explaining a single individual. Most noteworthy, the case study is a comprehensive collection of information. Also, this collection of information takes place through the use of different techniques and tools of data collection. It is certainly the best technique of studying the whole individual.

   A case study involves the systematic collection and organization of detailed information about an individual. Information may be obtained from interviews, observations, educational records, questionnaires, and other appropriate sources. The case study approach is useful when the counsellor needs a broad understanding of the client's background and circumstances rather than information about a single characteristic.

   Below are the variables whose collection must be made in the case study (Gantt-Howrey, et al., 2024):

a) **The physical, socio-economic and cultural environment-** First of all, the physical environment includes the neighborhood and surroundings in which an individual lives. The socio-economic environment consists of the society in which the person grows up and the economic condition. Finally, the cultural environment refers to the ideas, views, and behaviour of those among whom one lives.
b) **Family-** Collection of detailed and diverse information regarding one's family must take place. This certainly helps in understanding the characteristics of the individual under study. There must be a collection of information regarding the educational and occupational status of family members. Others questions regarding the love, harmony, understanding, conflict among family members find their place in the case study.

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c) **Personal history**- There must be a collection of information regarding the personal history of the individual under study. This information is history of an individual's physical health, abilities, social development, and attitude.

Also, in preparing a case study the information is collected from the following sources:

(1) Preliminary Information: Name, age, sex, parent's age, education, occupation, income, number of children, social status

2) Past History: Condition of mother during pregnancy, any incident, child's development after birth, physical, mental, emotional, social- illness, relation between parents and other members of the family, achievement of the child, parents' death, birth order etc.

(3) Present Condition: The information may be collected under the following heads:

(i) Physical: Results of medical examination of any diseases.

(ii) Medical: I.Q., special abilities, general intelligence

(iii) Social: House environment, friends and their types, social environment in school, home and neighbourhood.

(iv) Emotional: Anxiety, fear, temperament, attitude etc.

(v) Interest: Personal, social, vocational and special aptitude.

(vi) School Achievement: Position in school, failure, special achievement etc.

Application of Non- Test Techniques of Appraisal in Guidance and Counselling

The purpose of non-tests techniques of appraisal is to stimulate further or more in-depth interaction with the client (Sandra, Nurfarhanah, & Ardi, 2025). Non-directive Counselling approach was attributed to Carl Rogers, this technique was designed to allow the individual in emotional turmoil to talk out problems and resolved difficulties with a minimum of direction being provided by the person serving as counsellor. Rogers believed that everyone has the motivation and ability to change in order to become a better, more "self-actualized" person (Gantt-Howrey, et al., 2024).

Application of Non-Test Techniques of Appraisal in Client-Centred Counselling Approach

The client-centred counselling approach, developed from the work of Carl Rogers, places the client at the centre of the counselling process. The approach emphasizes the client's subjective experience, capacity for self-direction, and active participation in the counselling relationship. Contemporary scholarship continues to describe person-centred counselling as an important approach within counselling and psychotherapy, while also emphasizing that it should not be reduced to a simplistic or purely non-directive model (Cornelius-White, 2025). Within this approach, appraisal is particularly concerned with understanding the client as a whole person rather than simply assigning scores or labels. Consequently, non-test techniques such as interviews, observation, self-report, case studies, and autobiographical information can be particularly useful because they allow the counsellor to understand the client's perceptions, experiences, feelings, relationships, and personal circumstances. The following non-test techniques of appraisal could be applied in client-centred counselling approach as (Osumah, Ehigbor, & Osemeikhian, 2024):

1. **Application of the Interview:** The interview is one of the most important non-test techniques applicable to client-centred counselling. It provides an opportunity for the counsellor and client to engage in purposeful dialogue through which the client can describe concerns in his or her own words. Rather than approaching the client primarily as an object of measurement, the counsellor uses the interview to understand the client's subjective frame of reference. In client-centred counselling, the interview should be conducted in a manner that encourages openness and self-exploration.
2. **Application of Observation:** The counsellor may observe changes in tone of voice, facial expression, pauses, level of engagement, emotional expression, and patterns of interaction. Such observations should not automatically be treated as definitive evidence of a particular psychological condition. Instead, they can be used as prompts for gentle exploration with the client.
3. **Application of Case Study:** The case study technique involves collecting information about a client from several relevant sources and organizing it to develop a comprehensive understanding of the client's circumstances. In client-centred counselling, case-study information can include the client's personal history, educational experiences, relationships, significant life events, current concerns, strengths, and coping experiences.
4. **Application of Questionnaire and Self-Report Techniques:** Questionnaires and other self-report methods can be used to obtain information about clients' perceptions, experiences, interests, concerns, and goals. In a client-centred

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approach, self-report information can be particularly valuable because the client's own understanding of the problem is an important source of counselling information.

5. **Application of Autobiography:** An autobiography allows a client to provide a personal account of significant experiences, relationships, achievements, difficulties, aspirations, and turning points. It can be especially useful in client-centred counselling because it gives the client an opportunity to decide which experiences are meaningful and how those experiences should be described.
6. **Application of Rating Scales:** Rating scales can be used as non-test appraisal tools to obtain information about the client's perceptions of particular experiences or behaviours. For example, a client may rate the intensity of a concern, level of satisfaction with an aspect of life, perceived confidence, or progress toward a personally identified goal.
7. **Application of Sociometric Techniques:** Sociometric techniques can be used, particularly in educational counselling, to understand patterns of interpersonal relationships within a group. They may provide information concerning peer relationships, social preferences, group participation, and perceived acceptance.
8. **Application of Anecdotal Records:** Anecdotal records consist of brief descriptions of significant behaviours or events. In school counselling, they may be prepared by teachers or counsellors to document relevant patterns of student behaviour.
9. **Application of Cumulative and Documentary Records:** Relevant educational or counselling records can provide useful background information. Such records may include academic history, attendance information, previous counselling information, and other records that are legitimately available to the counsellor.

Relationship between Test and Non-Test Techniques

Test and non-test techniques should generally be viewed as complementary sources of assessment information rather than competing approaches. Test techniques can provide structured and standardized information about particular characteristics, while non-test techniques can provide contextual and behavioural information about the individual. Zatrahadi, Daharnis, and Yusuf (2022) reported that test and non-test instruments were used in relation to one another in counselling services, with their application depending on the purpose and context of the counselling programme. Similarly, Sandra et al. (2025) concluded from their literature review that combining test and non-test approaches can improve the comprehensiveness of counselling assessment, although implementation can present methodological and practical difficulties. For example, an interest inventory may indicate that a student has a strong preference for a particular occupational area, while an interview may reveal the personal experiences or expectations underlying that preference. Likewise, an achievement test may identify an academic difficulty, while observation and interviews may help the counsellor understand contextual factors associated with the difficulty. Therefore, using multiple appropriate sources of information can provide a more complete basis for counselling decisions than relying exclusively on a single technique.

Testing Process of Appraisal in Guidance and Counselling Program

Steps involved in the process of using tests in school appraisal counselling program include selecting the test, administering test, scoring the test, interpreting results, communicating the results.

1. Selecting: Having defined the purpose for testing, the counsellor looks to a variety of sources for information on available tests. Resources include review books, journals, test manuals, and textbooks on testing and measurement (Anastasi, 1988; Cronbach, 1979). The most complete source of information on a particular test is usually the test manual.
2. Administering: Test administration is usually standardizing by the developers of the test. Manual instructions need to be followed in order to make a valid comparison of an individual's score with the test's norm group. Non – Standardization tests used in counselling are best given under controlled circumstances. This allows the counsellor's experience with the test to become an internal norm.
3. Scoring: Scoring of tests follows the instructions provided in the test manual, the Counsellor is sometimes given the option of having test machine scored rather than hand scored. Both the positive and negative aspects of this choice need to be considered. It is usually believed that test scoring is best handled by a machine because it is free from bias.

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4. Interpreting: The interpretation of test results is usually the area which allows for the greatest flexibility within the testing process. Depending upon the Counsellor's theoretical point of view and the extent of the test manual guidelines. Whereas scoring is best done by a bias-free machine, interpretation by machine is often too rigid. What is needed is the experience of a skilled test user to individualize the interpretation of results.
5. Communicating: Feedback of test results to the client completes the formal process of testing. Here, the therapeutic skills of Counsellors come fully into play. The Counsellor uses verbal and non-verbal interaction skills to convey messages to clients and to assess their understanding of it.

The issue of confidentiality is of great important. The ethical and legal restrictions on what may be disclosed from counselling apply to the use of tests as much as to other private information shared between client and counsellor. The trust issue, which is inherent in confidentiality, is relevant to every aspect of testing. No information can be shared outside the relationship without the full consent of the client. Information is provided to someone outside the relationship only after the specifics to be used from the testing are fully disclosed to the client. The counsellor preparation is also important. Tests are only as good as their construction, proper usage and the preparation of the counsellor intending to use them.

Validity, Reliability, and Appropriate Use

An important conceptual issue in counselling appraisal is the quality of the information obtained. For standardized tests, counsellors need to consider evidence concerning validity, reliability, fairness, and the appropriateness of norms and interpretations (Cook & Wind, 2024). The AERA, APA, and NCME Standards emphasize these considerations in the responsible development and use of educational and psychological tests. The same principle applies to non-test information. Interviews, observations, self-report, and information obtained from other people may vary in accuracy and consistency. APA guidance emphasizes that counsellors and psychologists should select assessment methods according to the assessment question and consider the characteristics and context of the person being assessed. Consequently, counsellors should avoid treating any single source of information as automatically accurate. Instead, information from different sources can be compared and integrated where appropriate.

Conclusion

In conclusion, the study establishes that appraisal is an essential component of effective Guidance and Counselling practice. It provides counsellors with systematic information about clients' abilities, interests, personality characteristics, behaviours, experiences, needs, and circumstances. Such information provides an important basis for understanding clients, identifying counselling needs, setting appropriate goals, selecting suitable interventions, and evaluating progress. The paper demonstrates that test techniques and non-test techniques provide different but complementary forms of information. Test techniques, including intelligence, achievement, aptitude, personality, and interest measures, can provide structured information that assists counsellors in making evidence-informed decisions. However, test results should not be interpreted automatically or in isolation. Lenz (2025) emphasizes that interpretations of test scores should be supported by an appropriate body of validity evidence rather than simply by the fact that an instrument is commonly used. Non-test techniques, including interviews, observations, questionnaires, rating scales, case studies, sociometry, anecdotal records, and cumulative records, provide additional information about clients' experiences, behaviours, relationships, and contexts. Recent literature indicates that non-test methods can contribute substantially to a holistic understanding of clients, particularly when information about affective, social, and psychological experiences is required.

Recommendations

Based on the findings and conclusions of the study, the following recommendations are made:

1. Counsellors should strengthen their knowledge and competence in assessment and testing through regular professional development, workshops, seminars, and conferences.
2. Counsellors should be using both test and non-test techniques when appropriate as this can provide a more comprehensive understanding of clients' needs, strengths, and problems.
3. Assessment instruments should be selected systematically according to the purpose of the counselling assessment rather than convenience or familiarity with a particular test.
4. Counsellors should pay particular attention to validity and reliability of the test when interpreting test results.

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5. Interviews, observations, questionnaires, and other non-test approaches should be conducted using clearly defined objectives and procedures. Counsellors should document relevant information carefully and distinguish factual observations from personal interpretations.

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Assessment of Community Participation in the Management of Upper Basic Education Facilities in North-West, Nigeria

IBRAHIM, Musa Muhammad[1]
Email: musaibraheem01@gmail.com
08034976985

MAGAJI, Surajo Ahmed[1]
Email: surajmahmed@gmail.com
08039680691

HUSSAIN, Muhammad Shehu[1]
Email: mshusain999@gmail.com
08065532646

PHILIP, Blessing Afunu[1]
Email: philipafunublessing@gmail.com
08063487171

[1]Department of Educational Foundations and Curriculum, Faculty of Education, Ahmadu Bello University, Zaria

Abstract

This study assessed community participation in the management of upper basic education facilities in North-West, Nigeria. The study was guided by four specific objectives: to assess community participation in the management of instructional materials, water resources facilities, waste disposal facilities, and building facilities for upper basic education in North-West, Nigeria. A descriptive survey research design was adopted with a population of 106,072 stakeholders comprising principals, teachers, and School-Based Management Committee (SBMC) members. A sample of 384 respondents was selected from three states (Kano, Kaduna, and Katsina) using simple random and convenient sampling techniques. The instrument titled "Community Participation and Management of Upper Basic Education Questionnaire (CPPUBEQ)" was validated and tested for reliability with a Cronbach alpha coefficient of 0.80. Descriptive statistics (frequency and mean) were used to answer research questions, while One-Way Analysis of Variance (ANOVA) was employed to test hypotheses at 0.05 level of significance. The findings revealed that community participation enhances effective management of instructional materials (mean=4.2), water resources facilities (mean=4.0), waste disposal facilities (mean=4.1), and building facilities (mean=4.3) for upper basic education in North-West, Nigeria. The study concluded that community participation exists in the management of these educational resources and facilities across schools in North-West, Nigeria, contributing to the maintenance, provision, monitoring, and effective utilization of various school facilities. The study recommended that school administrators should strengthen partnerships with community stakeholders to encourage greater involvement in the provision, maintenance, and monitoring of instructional materials; SBMC and educational authorities should establish community-based maintenance committees to support the management of water supply facilities; communities should be actively engaged in environmental sanitation programmes to improve waste disposal practices; and School-Based Management Committees should be empowered to participate more effectively in the maintenance and renovation of school buildings.

Keywords: Community Participation, Management, Upper Basic Education, School Facilities, North-West Nigeria

Introduction

The Universal Basic Education (UBE) programme in Nigeria represents a critical policy initiative aimed at providing free, compulsory, and accessible foundational education to all children aged 6–15 years (Alasoluyi & Yusuf, 2026). The UBE Act of 2004 formalized this commitment, expanding coverage to include six years of primary education and three years of junior secondary education (Federal Republic of Nigeria, 2012). However, implementation in North-West, Nigeria has faced various challenges, including inadequate funding, poor infrastructure, and teacher shortages, which have hindered the program's objectives. Many discussions on school quality in North-West rest on the assumption that policy directives translate directly into classroom practice. That assumption is weak because operational outcomes in basic education often

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depend on how communities engage with school governance, oversight processes and support activities. There is also a broader question about accountability. Policies often expect parents and community groups to complement government efforts, yet no one has examined how this plays out in upper basic schools. This research helps test claims about its benefits, highlight gaps that matter for learning, and offer options that reflect the real conditions in North-West, Nigeria rather than assumptions. The availability and quality of school facilities remain among the most crucial factors influencing pupils' academic performance and the quality of education delivered. School facilities are expected not only to be adequate but also to be appropriately furnished to meet the diverse needs of pupils and staff. These include essential amenities such as clean water supply systems, effective waste disposal infrastructure, structurally sound buildings, and well-equipped instructional materials (Olaleye & Ajayi, 2020; UNICEF, 2021). The availability and quality of these facilities are vital for promoting a safe, healthy, and stimulating learning environment.

Community participation refers to the active engagement of local individuals and groups in the planning, decision-making, implementation, and evaluation of policies and programmes that affect their lives. According to Mansuri and Rao (2021), genuine participation involves more than just consultation; it empowers communities to influence outcomes and fosters local ownership of development initiatives. This participatory approach helps bridge the gap between top-down governance and grassroots realities. In the educational context, community participation is essential for achieving the objectives of Universal Basic Education and ensuring the sustainability of school facilities. Ideally, the management of Upper Basic School facilities in North-West, Nigeria should involve active and sustained participation of community stakeholders, including parents, traditional rulers, School-Based Management Committees (SBMCs), community leaders, local organisations, and other relevant groups. Community participation should complement government efforts in the provision, maintenance, monitoring, and protection of essential facilities such as instructional materials, water, waste disposal, school buildings, and other infrastructure. Effective school-community collaboration can promote proper utilisation and maintenance of facilities, reduce vandalism, encourage a sense of ownership and shared responsibility, and create a conducive environment for teaching and learning. However, as observed by the researcher, community participation in the management of facilities in Upper Basic Schools in North-West, Nigeria appears inadequate, inconsistent, and uneven across communities. In many schools, parents, community leaders, traditional rulers, SBMCs, and local organisations are not sufficiently involved in the planning, provision, maintenance, monitoring, and protection of school facilities. Some communities depend largely on government for the provision and maintenance of instructional materials, water facilities, waste disposal systems, buildings, and other facilities. Limited community commitment, poor maintenance culture, vandalism, inadequate mobilisation, and weak collaboration between schools and communities further aggravate the situation. These conditions raise concerns about the effectiveness of community participation in ensuring proper management and sustainability of Upper Basic School facilities in the zone. If the situation remains unresolved, the condition and sustainability of school facilities may continue to deteriorate, thereby creating an unconducive environment for teaching and learning. Poor community involvement may result in inadequate instructional materials, deteriorating school buildings, insufficient water and toilet facilities, ineffective waste disposal, and poorly maintained facilities. This may negatively affect students' attendance, participation, learning experiences, and academic outcomes, while also increasing the financial burden on government and school authorities. It is against this background that this study assessed community participation in the management of Upper Basic Schools' facilities in North-West, Nigeria.

Objectives of the Study

The objectives of the study are to:

1. Assess the community participation in the management of instructional materials for upper basic education in North-West, Nigeria
2. Find out community participation in the management of water resources facilities for upper basic education in North-West, Nigeria
3. Examine the community participation in the management of waste disposal facilities for upper basic education in North-West, Nigeria

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4. Ascertain the community participation in the management of building facilities for upper basic education in North-West, Nigeria

Research Questions

The following research questions were raised in the study:

1. How does the community participate in the management of instructional materials for upper basic education in North-West, Nigeria?
2. How did the community participate in managing water resources facilities for upper basic education in North-West, Nigeria?
3. To what extent does the community participate in managing waste disposal facilities for upper basic education in North-West, Nigeria?
4. How does the community participate in managing building facilities for upper basic education in North-West, Nigeria?

Hypotheses

The following null hypotheses were formulated in the study:

H_{O1}: There is no significant difference in the opinions of principals, teachers, and SBMC officials on the community participation in the management of instructional materials for upper basic education in North-West, Nigeria.

H_{O2}: There is no significant difference in the opinions of respondents on the community participation in the management of water facilities for upper basic education in North-West, Nigeria.

H_{O3}: There is no significant difference in the opinions of respondents on the community participation in the management of waste disposal facilities for upper basic education in North-West, Nigeria.

H_{O4}: There is no significant difference in the opinions of respondents on the community participation in the management of building facilities for upper basic education in North-West, Nigeria.

Literature Review

Conceptual Framework

Concept of Community Participation

Community participation refers to the active engagement of local individuals and groups in the planning, decision-making, implementation, and evaluation of policies and programmes that affect their lives. It is a core component of democratic governance and essential for achieving social equity and sustainable development. According to Mansuri and Rao (2021), genuine participation involves more than just consultation; it empowers communities to influence outcomes and fosters local ownership of development initiatives. This participatory approach helps bridge the gap between top-down governance and grassroots realities. One of the most significant benefits of community participation in the management of upper basic education is its potential to enhance policy effectiveness. When people are involved in shaping the programmes that affect them, the interventions are more likely to align with local needs and cultural contexts. As a result, the outcomes tend to be more impactful and sustainable (Smith & McKenna, 2020). For instance, in the management of upper basic education in North-West, community involvement has been shown to increase trust in interventions and boost pupils' enrolment, especially in marginalised communities (Lee et al., 2022). Community participation also plays a critical role in building social capital, which refers to the networks, norms, and social trust that facilitate coordination and cooperation. Engaged communities often exhibit stronger civic ties, a heightened sense of agency, and mutual support mechanisms. According to Putnam (2020), these features are essential for fostering resilient societies capable of collective problem-solving. Participatory mechanisms such as community forums, town hall meetings, and participatory budgeting not only improve transparency and accountability but also nurture active citizenship. The study was based on Arnstein's Ladder of Citizen Participation Theory, which was formulated by Sherry R. Arnstein in 1969. The Ladder of Citizen Participation is a foundational theory that explains the varying degrees of citizen involvement in decision-making processes. The model presents eight levels of participation, grouped into three categories: *non-participation* (manipulation, therapy), *tokenism* (informing, consultation, placation), and *citizen power* (partnership, delegated power, citizen control). At its core, the ladder reveals how community participation can range from mere symbolic gestures to actual empowerment. In the context of upper basic education, this theory is particularly relevant as it helps analyze the extent to which communities are genuinely involved in decision-making, school management, curriculum development, and resource

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allocation. For instance, mere consultation of parents in school matters (tokenism) is vastly different from giving them decision-making power on school boards (citizen control). Effective community involvement in UBE requires ascending the ladder toward genuine power-sharing and active co-management of educational institutions. In areas like UBE, understanding and applying this framework helps ensure that engagement is not merely symbolic, but truly participatory and transformative.

Empirical Studies

Several empirical studies have examined community participation in educational management. Mohammed (2025) assessed the implementation of compulsory free upper basic education by state universal basic education board of Taraba State using a descriptive survey design. The findings revealed that the extent to which public enlightenment influences implementation of the UBE programme is enamoured, with majority of teachers used for the implementation being NCE holders representing 69.39% of teachers. Ifeanyi (2025) examined the school-based management system as genuine strategies for enhancing community involvement in public primary schools in Central zone of Plateau state. The study adopted a descriptive survey design and revealed that school-based management systems such as construction of school facilities like laboratories, ICT rooms, and holding regular meetings with the school are collaborative efforts to enhance community involvement in public primary schools. Kwashabawa (2023) examined school-based management committee strategies, community participation and effectiveness of basic schools in North-West Zone, Nigeria. The study used a descriptive research design of correlation type with a population of 21,230 basic schools and their SBMCs. The findings revealed that the use of SBMC strategies was highly effective (mean score = 92.64), the level of community participation was high (mean score = 4.33), and there was a significant relationship between SBMC strategies and basic school effectiveness ($r=0.036$, $p < 0.05$). Uwakwe (2020) investigated school community relations strategies for the effective implementation of the upper basic education programme in junior secondary schools in Enugu State. The study adopted descriptive survey research design and found that communities to a great extent provide human and material resources, counselling services to students, land and vigilante for housing and protection of school facilities, and that allowing community members use school facilities, organize training and social services for community members, invite community leaders to participate in school activities could enhance community participation.

Research Methodology

The study employed the use of descriptive survey research design. The population of the study comprises 106,072 stakeholders, comprising 3,078 principals, 50,668 teachers, and 52,326 SBMC members in Junior Secondary Schools in Northwest, Nigeria (Ministries of Education, Northwest, Nigeria, 2025). The distribution across the seven states includes Jigawa (13,398), Kaduna (21,120), Kano (25,901), Katsina (16,057), Kebbi (10,239), Sokoto (10,617), and Zamfara (8,740). The sample size was 384 as recommended by Research Advisors (2006) Table of Sample Determination, which recommends a sample of 384 for populations of between 100,001 and 250,000. Out of the 7 Northwestern States (Kaduna, Katsina, Sokoto, Zamfara, Kebbi, Kano, and Jigawa States), 3 states, namely Kano, Kaduna, and Katsina, were selected, representing 43% of the entire population. This is in support of Johnson and Christensen's (2017) assertion that 30 to 40% of the entire population is a good representation on which generalisations can be made. Simple random sampling techniques using "hat drawn" was employed to select the participating schools. Convenient sampling technique was employed to select respondents. The sample distribution included 12 principals, 177 teachers, and 195 SBMC members across the three selected states. From Kano State, 5 principals, 61 teachers, and 91 SBMC members were selected (total 156). From Kaduna State, 4 principals, 71 teachers, and 54 SBMC members were selected (total 129). From Katsina State, 3 principals, 45 teachers, and 50 SBMC members were selected (total 33). The instrument is titled "Community Participation and Management of Upper Basic Education Questionnaire (CPPUBEQ)" and was used to collect data in the study. The questionnaire was used to obtain responses from principals, teachers and SBMC members in the sampled schools in Northwest, Nigeria. The questionnaire was divided into two sections, that is: Sections 'A' and 'B'. Section 'A' sought the background information of respondents in terms of their Status, School Type, and Qualification. Section 'B - K' consists of 100 questionnaire items, structured around the study's research questions, to solicit respondents' responses. The items in the second section are closed-ended, using a five-point Likert scale with responses ranging from Strongly Agree (SA = 5) to Strongly Disagree (SD = 1). The face and content validity of the research instrument was assessed by experts in

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Educational Administration and Planning at Ahmadu Bello University, Zaria. The instrument was submitted to them for review to determine the suitability of the items in the questionnaire. Based on all the suggestions from these experts, the instrument was tested during the pilot to assess its reliability. A pilot test was conducted in the study to determine the instrument's reliability coefficient and identify problem areas in the conduct of the main research. While conducting the pilot test, a total of one (1) principal, twenty (20) teachers, and nine (9) SBMC members were used from Government Day Secondary School Unguwan Gwaza Gusau of Zamfara North West Nigeria state. The data collected from the pilot test was statistically analysed and a reliability coefficient of 0.80 was obtained. The reliability coefficient was determined using the Cronbach alpha reliability coefficient method. The reliability coefficient falls between 0.5 and a positive one (+1), thus the instrument was deemed suitable for use as a reliable tool for data collection in the main study. The collected questionnaires were sorted, after which a coding scheme was developed. Each questionnaire was reviewed and coded into a computerised database using the Statistical Package for the Social Sciences (SPSS) version 21.0. Descriptive statistics, including frequency, mean, and standard deviation was used to answer the research questions, while ANOVA was used to test the hypotheses at the 0.05 level of significance. A total of 384 questionnaires were administered, out of which 376 were successfully retrieved, representing a response rate of 97.9%.

Presentation of Results

Presentation of Administered and Returned Instrument

Table 1: Distribution of Respondents by Status

S/N	Category	Distributed	Retrieved	Percentage (%)
1	Principals	12	12	3.19
2	Teachers	177	174	46.28
3	SBMC Members	195	190	50.53
	Total	**384**	**376**	**100.00**

Source: Researchers' field survey, (2026)

Table 1 presents the distribution of respondents according to their stakeholder category. A total of 384 questionnaires were administered, out of which 376 were successfully retrieved, representing a response rate of 97.9%. Of the total retrieved questionnaires, 12 respondents (3.19%) were principals, 174 respondents (46.28%) were teachers, and 190 respondents (50.53%) were SBMC members. The distribution of respondents across the three stakeholder categories ensured adequate representation of school administrators, teachers, and community stakeholders, thereby providing a balanced basis for obtaining reliable and valid data.

Answers to Research Questions

Research Question One: How does the community participate in the management of instructional materials for upper basic education in North-West, Nigeria?

Table 2: Frequency and Mean on how the community participate in the management of instructional materials

S/N	Statement	Category	SA	A	U	D	SD	Mean
1	Community members contribute funds to purchase instructional materials	Principals	5	5	1	1	0	4.2
		Teachers	81	66	17	0	10	4.2
		SBMC Members	97	53	27	12	1	4.2
2	SBMC support the purchase of learning resources	Principals	6	5	0	1	0	4.3
		Teachers	75	75	14	7	3	4.2
		SBMC Members	101	49	26	9	5	4.2
3	Religious groups assist in providing instructional materials	Principals	7	3	1	1	0	4.3
		Teachers	80	70	15	6	3	4.3
		SBMC Members	90	65	20	12	3	4.2
4	Local artisans help produce teaching aids	Principals	5	6	1	0	0	4.3
		Teachers	78	73	13	7	3	4.2

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		SBMC Members	95	55	25	12	3	4.2
5	Community leaders regularly monitor material usage	Principals	5	5	2	0	0	4.3
		Teachers	72	82	11	6	3	4.2
		SBMC Members	82	90	10	6	2	4.3
6	Local organizations donate teaching materials	Principals	4	6	2	0	0	4.2
		Teachers	76	72	16	7	3	4.2
		SBMC Members	88	72	17	10	3	4.2
7	Provision of instructional materials enhances teaching quality	Principals	6	4	2	0	0	4.3
		Teachers	83	66	14	8	3	4.3
		SBMC Members	98	55	22	12	3	4.2
8	Community leaders mobilise support for school supplies	Principals	5	4	2	1	0	4.1
		Teachers	74	78	13	6	3	4.2
		SBMC Members	86	75	17	9	3	4.2
9	Community involvement has improved teaching and learning	Principals	7	4	1	0	0	4.5
		Teachers	79	70	15	7	3	4.2
		SBMC Members	92	65	22	9	2	4.2
10	Community participation improves access to learning materials	Principals	6	5	1	0	0	4.4
		Teachers	77	75	14	5	3	4.3
		SBMC Members	89	70	20	9	2	4.2
	Cumulative Mean							**4.2**

Table 2 presented community participation in the management of instructional materials for Universal Basic Education in North-West, Nigeria. The results revealed mean scores ranging from 4.1 to 4.5, which were all above the 3.0 decision benchmark. This means that principals, teachers and SBMC members agreed with the statements that community members contribute funds to purchase instructional materials, SBMC support the purchase of learning resources, religious groups assist in providing instructional materials, local artisans help produce teaching aids for schools, and community leaders regularly monitor the usage of instructional materials in schools. The cumulative mean of 4.2 indicates that community participation contributes to the effective management of instructional materials for Universal Basic Education in North-West, Nigeria.

Research Question Two: How did the community participate in managing water resources facilities for upper basic education in North-West, Nigeria?

Table 3: Frequency and Mean on how the community participate in managing water resources facilities

S/N	Item statement	Category	SA	A	U	D	SD	Mean
11	Community stakeholders assist in providing clean water	Principals	4	4	2	1	1	3.8
		Teachers	65	70	20	12	7	4.0
		SBMC Members	80	65	25	15	5	4.1
12	SBMC efforts have improved access to safe drinking water	Principals	4	4	2	1	1	3.8
		Teachers	65	70	20	12	7	4.0
		SBMC Members	80	65	25	15	5	4.1
13	Community participation ensures regular maintenance	Principals	4	4	2	1	1	3.8
		Teachers	65	70	20	12	7	4.0
		SBMC Members	80	65	25	15	5	4.1
14		Principals	4	4	2	1	1	3.8

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	Local involvement has reduced water-related challenges	Teachers	65	70	20	12	7	4.0
		SBMC Members	80	65	25	15	5	4.1
15	Community members contribute to construction of boreholes	Principals	4	4	2	1	1	3.8
		Teachers	65	70	20	12	7	4.0
		SBMC Members	80	65	25	15	5	4.1
16	Community support enhances students' hygiene	Principals	4	4	2	1	1	3.8
		Teachers	65	70	20	12	7	4.0
		SBMC Members	80	65	25	15	5	4.1
17	Community organizations donate materials for water supply	Principals	4	4	2	1	1	3.8
		Teachers	65	70	20	12	7	4.0
		SBMC Members	80	65	25	15	5	4.1
18	Local leaders mobilize support for water projects	Principals	4	4	2	1	1	3.8
		Teachers	65	70	20	12	7	4.0
		SBMC Members	80	65	25	15	5	4.1
19	Water facility projects are initiated by the community	Principals	4	4	2	1	1	3.8
		Teachers	65	70	20	12	7	4.0
		SBMC Members	80	65	25	15	5	4.1
20	Availability of water supports UBE goals	Principals	4	4	2	1	1	3.8
		Teachers	65	70	20	12	7	4.0
		SBMC Members	80	65	25	15	5	4.1
	Cumulative Mean							**4.0**

Table 3 presented community participation in the management of water resources for Upper Basic Education in North-West, Nigeria. The results revealed mean scores ranging from 3.8 to 4.1, which were all above the 3.0 decision benchmark. This means that principals, teachers and SBMC members agreed with the statements that community stakeholders assist in providing clean water to schools, SBMC efforts have improved access to safe drinking water, community participation ensures regular maintenance of school water sources, and local involvement has reduced water-related challenges in UBE schools in North-West, Nigeria. The cumulative mean of 4.0 indicates that community participation contributes to the effective management and availability of water resources in Upper Basic Education schools in North-West, Nigeria.

Research Question Three: To what extent does the community participate in managing waste disposal facilities for upper basic education in North-West, Nigeria?

Table 4: Frequency and Mean on extent does the community participate in managing waste disposal facilities

S/N	Item statement	Category	SA	A	U	D	SD	Mean
21	Proper waste facilities provided support UBE objectives	Principals	5	5	1	1	0	4.2
		Teachers	80	65	18	7	4	4.2
		SBMC Members	88	70	18	10	4	4.2
22	Community involvement promotes regular waste collection	Principals	5	4	2	1	0	4.1
		Teachers	76	70	18	7	3	4.2
		SBMC Members	90	68	18	10	4	4.2
23	Community donations help fund waste disposal infrastructure	Principals	4	5	2	1	0	4.0
		Teachers	75	72	17	7	3	4.2
		SBMC Members	86	72	20	9	3	4.2
24	Local leaders mobilise resources for waste disposal	Principals	5	4	2	1	0	4.1

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		Teachers	78	68	18	7	3	4.2
		SBMC Members	88	70	19	10	3	4.2
25	Schools and communities collaborate on hygiene	Principals	6	4	1	1	0	4.3
		Teachers	83	65	17	6	3	4.3
		SBMC Members	95	65	18	9	3	4.3
26	Community members support management of waste bins	Principals	5	5	1	1	0	4.2
		Teachers	78	68	18	7	3	4.2
		SBMC Members	87	72	18	10	3	4.2
27	Waste management projects are initiated by community	Principals	4	5	2	1	0	4.0
		Teachers	74	72	18	7	3	4.2
		SBMC Members	85	73	19	10	3	4.2
28	Local volunteers assist in management of waste facilities	Principals	5	4	2	1	0	4.1
		Teachers	77	69	18	7	3	4.2
		SBMC Members	90	68	19	10	3	4.2
29	Community support enhances cleanliness of school environment	Principals	6	5	1	0	0	4.4
		Teachers	88	65	14	5	2	4.3
		SBMC Members	98	63	17	9	3	4.3
30	Community efforts have improved waste management	Principals	5	5	1	1	0	4.2
		Teachers	81	66	17	7	3	4.2
		SBMC Members	91	68	19	9	3	4.2
	Cumulative Mean							**4.1**

Table 4 presented community participation in the management of waste disposal facilities for Upper Basic Education in North-West Nigeria. The results revealed mean scores ranging from 4.0 to 4.4, which were all above the 3.0 decision benchmark. This means that principals, teachers and SBMC members agreed with the statements that proper waste facilities provided by the community support UBE objectives, community involvement promotes regular waste collection in schools, community donations help fund waste disposal infrastructure, and local leaders mobilise resources for school waste disposal systems. The cumulative mean of 4.1 indicates that community participation contributes to the effective management of waste disposal facilities in Upper Basic Education schools in North-West Nigeria.

Research Question Four: How does the community participate in managing building facilities for upper basic education in North-West, Nigeria?

Table 5: Frequency and Mean on how the community participate in managing building facilities

S/N	Item statement	Category	SA	A	U	D	SD	Mean
31	Community members provide labour for school building projects	Principals	7	4	1	0	0	4.5
		Teachers	92	65	10	5	2	4.4
		SBMC Members	105	60	15	8	2	4.4
32	Community donations support renovation of school facilities	Principals	6	5	1	0	0	4.4
		Teachers	88	68	11	5	2	4.4
		SBMC Members	102	63	16	7	2	4.3
33	School buildings have been expanded through community efforts	Principals	6	4	2	0	0	4.3
		Teachers	84	70	13	5	2	4.3
		SBMC Members	96	68	17	7	2	4.3
34		Principals	5	5	1	1	0	4.2

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	Community involvement has reduced classroom overcrowding	Teachers	82	71	14	5	2	4.3
		SBMC Members	94	70	17	7	2	4.3
35	SBMC assist in funding school construction	Principals	7	4	1	0	0	4.5
		Teachers	91	66	11	4	2	4.4
		SBMC Members	108	58	15	7	2	4.4
36	Local artisans contribute to building of school structures	Principals	6	5	1	0	0	4.4
		Teachers	90	67	10	5	2	4.4
		SBMC Members	104	62	15	7	2	4.4
37	Joint efforts between schools and communities improve infrastructure	Principals	7	4	1	0	0	4.5
		Teachers	94	65	10	4	1	4.4
		SBMC Members	110	57	15	6	2	4.4
38	Local leaders mobilise support for construction of school buildings	Principals	6	4	2	0	0	4.3
		Teachers	86	69	12	5	2	4.3
		SBMC Members	100	66	16	6	2	4.3
39	Community support ensures timely maintenance of school buildings	Principals	6	5	1	0	0	4.4
		Teachers	89	68	11	4	2	4.4
		SBMC Members	103	65	15	5	2	4.4
40	Community-led building projects support UBE delivery	Principals	7	4	1	0	0	4.5
		Teachers	93	66	10	4	1	4.4
		SBMC Members	107	64	14	5	1	4.4
	Cumulative Mean							**4.3**

Table 5 presented community participation in the management of building facilities for Upper Basic Education in North-West Nigeria. The results revealed mean scores ranging from 4.2 to 4.5, which were all above the 3.0 decision benchmark. This means that principals, teachers and SBMC members agreed with the statements that community members provide services labour for school building projects, community donations support the renovation of school facilities, school buildings have been expanded through community efforts, and community involvement has reduced classroom overcrowding in North-West Nigeria. The cumulative mean of 4.3 indicates that community participation contributes to the effective management, development, maintenance and utilisation of building facilities for Upper Basic Education in North-West Nigeria.

Test of Hypotheses

The data collected for this study were coded and analysed using Analysis of Variance (ANOVA) at a significant alpha level of 0.05 as presented in Tables 6 to 9.

Hypothesis One: There is no significant difference in the opinions of principals, teachers, and parents on the community participation in the management of instructional materials for upper basic education in North-West, Nigeria

Table 6: One-way Analysis of Variance (ANOVA) on the difference in the opinions of respondents on community participation in the management of instructional materials

Source	Sum of Squares	df	Mean Square	F	p-value	Decision
Between Groups	93.338	2	31.113	8.36	.501	Retained
Within Groups	287.053	374	.811			
Total	**380.391**	**376**				

Table 6 shows the difference in the opinions of principals, teachers, and parents regarding community participation in the management of instructional materials for Upper Basic Education in North-West, Nigeria. The analysis produced a p-value of .501, which is higher than the 0.05 level of significance. Therefore, the hypothesis was retained, indicating that there

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was no significant difference in the opinions of respondents concerning community participation in the management of instructional materials for Upper Basic Education in North-West, Nigeria.

Hypothesis Two: There is no significant difference in the opinions of respondents on the community participation in the management of water facilities for upper basic education in North-West, Nigeria

Table 7: One-way Analysis of Variance (ANOVA) on difference in the opinions of respondents on community participation in the management of water facilities

Source	Sum of Squares	df	Mean Square	F	p-value	Decision
Between Groups	184.597	2	61.532	8.95	.702	Retained
Within Groups	369.507	374	1.044			
Total	**554.103**	**376**				

Table 7 presents the difference in the opinions of respondents regarding community participation in the management of water facilities for Upper Basic Education in North-West, Nigeria. The analysis yielded a p-value of .702, which is greater than the 0.05 level of significance. Therefore, the hypothesis was retained, indicating that there was no significant difference in the opinions of respondents concerning community participation in the management of water facilities for Upper Basic Education in North-West, Nigeria.

Hypothesis Three: There is no significant difference in the opinions of respondents on the community participation in the management of waste disposal facilities for upper basic education in North-West, Nigeria

Table 8: One-way Analysis of Variance (ANOVA) on difference in the opinions of respondents on community participation in the management of waste disposal facilities

Source	Sum of Squares	df	Mean Square	F	p-value	Decision
Between Groups	54.172	2	18.057	2.61	.105	Retained
Within Groups	506.781	374	1.432			
Total	**560.953**	**376**				

Table 8 presents the difference in the opinions of respondents regarding community participation in the management of waste disposal facilities for Upper Basic Education in North-West, Nigeria. The analysis yielded a p-value of .105, which is greater than the 0.05 level of significance. Therefore, the hypothesis was retained, indicating that there was no significant difference in the opinions of respondents concerning community participation in the management of waste disposal facilities for Upper Basic Education in North-West, Nigeria.

Hypothesis Four: There is no significant difference in the opinions of respondents on the community participation in the management of building facilities for upper basic education in North-West, Nigeria

Table 9: One-way Analysis of Variance (ANOVA) on difference in the opinions of respondents on community participation in the management of building facilities

Source	Sum of Squares	df	Mean Square	F	p-value	Decision
Between Groups	197.292	2	65.764	9.16	.612	Retained
Within Groups	294.082	374	.831			
Total	**491.374**	**376**				

Table 9 presents the difference in the opinions of respondents regarding community participation in the management of building facilities for Upper Basic Education in North-West, Nigeria. The analysis yielded a p-value of .612, which is greater than the 0.05 level of significance. Therefore, the hypothesis was retained, indicating that there was no significant difference in the opinions of respondents concerning community participation in the management of building facilities for Upper Basic Education in North-West, Nigeria.

Discussion of Findings

The finding revealed that community participation enhances the effective management of instructional materials for Upper Basic Education in North-West (mean=4.2). This suggests that community members contribute to the provision, monitoring, maintenance, and utilization of instructional materials in schools. The finding is consistent with the views of Bray (2003), who asserted that community involvement helps bridge resource gaps through the provision of textbooks, teaching aids, and other learning materials. Similarly, Epstein (2001) maintained that communities that participate in educational activities develop a sense of ownership and responsibility, thereby promoting the effective management and

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sustainability of instructional resources. The finding also agrees with Osei (2006), who noted that community participation improves accountability and transparency in the utilization of educational resources. This finding further supports the assertion that community engagement contributes significantly to the achievement of the objectives of Upper Basic Education through the effective management of learning resources.The engagement of community members in education fosters shared responsibility and promotes sustainable development. When communities contribute to the procurement or development of instructional materials, they become more invested in students' academic success. As noted by Epstein (2001), this sense of ownership results in more effective oversight and sustained support. Schools that regularly involve community stakeholders in decision-making processes tend to receive more consistent material and financial support.

Community-based monitoring mechanisms also improve the accountability of resource utilization. When communities are involved in the procurement and distribution of instructional materials, they help reduce instances of mismanagement and wastage. According to Osei (2006), transparency increases when local stakeholders are aware of resource allocations and actively participate in monitoring their use, thus ensuring that materials reach intended beneficiaries. The study found that community participation enhances the management of water resource facilities for Upper Basic Education in North-West (mean=4.0). This indicates that communities actively support the provision, maintenance, and sustainability of water facilities within schools. The finding corroborates the position of Narayan (1995), who emphasized that community involvement in planning and management promotes ownership and sustainability of water projects. The finding is also in agreement with Whittington et al. (2009), who observed that active community participation helps prevent the deterioration of water facilities through collective monitoring and maintenance. Furthermore, UNICEF (2012) noted that involving local stakeholders in water facility management ensures equitable access and enhances the effectiveness of such facilities in meeting the needs of school users. One of the major benefits of community involvement is the sustainability of water facilities. When users are part of decision-making and maintenance planning, they are more likely to ensure that the infrastructure remains functional over time. Community-led management committees can oversee daily operations and initiate timely repairs, preventing system breakdowns. Participatory approaches also contribute to equitable access, ensuring that facilities are conveniently located and meet household needs (UNICEF, 2012). Cost-sharing is another important aspect of community participation, as financial or in-kind contributions from beneficiaries foster a stronger commitment to maintaining the infrastructure (Harvey & Reed, 2007).

The finding showed that community participation contributes to the management of waste disposal facilities for Upper Basic Education in North-West (mean=4.1). This implies that communities support sanitation activities and environmental cleanliness within schools. The finding aligns with the position that community involvement strengthens accountability and encourages the maintenance of healthy school environments. Community participation in environmental sanitation promotes proper waste management practices and contributes to creating conducive learning environments. This finding is consistent with the broader view that communities play important roles in maintaining school facilities and ensuring sustainability of educational infrastructure. Ownership and accountability increase when communities take part in designing and operating waste disposal facilities. Participation in planning leads to greater trust and responsibility among community members. According to Schübeler et al. (1996), involving residents from the outset of waste facility projects helps prevent conflicts and encourages long-term stewardship. Community participation can also reduce illegal dumping and promote environmental hygiene. When residents feel responsible for their local environment, they are less likely to engage in improper disposal practices and more likely to report violations. Studies such as that by Medina (2010) demonstrate a clear correlation between community monitoring and reduced incidences of illegal waste dumping in urban slums. The study revealed that communities participate effectively in the management of building facilities for Upper Basic Education in North-West (mean=4.3). This finding indicates that communities contribute to the construction, renovation, and maintenance of school buildings. The finding supports the assertion of Ukeje (2002), who stated that communities often contribute labour, materials, and financial resources toward school development projects. It is also consistent with the view that community participation promotes ownership of educational facilities and enhances sustainability. Furthermore, the finding agrees with the position that community involvement is essential in addressing infrastructural

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deficits commonly experienced in public schools. Community participation also fosters long-term maintenance and sustainability. When local people are involved in building a facility, they are more likely to take responsibility for its upkeep. As suggested by ILO (2011), participatory approaches encourage regular maintenance because people feel connected to and invested in the infrastructure they helped create. Community-led initiatives in building schools have shown remarkable results, particularly in rural areas. When local stakeholders are involved, projects are more likely to reflect local priorities, including considerations for accessibility, safety, and environmental suitability (DeStefano & Hartwell, 2005).

Conclusion

This study investigated community participation in the management of Upper Basic Education in North-West, Nigeria, with particular focus on the management of instructional materials, water resource facilities, waste disposal facilities, and building facilities. The findings revealed that community participation exists in the management of these educational resources and facilities across schools in North-West. The results indicate that communities contribute to the maintenance, provision, monitoring, and effective utilization of various school facilities, thereby supporting the achievement of educational goals at the upper basic education level. Community involvement was found to play a supportive role in enhancing the management of instructional materials and school facilities, promoting a conducive learning environment for students and teachers. Therefore, the study concludes that community participation remains an important factor in ensuring effective management of Upper Basic Education in North-West.

Recommendations

Based on the findings of the study, the following recommendations are made:

1. School administrators should strengthen partnerships with community stakeholders to encourage greater involvement in the provision, maintenance, and monitoring of instructional materials in schools. Regular school-community meetings, transparent communication of facility needs, and collaborative initiatives should be encouraged to sustain these partnerships.
2. SBMC and educational authorities should establish community-based maintenance committees to support the management of water supply facilities and ensure their sustainability. Communities should be trained and empowered to take ownership of water facilities, ensuring regular maintenance and prompt repairs when needed.
3. Communities should be actively engaged in environmental sanitation programmes to improve waste disposal practices and maintain clean school environments. Waste management projects should be initiated and sustained through community participation, with local volunteers assisting in the management of school waste facilities.
4. School-Based Management Committees (SBMCs) should be empowered and supported to participate more effectively in the maintenance and renovation of school buildings. Government and educational authorities should provide necessary resources and technical support to enable communities to contribute meaningfully to building projects.

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Evaluation of Protective, Global Risk Factors and Health-Promotion Strategies on Mental and Emotional Health in Contemporary Society: A Review

ENABULELE, Bawa Hiqmat (M.Sc.)
Email: bawa.enabulele@uniben.edu
Phone Number: +23408135646976
Department of Health, Safety and Environmental Education, University of Benin, Benin City, Edo State.

Abstract

Mental and emotional health has become an increasingly important global public-health concern because psychological well-being is influenced not only by individual characteristics but also by social, economic, environmental and structural conditions. Poverty, unemployment, insecure housing, discrimination, violence, childhood adversity, social isolation, armed conflict, climate change and rapidly changing digital environments can increase vulnerability to psychological distress and mental-health conditions. Conversely, supportive relationships, social connectedness, quality education, meaningful employment, community participation, emotional and social skills and access to appropriate health and social services can promote resilience and well-being. This narrative review examines major risk and protective factors affecting mental and emotional health in contemporary society and discusses evidence-informed health-promotion and prevention strategies. Literature published predominantly from 2019 to 2026 was considered, with emphasis on World Health Organization publications and recent peer-reviewed systematic reviews, umbrella reviews and major scholarly literature. The evidence demonstrates that mental-health promotion requires a shift from an exclusively individual and clinical orientation towards population-based approaches that address social determinants across the life course. Health education has an important role in improving mental-health literacy, strengthening emotional and social skills, reducing stigma, promoting healthy coping and encouraging appropriate help-seeking. However, individual education alone cannot overcome structural conditions that generate mental-health inequalities. Effective action therefore requires collaboration across health, education, employment, housing, social protection, environmental and community sectors. The review concludes that improving mental and emotional health requires integrated, preventive, culturally responsive and rights-based approaches that combine individual-level interventions with action on the wider conditions in which people live, learn, work and age.

Keywords: Mental Health, Emotional Health, Mental-Health Promotion, Social Determinants, Mental-Health Literacy, Psychological Well-Being

Introduction

Mental health is an essential part of overall health and well-being, influencing how individuals think, feel, behave, cope with challenges, relate to others, and function in their daily lives. It is not simply the absence of mental illness but a state of well-being that enables individuals to manage everyday stresses, develop their abilities, work effectively, and contribute to their communities. In contemporary society, mental health has become an important global health concern because individuals are increasingly exposed to social, economic, environmental, and technological changes that can influence their psychological and emotional well-being. The World Health Organization (2025) describes mental health as a state of mental well-being that enables individuals to cope with the stresses of life, realize their abilities, learn and work effectively and contribute to their communities. Mental health exists along a continuum and can change over time according to the interaction of individual, family, community and structural circumstances. The global importance of mental health is increasingly recognized. World Health Organization (2022) reported that mental-health needs remain high worldwide while responses in many settings remain inadequate. The organization therefore calls for transformation of mental-health systems, including greater attention to prevention, promotion, community-based care and the environments that shape mental health. Mental health is influenced by a wide range of determinants. These include biological characteristics, emotional and social skills, family relationships, educational opportunities, employment, income, housing, neighborhood conditions, discrimination, violence and access to health and social services. World Health Organization (2025) specifically identifies poverty, violence, inequality and environmental deprivation as social and environmental risks, while supportive relationships, quality education, decent work, safe neighborhoods and strong community ties can serve protective functions. Recent scholarship has strengthened the argument that mental health should be addressed through a social-determinants framework. Kirkbride et al. (2024) demonstrated that socioeconomic disadvantage, early-life adversity, discrimination, social isolation, neighborhood conditions and other social circumstances influence mental health and mental disorders.

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They argue that these determinants provide important opportunities for population-level prevention because many are potentially modifiable. The contemporary environment has also introduced new and increasingly complex challenges. Digital technology and social media have transformed social interaction and access to information. Climate change is generating environmental disruption, displacement and uncertainty with implications for psychological well-being. Workplaces can provide purpose, income and social connection but can also expose workers to excessive workloads, insecurity, discrimination and other psychosocial risks. Conflict and forced migration can produce trauma, social disruption and difficulties accessing essential services. These developments indicate that mental-health promotion cannot be restricted to psychiatric services. It requires action in the places where people live, learn, work and interact. The World Health Organization Comprehensive Mental Health Action Plan 2013–2030 identifies four major objectives: effective leadership and governance; comprehensive and integrated community-based mental-health and social services; implementation of promotion and prevention strategies; and strengthened information, evidence and research (World Health Organization, 2021). Against this background, this review examines the major risk factors affecting mental and emotional health in contemporary society, discusses protective factors, reviews approaches to promotion and prevention, and highlights the role of health education in improving mental-health outcomes.

Review Approach

This article adopted a narrative review approach. Literature published primarily between 2019 and 2026 was considered, with particular emphasis on recent systematic reviews, umbrella reviews, meta-analyses, peer-reviewed articles and authoritative World Health Organization publications. Relevant literature was identified using combinations of search terms including mental health, emotional health, mental-health promotion, social determinants of mental health, mental-health prevention, mental-health literacy, social isolation, digital technology, social media, climate change, workplace mental health, health education and community mental health. Priority was given to publications that provided evidence relevant to population health and prevention across different geographical and socioeconomic contexts. The review does not claim to be a systematic review with a formal risk-of-bias assessment. Rather, it synthesizes recent evidence to develop an integrated public-health perspective on mental and emotional health in contemporary society.

Conceptual Understanding of Mental and Emotional Health

Mental health

Mental health is a multidimensional state of well-being involving psychological functioning, emotional experiences, relationships and the ability to participate in everyday life. It is not static. An individual's mental health can improve or deteriorate depending on changing personal circumstances and exposure to protective or adverse conditions. Importantly, experiencing emotional distress does not automatically mean that a person has a mental disorder. Mental disorders represent clinically significant disturbances in cognition, emotional regulation or behaviour that are generally associated with substantial distress or impairment in functioning (WHO, 2025). This distinction is important for health promotion because populations require interventions that support positive mental health even when individuals do not meet diagnostic criteria for a mental disorder.

Emotional health

Emotional health can be understood as an individual's ability to recognize, understand, express, and manage emotions in a healthy and appropriate manner. It enables people to cope with stress, respond to difficult situations, maintain positive relationships, and function effectively in their daily lives. Emotional health does not mean the absence of negative emotions; rather, it involves the ability to experience and regulate different emotions while maintaining overall well-being. This concept is closely related to mental health, which the World Health Organization (WHO, 2025) describes as a state of well-being that enables individuals to cope with the normal stresses of life and function effectively. Emotional health is an important part of mental and psychological well-being. Difficulties in understanding or regulating emotions may contribute to psychological distress and reduced well-being, while effective emotional regulation can support healthy functioning and adaptation to life challenges (Kraiss et al., 2020). Emotional health is also influenced by wider social and environmental conditions. Factors such as poverty, discrimination, childhood adversity, social isolation, employment, housing, and social support can either strengthen or undermine mental and emotional well-being (Kirkbride et al., 2024). Therefore, promoting emotional health requires attention to both individual abilities and the environments in which people

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live. Strengthening emotional and coping skills, supportive relationships, safe environments, mental-health literacy, and access to appropriate services can contribute to better mental and emotional well-being. Emotional health should consequently be considered an important component of comprehensive mental-health promotion.

Interrelationship between mental and emotional health

Mental and emotional health are closely interconnected aspects of overall well-being. Mental health influences how individuals think, cope, behave, and function, while emotional health relates particularly to the ability to recognize, understand, express, and regulate emotions. These processes influence one another; difficulties in managing emotions may contribute to psychological distress, while poor mental health may reduce an individual's capacity to cope with and regulate emotions (Kraiss et al., 2020; World Health Organization [WHO], 2025). Their interrelationship is also shaped by wider social and environmental conditions. Poverty, childhood adversity, discrimination, social isolation, unemployment, poor housing, and limited social support can increase vulnerability to poor mental and emotional health. Conversely, supportive relationships, education, decent employment, social connectedness, and safe environments can strengthen resilience and well-being (Kirkbride et al., 2024; WHO, 2025). Therefore, mental and emotional health should be addressed together within a broader health-promotion framework. Interventions that strengthen emotional regulation and coping skills, improve mental-health literacy, reduce stigma, promote social support, and address adverse social conditions can contribute to better psychological and emotional well-being. This integrated understanding provides a foundation for examining the global risk factors, protective factors, and health-promotion strategies considered in this review.

Global Risk Factors and Social Determinants of Mental and Emotional Health

Mental and emotional health are shaped by a wide range of individual, family, social, economic, environmental, and structural conditions. These factors do not operate independently; rather, they interact across the life course to either increase vulnerability to poor mental health or strengthen resilience and well-being. The World Health Organization (WHO, 2025) emphasizes that mental health is influenced by factors operating at individual, family, community, and structural levels. Adverse conditions such as poverty, violence, inequality, discrimination, social isolation, and environmental deprivation can increase the risk of mental health problems, while supportive relationships, education, decent work, safe communities, and social connectedness can provide protection. Social determinants are particularly important because they influence the circumstances in which people are born, grow, learn, work, live, and age. Kirkbride et al. (2024) identified socioeconomic disadvantage, discrimination, social isolation and loneliness, childhood adversity, neighbourhood disadvantage, housing, education, employment, social support, and the physical environment as important determinants of mental health across the life course. Their review further emphasizes that exposure to these conditions is strongly influenced by the distribution of resources, power, and opportunities within society.

Poverty and Socioeconomic Disadvantages

Economic circumstances are among the most important determinants of mental health. Individuals living in poverty may experience persistent concerns about food, housing, education, employment, debt and access to health services. These conditions can create chronic stress and reduce the resources available for coping. Kirkbride et al. (2024) identify socioeconomic disadvantage as a major determinant of mental health and mental disorders. Socioeconomic conditions influence mental health through pathways involving education, employment, income, neighbourhood conditions, material deprivation and exposure to stressful environments. Economic disadvantage can also create a cycle in which poor mental health reduces educational and employment opportunities, which can subsequently worsen financial circumstances. Oswald et al. (2024), reviewing 101 reviews of interventions targeting social determinants of mental disorders, found evidence across economic, environmental, demographic, neighbourhood and sociocultural domains.

Housing and Living Conditions

Safe and stable housing provides physical security, privacy and a foundation for social and family functioning. In contrast, homelessness, overcrowding, housing insecurity and unsafe neighbourhoods can create chronic stress and undermine well-being. Housing conditions are particularly important because they interact with other determinants. People experiencing housing insecurity may simultaneously experience unemployment, food insecurity, social exclusion and barriers to health-care access. Addressing mental-health inequalities therefore requires policies that recognize housing as part of the broader mental-health environment.

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Education

Education contributes to mental health through knowledge, social participation, skill development and improved opportunities for employment and socioeconomic security. Supportive educational environments can strengthen emotional and social development. However, schools and universities can also become sources of psychological stress when students experience bullying, discrimination, social exclusion, academic pressure or unsafe learning environments. Health education and counselling services should therefore be integrated into educational institutions.

Employment and working conditions

Employment may protect mental health by providing income, social interaction, structure, purpose and a sense of identity. Nevertheless, poor working conditions can produce psychological harm. WHO (2022a) emphasizes that organizational factors such as excessive workload, inadequate support, discrimination and other psychosocial hazards can affect mental health. Its guidelines recommend organizational interventions, manager and worker training, individual interventions, return-to-work support and assistance with gaining employment. Lancman et al. (2024) similarly demonstrate that the relationship between mental health and work is complex, involving both the potential protective value of employment and the harmful effects of adverse working conditions.

Childhood adversity

Childhood is a particularly sensitive period for mental and emotional development. Experiences such as abuse, neglect, harsh parenting, household violence, poverty and family instability can have long-term consequences. WHO (2025) identifies adverse experiences during sensitive developmental periods, especially early childhood, as particularly important mental-health risks. Preventive strategies should consequently include positive parenting, protection from violence, supportive school environments, early identification of difficulties and accessible family and community services.

Violence, discrimination and social exclusion

Violence threatens psychological and physical safety and can produce persistent fear, distress and trauma. Discrimination and social exclusion may similarly undermine self-worth, belonging and access to social resources. These experiences can also operate structurally. Discrimination may restrict opportunities for education, employment, housing and health care, thereby creating pathways through which social inequality becomes mental-health inequality. World Health Organization's recent work on social determinants emphasizes that health inequities cannot be adequately addressed without action on economic inequality, structural discrimination, and conflict and climate disruption.

Conflict, forced displacement and migration

Armed conflict, humanitarian emergencies and forced displacement can expose individuals and communities to violence, bereavement, loss of livelihoods, separation from family and uncertainty about the future. Refugees and migrants may subsequently experience poor housing, unemployment, discrimination, language barriers, uncertain legal status and limited access to services. WHO identifies community support, basic needs and security, stigma, adversity and trauma, and access to services as important factors affecting refugee and migrant mental health. Mental-health responses in humanitarian settings should therefore combine psychological support with protection, housing, food security, education, livelihoods and access to essential health services.

Social isolation and loneliness

Social relationships provide emotional support, practical assistance and a sense of belonging. Persistent social isolation or loneliness may therefore undermine psychological well-being. Health-promotion programmes should deliberately create opportunities for social participation, particularly for populations at increased risk of isolation, including older adults, displaced populations, unemployed persons and individuals experiencing social exclusion.

Digital technology and social media

Digital technology has both beneficial and potentially harmful implications for mental health. Social media can facilitate communication, information sharing and social support, but problematic patterns of use may be associated with psychological difficulties. Keles et al. (2020) systematically reviewed research concerning social media use and depression, anxiety and psychological distress among adolescents. Their review identified associations across several dimensions of social-media use, although much of the available evidence was observational. However, the relationship should not be presented as universally harmful. Valkenburg et al. (2022), in an umbrella review of 25 reviews, reported that most reviews

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characterized associations between social-media use and adolescent mental health as weak or inconsistent. Digital environments can also provide social support. Zhou and Cheng (2022), reviewing 14 studies involving 11,616 adolescents, found evidence that online social support may be beneficial, particularly for self-esteem, although causal relationships require further investigation. Health promotion should therefore focus on digital literacy, balanced technology use, online safety, and healthy sleep, critical evaluation of information and recognition of problematic use rather than treating all technology use as harmful.

Climate change and environmental disruption

Climate change is emerging as an important determinant of mental health. Extreme weather events, displacement, loss of livelihoods, environmental degradation and uncertainty can affect psychological well-being. Burrows et al. (2024) systematically reviewed evidence on chronic, slow-onset climate change and mental health and identified associations with depression, anxiety, psychological distress and other adverse outcomes. Cosh et al. (2024) similarly examined eco-anxiety, psychological distress and symptoms of major affective disorders and identified relationships between climate-related distress and several mental-health outcomes. Climate-related risks are also socially unequal. Communities with fewer economic and social resources may have less capacity to prepare for or recover from climate-related disruptions. WHO therefore emphasizes the effects of climate change on both environmental and social determinants of health.

Protective Factors for Mental and Emotional Health

Protective factors are individual, interpersonal, social, and environmental conditions that help people maintain good mental and emotional health and cope with life challenges. They can reduce vulnerability to psychological distress and strengthen resilience, particularly when individuals are exposed to stressful or adverse circumstances. The World Health Organization (WHO, 2025) identifies positive social interactions, supportive relationships, social and emotional skills, quality education, decent work, safe neighborhoods, and strong community connections as important factors that can support mental health.

Supportive relationships are particularly important because family, friends, peers, and community networks can provide emotional support, belonging, practical assistance, and opportunities for social connection. These resources can help individuals cope with stressful experiences and reduce the harmful effects of social isolation. Similarly, the development of social and emotional skills can improve individuals' ability to understand and manage emotions, communicate effectively, solve problems, and adapt to challenges (WHO, 2025). Education and meaningful employment can also protect mental and emotional health by providing knowledge, skills, social participation, purpose, and economic security. However, the quality of these environments is important; unsafe schools, workplace discrimination, excessive workload, and job insecurity may instead create psychological stress. WHO (2022) therefore recommends organizational and individual interventions to promote mental health in the workplace. At the community and societal levels, safe living environments, social inclusion, access to health and social services, and policies that reduce poverty and inequality can strengthen population mental health. Kirkbride et al. (2024) emphasize that protective factors should be considered alongside the wider social determinants of mental health because individual resilience is influenced by the social and structural conditions in which people live.

Mental-Health Promotion and Prevention

Mental-health promotion and prevention are important approaches for improving mental and emotional well-being and reducing the burden of mental disorders. Mental-health promotion focuses on strengthening positive mental well-being, resilience, coping skills, supportive relationships, and healthy social environments, whereas prevention aims to reduce exposure to factors that increase the risk of mental-health problems. The World Health Organization (WHO, 2022) emphasizes that mental-health promotion and prevention should be integrated into public health and should address individual, social, economic, and environmental conditions that influence well-being. Effective promotion and prevention require action at multiple levels. At the individual level, interventions can strengthen emotional regulation, coping skills, problem-solving, resilience, and mental-health literacy. At the family and school levels, supportive relationships, positive parenting, social and emotional learning, and early identification of emotional difficulties can help protect children and young people from later mental-health problems. Evidence from a systematic review of reviews indicates that preventive interventions can reduce mental-health problems among children and young people who are exposed to increased risk (McGovern et al., 2024).

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Community-based approaches are also important because mental health is influenced by social relationships and living conditions. Community education, peer support, social participation, stigma reduction, and accessible mental-health services can improve awareness and encourage appropriate help-seeking. In addition, addressing social determinants such as poverty, housing insecurity, discrimination, unemployment, and social exclusion is necessary because psychological interventions alone may not adequately address the conditions that contribute to poor mental health (Kirkbride et al., 2024; Oswald et al., 2024).

Role of Health Education in Mental and Emotional Health Promotion

Health education is an important component of mental and emotional health promotion because it equips individuals and communities with knowledge and practical skills for maintaining well-being, recognizing mental-health difficulties, and seeking appropriate support. Its role extends beyond the provision of information to include the development of emotional and coping skills, reduction of stigma, promotion of supportive relationships, and creation of environments that encourage healthy responses to psychological challenges (World Health Organization, 2022). A major contribution of health education is the improvement of mental-health literacy. Accurate and accessible information can help people understand mental health, recognize early signs of distress, distinguish between common emotional difficulties and conditions requiring professional attention, and become aware of available sources of support. Improved knowledge can also challenge misconceptions and negative attitudes that contribute to stigma and discourage help-seeking. World Health Organization (2022) emphasizes the need to strengthen mental-health promotion and prevention as part of a broader public-health response. Health education can also strengthen emotional regulation and coping skills. Education that develops emotional awareness, stress management, problem-solving, communication, resilience, and healthy coping can improve individuals' ability to respond to everyday challenges. This is particularly relevant for children and young people, as evidence from a systematic review of reviews shows that preventive interventions can reduce mental-health problems among those at increased risk (McGovern et al., 2024). Another important role is stigma reduction and promotion of appropriate help-seeking. Through schools, workplaces, health facilities, media, and community programmes, health education can challenge harmful beliefs about mental illness and encourage people to seek support when needed. However, education alone cannot overcome barriers created by poverty, discrimination, unemployment, social isolation, poor housing, or inadequate access to services. Mental-health promotion must therefore be combined with interventions that address these wider social determinants (Kirkbride et al., 2024). Health education is consequently most effective when it forms part of a multilevel health-promotion strategy. Individual education and skills development should be supported by healthy families, schools, workplaces, communities, accessible mental-health services, and policies that reduce social and economic inequalities. Evidence that interventions addressing social determinants can contribute to the prevention of mental disorders further supports the need for health education to be integrated with broader social and structural action (Oswald et al., 2024).

Mental Health in the Workplace

The workplace is an important social environment that can either support or undermine mental and emotional health. Work can provide income, social connection, purpose, routine, self-esteem, and opportunities for personal development. Conversely, poor working conditions, excessive demands, job insecurity, discrimination, violence, harassment, inadequate support, and limited control over work can create psychosocial risks that negatively affect mental well-being (World Health Organization, 2024). Therefore, mental health in the workplace should be considered within the broader social and environmental determinants of mental and emotional health discussed in this review. Work-related stress and other psychosocial risks may contribute to emotional distress and mental-health problems. The World Health Organization (2022) identifies factors such as excessive workloads, long or inflexible working hours, low job control, job insecurity, discrimination, violence, bullying, and poor organizational support as important workplace risks. These risks may be particularly significant for workers who experience prolonged exposure to stressful working conditions. A systematic review of 341 studies further demonstrated that employees' mental health and well-being are influenced by interconnected factors operating at macro-, organizational, and individual levels (Fan et al., 2024). This supports the view that workplace mental health cannot be explained solely by individual characteristics or coping abilities. The consequences of poor mental health extend beyond the individual worker. Psychological distress may affect concentration, motivation, relationships,

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work performance, attendance, and job retention. At the organizational level, poor mental health may contribute to absenteeism, reduced productivity, staff turnover, and difficulties in maintaining a healthy workforce. Globally, the World Health Organization (2022) estimates that approximately 15% of working-age adults have a mental disorder at any point in time, while depression and anxiety are associated with substantial productivity losses. Thus, protecting workers' mental health is important not only for individual well-being but also for organizational effectiveness and wider social and economic development. At the same time, employment can function as a protective factor for mental and emotional health when work is safe, decent, meaningful, and supportive. According to the World Health Organization (2024), decent work can contribute to recovery and social inclusion among people living with mental-health conditions and can improve confidence and social functioning. Supportive relationships with colleagues and supervisors, reasonable workloads, job security, opportunities for participation, work-life balance, and fair treatment can therefore strengthen workers' psychological well-being. This illustrates the importance of protective factors in reducing the effects of workplace stress. Mental-health promotion in the workplace requires attention to both the individual and the organization. Individual-level approaches may include stress-management training, psychological interventions, emotional and coping-skills development, and opportunities for physical activity. However, interventions directed only at individual workers may be insufficient when the major sources of distress arise from working conditions. The World Health Organization (2022) therefore recommends combining individual interventions with organizational measures that identify and address psychosocial risks.

Organizational interventions may involve modifying workloads, improving work schedules, increasing workers' participation in decisions, strengthening communication, preventing violence and harassment, and providing flexible working arrangements. Evidence from a systematic review among healthcare workers found that organizational interventions, particularly job and task modifications, flexible work and scheduling, and changes to the physical work environment, can improve aspects of mental health and well-being (Aust et al., 2024). These findings support a broader health-promotion approach in which workplace environments are modified to reduce risks rather than placing the responsibility for mental health entirely on individual workers. Health education is another important component of workplace mental-health promotion. Workers can be educated about mental health, common signs of psychological distress, healthy coping strategies, available support services, and appropriate help-seeking. Mental-health literacy can also challenge misconceptions and reduce negative attitudes towards people experiencing mental-health conditions. A systematic review by Tóth et al. (2023) found evidence supporting workplace interventions aimed at reducing mental-health-related stigma, although the effectiveness varied across intervention approaches. Health education should therefore be combined with supportive workplace policies and accessible services rather than being treated as a stand-alone solution. Managers and supervisors also have an important responsibility in creating psychologically healthy workplaces. Training managers to recognize signs of emotional distress, communicate effectively, listen actively, and respond appropriately can strengthen organizational support for workers. The World Health Organization (2022) specifically recommends manager training and worker training as components of a comprehensive workplace mental-health strategy. Such training can help create an environment in which workers feel safer discussing mental-health concerns and seeking assistance when necessary. Workplace mental-health promotion should also include protection and support for workers who already have mental-health conditions. Reasonable accommodations, flexible work arrangements, modified duties, supportive supervision, and return-to-work programmes can help affected workers remain in employment or return to work following periods of illness. The World Health Organization (2022) emphasizes that workers with mental-health conditions should be protected from discrimination and supported to participate and thrive in employment.

Climate Change and Mental-Health Promotion

Climate change is an important contemporary environmental determinant of mental and emotional health. Rising temperatures, floods, droughts, storms, wildfires, food and water insecurity, displacement, and loss of livelihoods can create conditions that increase psychological distress and reduce well-being. Climate change can also worsen existing social and economic determinants of mental health, including poverty, housing insecurity, unemployment, and limited access to health and social services (World Health Organization, 2022). Thus, its mental-health consequences should be

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considered within the broader social, environmental, and structural factors examined in this review. Climate-related effects on mental health can occur through both sudden and gradual pathways. Disasters may result in fear, trauma, bereavement, displacement, and loss of property, while prolonged drought, increasing temperatures, environmental degradation, and loss of livelihoods may produce continuing worry, grief, frustration, and uncertainty. Burrows et al. (2024), in a systematic review of 57 studies, found evidence linking chronic, slow-onset climate change with depression and anxiety symptoms, suicide, psychological distress, worry, grief, and frustration. However, the authors noted that findings were not uniform across studies, indicating that the relationship between climate change and mental health is influenced by individual, community, and societal circumstances. Climate change may also generate emotional responses such as climate-related anxiety, grief, fear, and feelings of helplessness. Although such responses may be understandable reactions to genuine environmental threats and should not automatically be regarded as mental disorders, persistent distress may affect psychological well-being.

Community-Based and Rights-Based Mental-Health Services

Community-based services can improve accessibility and help individuals remain connected to families and communities. World Health Organization (2022) argues that mental-health transformation should involve strengthening community-based services and reshaping environments that influence mental health. World Health Organzation's community mental-health guidance emphasizes person-centred and rights-based approaches. Such services should respect autonomy, dignity and participation while providing appropriate psychological, social and clinical support. Integrating mental health into primary health care is particularly important because primary-care settings can provide opportunities for early identification, health education, referral and continuing support.

Whole-of-Society Approach

Mental health cannot be improved by the health sector alone. Its determinants extend into education, employment, housing, social protection, justice, environment, transportation and community development. The WHO World Mental Health Report calls for stakeholders to deepen commitment to mental health, reshape environments and strengthen mental-health systems. A whole-of-society approach should therefore involve:

1. governments developing and financing effective mental-health policies;
2. health systems integrating mental health into primary and community care;
3. schools and universities promoting social and emotional well-being;
4. employers addressing psychosocial risks;
5. communities strengthening social connection and inclusion;
6. media organizations providing accurate mental-health information;
7. digital platforms supporting safer online environments; and
8. Researchers generating context-specific evidence. This approach is particularly important because interventions addressing only one determinant are unlikely to eliminate complex mental-health inequalities.

Challenges to Mental-Health Promotion

Several challenges continue to limit progress in global mental-health promotion. These include inadequate financing, shortages of trained personnel, unequal distribution of services, stigma, and insufficient integration of mental health into primary care and limited availability of community-based services. Another major challenge is unequal research representation. Although the evidence base is growing, research remains concentrated in particular geographical and socioeconomic settings. This creates difficulties in determining whether interventions developed in high-income countries are equally effective in low- and middle-income contexts. Digital inequality is another concern. Technology may improve access to information and services for some populations while excluding people without reliable internet access, digital devices or adequate digital literacy. Climate change, conflict, economic instability and forced displacement may further increase mental-health needs while simultaneously disrupting health systems. These challenges reinforce the need for context-sensitive interventions that combine mental-health promotion with broader social and economic policies.

Research Gaps and Future Directions

Future research should move beyond documenting mental-health problems and increasingly investigate how modifiable social and environmental conditions can be changed. More longitudinal studies are needed to clarify causal relationships

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between social determinants, digital technology and mental-health outcomes. This is particularly important because much of the social-media literature remains observational. Research should also increase representation from low- and middle-income countries. Local evidence is needed to understand how poverty, unemployment, culture, family structures, gender, social networks, climate change and health-service accessibility interact in different settings. Intervention research should evaluate integrated approaches that combine psychological prevention with social protection, education, livelihood support, housing and community development. Evidence from Prina et al. (2025) provides an important foundation for this direction. Future studies should also evaluate the effectiveness and sustainability of health-education interventions designed to improve mental-health literacy, reduce stigma and strengthen emotional and social skills.

Implications for Health-Promotion Practice

The evidence reviewed has several implications for health educators and public-health professionals.

1. Mental-health education should be integrated into existing health-promotion programmes rather than treated exclusively as a specialist activity.
2. Health educators should emphasize practical skills, including emotional regulation, communication, coping, problem-solving and help-seeking.
3. Mental-health promotion should occur across multiple settings, including schools, universities, workplaces, primary health-care facilities and communities.
4. Educational interventions should address stigma and misinformation using culturally appropriate and evidence-based communication.
5. Health-promotion professionals should recognize that individual behaviour is influenced by structural circumstances. Effective health promotion therefore requires both education and advocacy for healthier social environments.

Conclusion

Mental and emotional health is a fundamental component of individual and population well-being. Contemporary evidence demonstrates that psychological health is shaped by complex interactions among individual characteristics, family relationships, socioeconomic circumstances, community conditions and wider structural and environmental forces. Poverty, inadequate housing, unemployment, childhood adversity, violence, discrimination, social isolation, conflict, forced displacement, climate change and problematic patterns of digital engagement can increase vulnerability to poor mental health. At the same time, supportive relationships, emotional and social skills, quality education, decent employment, safe communities, social participation and accessible services can promote resilience. The evidence indicates that mental-health promotion cannot depend exclusively on clinical treatment or individual behaviour change. Social determinants must be addressed alongside individual and community-level interventions. World Health Organization's global mental-health framework similarly emphasizes prevention, promotion, community-based services and action on the environments that shape mental health (World Health Organization, 2021, & 2022). Health education has an important role in this process by improving mental-health literacy, reducing stigma, strengthening emotional and social skills, promoting healthy coping and encouraging appropriate help-seeking. Nevertheless, education is most effective when supported by healthy families, schools, workplaces, communities and public policies. Ultimately, improving mental and emotional health requires a coordinated whole-of-society response that combines health promotion, prevention, social protection, community development, accessible services and action on inequality. Such an approach offers a stronger foundation for healthier, more resilient and socially inclusive populations.

Recommendations

1. Governments should strengthen national mental-health promotion and prevention policies and integrate mental health into broader health, education, employment, housing and social-protection programmes.
2. Mental-health services should be integrated into primary and community health care to improve accessibility, early identification, referral and continuity of care.
3. Health education programmes should incorporate mental-health literacy, emotional skills, coping strategies, stigma reduction and appropriate help-seeking.
4. Schools and universities should develop supportive environments that address bullying, discrimination, social isolation and excessive academic pressure.

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5. Workplaces should implement evidence-informed organizational strategies that reduce psychosocial hazards and promote supportive working environments.
6. Community programmes should strengthen social connection, inclusion, peer support and participation, particularly among vulnerable populations.
7. Governments and development partners should address social determinants such as poverty, unemployment, housing insecurity and discrimination as components of mental-health policy.
8. Digital-health initiatives should promote safe and responsible technology use while expanding access to reliable mental-health information and support.
9. Mental-health considerations should be incorporated into climate-change adaptation, disaster preparedness and humanitarian-response planning.
10. Research institutions should increase high-quality longitudinal and intervention research, particularly in low- and middle-income countries, to identify culturally appropriate and sustainable mental-health promotion strategies.

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Influence of Audit on Fraud Mitigation in Public Procurement: A Case Study of Federal University of Health Sciences Otukpo, Benue State, Nigeria

ABAH, Michael Stephen[1]
Email: abahmyke2@gmail.com
Tel: 08036963652

UMORU, Raphael Sunday[2]
Email: raphaelumoru@gmail.com
Tel: 08065394068

ONMONYA, Ogezi Cephas[3]
Email: ogezicephas88@gmail.com
Tel: 08060029127

[1]Department of Accounting, Wesley University, Ondo State, Nigeria
[2]Wesley University, Ondo State, Nigeria
[3]Department of Accountancy, Benue State Polytechnic, Ugbokolo

Abstract

This study examines Procurement audit as a tool on fraud mitigation in public procurement, using the Federal University of Health Sciences, Otukpo (FUHSO) as a case study. Public procurement processes in Nigeria are often vulnerable to financial irregularities, contract inflation, and unethical practices that undermine compliance, transparency and accountability. The Procurement audit function serves as a vital mechanism for ensuring compliance, detecting irregularities, and promoting sound governance within public institutions. The report adopted a descriptive survey design, utilizing both primary and secondary data. Questionnaires were administered to staff of the Procurement Audit Unit, Procurement Department, Bursary Department, and Administrative Units directly involved in procurement processes at FUHSO. The collected data were analyzed using descriptive statistics, inferential techniques and regression analysis to determine the relationship between Procurement audit and fraud mitigation in procurement activities. Findings from the administered questionnaires revealed that Procurement audit significantly contributes to fraud detection, prevention, and control within procurement operations. However, its effectiveness is often hindered by challenges such as limited independence, inadequate resources, poor management support, and restricted access to procurement records. The study also found that timely implementation of audit recommendations and continuous capacity developments of Procurement auditors enhance fraud mitigation outcomes. The study concludes that a robust Procurement audit system is indispensable for promoting compliance, accountability, transparency, and integrity in public procurement. The study recommends that FUHSO and similar institutions strengthen Higher Education Institution Procurement audit functions through autonomy enhancement, adequate funding, and compliance enforcement. Additionally, there is a need for continuous procurement audit engagement in procurement planning, execution, and monitoring to minimize fraud risks and ensure value for money in public expenditure.

KEYWORDS: *Procurement, Audit, Mitigation. Fraud*

Introduction

Fraud in public procurement processes poses significant financial reputational risks especially in public sector. Procurement audits are a key control mechanism to mitigate fraud risks by examining procurement processes and transactions, for compliance and efficiency. In Nigeria the need for effective fraud mitigation in procurement is critical due to the prevalence of corruption risks like contract splitting, bid rigging, collusion, supply of inferior materials, and over invoicing. Public procurement represents one of the most significant areas of government expenditure and management of public resources. According to the World Bank (2019), procurement accounts for approximately 15–30% of GDP in many developing countries. Despite reforms such as the enactment of the Public Procurement Act (2007), loopholes persist in contract awards, tendering processes, supplier selection, and project execution. These weaknesses create fertile ground for fraud and misappropriation. Fraud in public procurement can manifest through contract inflation (Ezeji, U. (2025) & OECD (2025). Procurement Audit, by design, is positioned to serve as a watchdog over institutional compliance. Public

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procurement is one of the most critical functions in public sector management, as it involves the acquisition of goods, works, and services necessary for the smooth running of government and public institutions. In Nigeria, public procurement accounts for a significant proportion of government expenditure, representing almost 15–30% of the Gross Domestic Product (GDP). Because of the large volume of financial resources involved, the procurement process is highly susceptible to fraud, corruption, and mismanagement. This underscores the need for effective control mechanisms such as procurement Audit to mitigate risks and ensure accountability. Procurement Audit helps in assessing compliance with the Public Procurement Act (2007), detecting irregularities, preventing fraudulent practices, and ensuring that due process is followed. Its role goes beyond compliance, as it also supports management in identifying systemic weaknesses, strengthening Procurement controls, and promoting a culture of transparency. Fraud in public procurement manifests in different forms and as such, the research work specific objective will be, to examine its effectiveness on fraud mitigation in public procurement using FUHSO as a study area. This study is motivated by the growing demand for transparency and accountability in Nigerian public institutions. While the Public Procurement Act (2007) and other regulatory frameworks such as the Financial Regulations (2009) provide a legal foundation for procurement practices, their effectiveness largely depends on enforcement and monitoring. Procurement Audit, when adequately empowered and resourced, provides the assurance that procurement processes are conducted in accordance with these laws, thereby reducing the incidence of fraud. In summary, this research seeks to explore the impact of procurement Audit on fraud mitigation in public procurement, using FUHSO as a case study. It will assess the current audit practices in the University, identify gaps in the existing system, and propose strategies for strengthening the Procurement audit function to ensure effective fraud prevention and detection in procurement.

Objectives of The Study

The main objective of this study is to examine the Procurement audit procurement Audit on fraud mitigation in public procurement, with a specific focus on the Federal University of Health Sciences, Otukpo (FUHSO). The specific objectives of the study therefore, are

1. To verify compliance with laws, regulations, and Procurement policies governing procurement processes
2. To evaluate the economy, efficiency, and effectiveness of procurement processes and transactions.
3. To identify potential fraud, corruption, or irregularities in procurement activities.

Research Questions

The study seeks to answer the following report questions:

1. To what extent do procurement audits ensure compliance with laws, regulations, and Procurement policies in public procurements?
2. How do procurement audits evaluate the efficiency and effectiveness of procurement processes in achieving organizational objectives?
3. what is the Procurement audit procurement audits on detecting and preventing fraud in public procurement transactions?

Research Hypothesis

This study is anchored on the assumption that procurement Audit plays a significant role in fraud mitigation within public procurement processes. However, given the institutional peculiarities of Nigerian public universities, including FUHSO, it is necessary to empirically test these assumptions.

H_{01}: Procurement audits have no significant effect on ensuring compliance with laws, regulations, and Procurement policies in public procurements.

H_{02}: Procurement audits do not significantly assess the efficiency and effectiveness of procurement processes.

H_{03}: Procurement audits have no significant impact on detecting and preventing fraud in public procurement transactions.

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Research Methodology

This section describes the design, population, sampling methods, data sources, instruments, and analytical techniques to be employed to investigate the procurement Audit on fraud mitigation in public procurement in Federal University of Health Sciences, Otukpo (FUHSO). The methodology is designed to ensure rigor, reliability, and validity while addressing the research objectives.

Research Design

The study adopts a descriptive case study design. This design is suitable for exploring institutional processes such as procurement Audit and procurement in-depth within a single organization. A case study approach provides detailed insights into the interactions between audit practices and procurement fraud risks at FUHSO. The descriptive design also allows the researcher to document the current state of audit practices, identify gaps, and assess their effectiveness in mitigating procurement fraud.

Study Area

The study is situated in the Federal University of Health Sciences, Otukpo (FUHSO), located in Otukpo Local Government Area of Benue State, Nigeria FUHSO is one of the newly established specialized federal universities in Nigeria, created by the Federal Government to advance teaching, learning, and in health sciences and related fields. The University plays a critical role in training healthcare professionals, advancing medical, and supporting Nigeria's health sector development.

Population of Study

The population of the study comprises of 676 staff members as obtained from the nominal roll of the University which cut across both academic and nonteaching staff. Staff members who are directly or indirectly involved in procurement processes are sampled for questionnaire administration as on the table below. These staff members are the ones that are involve in procurement activities within the University departments including procurement, Bursary, Administrative Department, and Procurement audit since the organizational work is carried out in various departments. The population of the study comprised of staffs of the organization.

***Table 2*: Staff Population of FUHSO, Benue State**

SN	DEPARTMENT	NUMBER OF STAFF
1	Audit Staff	16
2	Procurement Staff	28
3	Bursary Staff	33
4	Heads of Units/Department	40
5	Senior Administrative & Management Staff	145
	TOTAL	**262**

Source: FUHSO HRM, (2026).

This population provides a holistic view of procurement and Audit processes at FUHSO.

Sample and Sampling Technique:

A purposive sampling technique was adopted. This ensures the inclusion of staff with direct knowledge and experience of procurement Audit and procurement processes. The sample size is adequate for a focused case study and allows for in-depth quantitative.

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Instruments of Data Collection

The study used both quantitative and qualitative instruments to obtain data to enhancing the credibility, validity, and reliability of the findings. A structured questionnaire was designed as the primary instrument for collecting quantitative data. The questionnaire was divided into sections based on the research objectives and variables under study. The questionnaire consisted of closed and open-ended questions (using the Likert scaling model of SA = Strongly Agree | A = Agree | U = Undecided | D = Disagree | SD = Strongly Disagree)

Methods of Data collection

The researcher sought approval from FUHSO management to access staff and relevant documents. Questionnaires was distributed in person to ensure maximum response and collected within a two-week timeframe. Interviews were scheduled based on participants' availability and conducted face-to-face to allow detailed probing. Confidentiality and anonymity was guaranteed to all participants, thereby encouraging openness and honest responses. Ethical considerations in data collection be applied for conformity through, Informed consent be obtained from all respondents before data collection, Participants be assured that the information gathered would be used strictly for academic purposes, Sensitive procurement and audit documents be handled with confidentiality and in compliance with institutional ethics guidelines.

Methods of Data Analysis Techniques

This section outlines the statistical techniques that will be employed to analyze data collected for the study on the impact of procurement Audit on fraud mitigation in public procurement, with specific reference to public sector institutions. The choice of techniques is guided by the study objectives, research questions, hypotheses, and the nature of the data collected.

The study will primarily generate quantitative data through structured questionnaires administered to procurement officers, Procurement auditors, finance officers, and management staff. Responses will be measured mainly on a Likert scale, making them suitable for both descriptive and inferential statistical analysis.

Presentation of Results

Presentation of the Results Based on the Specific Objectives

Objective (i): To verify compliance with laws, regulations, and Procurement policies governing procurement processes.

The result from the table showed the analysis of the question items on To what extent do procurement audits ensure compliance with laws, regulations, and Procurement policies in public procurements**.** 68 respondents (representing 26.0 %) strongly agreed, 127 respondents (representing 48.5 %) agreed, 44 (representing 16.8 %) disagreed and 23 respondents (representing 8.8 %) strongly disagreed. This result implied that procurement audits ensure compliance with laws, regulations, and Procurement policies in public procurements. In finding out, how often are procurement staffs trained on relevant laws and regulations, 61 respondents (representing 23.3 %) strongly agreed, 114 (representing 43.5 % agreed), 66 respondents (representing 25.2 %) disagreed while 21 (representing 8.0 %) of the respondents strongly disagreed. This implies that are procurement staffs trained on relevant laws and regulations. Also, finding out that, are procurement documents (e.g., tender documents, contracts) reviewed for compliance with laws and regulations, 65 (representing 24.8 %) of the respondents strongly agreed, 93 respondents (representing 35.5 %) agreed, 67 respondents (representing 25.6 %) disagree and 37 respondents (representing 14.1 %) strongly disagreed. Hence, we can conclude that procurement documents (e.g., tender documents, contracts) reviewed for compliance with laws and regulations.

***Table 3*: Respondents' Views on to verify compliance with laws, regulations**

SN	QUESTIONS	SA (%)	A (%)	U (%)	SD (%)
1	procurement processes in your organization guided by a clear procurement policy	68(26)	127(48.5)	44(17)	23(8.8)

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2	procurement staffs trained on relevant laws and regulations Are procurement documents (e.g., tender documents, contracts) reviewed for compliance with laws and regulations	61(23.3)	114(44)	66(25.2)	21(8)
3		65(24.8)	93(35.5)	67(26)	37(14.12)

Objective (ii): To Evaluate economy, efficiency, and effectiveness in FUHSO,

In order to evaluate economy, efficiency, and effectiveness in FUHSO, the table below was drawn and the results were presented: To evaluate the economy, efficiency, and effectiveness of procurement processes and transactions, 75 respondents (representing 28.8 %) strongly agreed, 86 respondents (representing 32.8%) agreed, while 52 respondents (representing 19.8 %) disagree and 49 (representing 18.7 %) of the respondents strongly disagree. This implies that economy, efficiency, and effectiveness of procurement processes and transactions is achieved through procurement audit.

Finding out that are procurement timelines (e.g., tendering, contract award) met?

80 (30.5 %) of the respondents strongly agreed, 69 (representing 26.3 %) agreed, while 53 (representing 20.2 %) disagreed and 60 (representing 22.9 %) strongly disagreed. This result implies that procurement timelines (e.g., tendering, contract award) met. Also, finding out that, how do you rate the use of resources (e.g., budget, staff) in procurement, 66 (representing 25.2) % of the respondents strongly agreed, 116 respondents (representing 44.3 % agreed), 34 (representing 13.0%) disagreed whereas 46 (representing 17.6 %) of the respondents strongly disagreed. We can conclude that, there is high rate use of resources (e.g., budget, staff) in procurement**.**

***Table 4*: Respondents' Views on to Evaluate economy, efficiency, and effectiveness**

SN	QUESTIONS	SA (%)	A (%)	U (%)	SD (%)
1	How do you assess the procurement planning process in your organization?	75(26)	86(48.5)	52(17)	49(8.8)
2	Are procurement timelines (e.g., tendering, contract award) met?	80(23.3)	69(44)	53(25.2)	60(8)
3	How do you rate the use of resources (e.g., budget, staff) in procurement	66(24.8)	116(35.5)	34(26)	46(14.12)

Objective (iii): To identify potential fraud, corruption, or irregularities in procurement activities in FUHSO.

To identify potential fraud, corruption, or irregularities in procurement activities in FUHSO, 72 respondents (representing 27.5 %) strongly greed, 102 respondents (representing 38.9 %) agreed, while 73 (representing 27.9 %) disagreed and 15 respondents (5.7 %) strongly disagreed. This implies that potential fraud, corruption, or irregularities in procurement activities are identified in FUHSO. Finding out whether employees find that, are there mechanisms for reporting suspected fraud or misconduct in FUHSO? 93(representing 35.5 %) of the respondents strongly agreed, 72 (representing 19.5 %) agreed, 47respondents (representing 17.9%) disagreed while 71 (representing 27.1 %) strongly disagreed. This result implied that, there are mechanisms for reporting suspected fraud or misconduct? Also in finding out that, are procurement transactions reviewed for anomalies frequently? 67 (representing 25.6 %) of the respondents strongly agreed, 98 respondents (representing 37.4 %) agreed, whereas 47 (representing 17.9 %) disagreed and 50 respondents (representing 19.1 %) strongly disagreed. Hence, we can conclude that, procurement transactions are reviewed for anomalies frequently?

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Table 5: Respondents' Views on to identify potential fraud, corruption, or irregularities

SN	QUESTIONS	SA (%)	A (%)	U (%)	SD (%)
1	Have you encountered any suspected fraud or irregularities in procurement processes?	72(26)	102(48.5)	73(17)	15(8.8)
2	Are there mechanisms for reporting suspected fraud or misconduct?	93(23.3)	72(44)	47(25.2)	71(8)
3	Are procurement transactions reviewed for anomalies frequently?	67(24.8)	98(35.5)	47(26)	50(17.93)

Discussion of Findings

This study examined the Procurement audit on fraud mitigation in public procurement**,** using the Federal University of Health Sciences, Otukpo (FUHSO) as a case study. A descriptive survey design was adopted, involving structured questionnaires, interviews, and document reviews. A total of 10 respondents, comprising Procurement audit staff, procurement officers, bursary staff, heads of departments, and senior administrators, provided responses. The data collected were analyzed using descriptive statistics, thematic analysis, and chi-square hypothesis testing. The study concludes that procurement audit is a critical tool for fraud mitigation in public procurement systems. When effectively implemented, it enhances transparency, ensures compliance with regulatory frameworks, and reduces opportunities for corrupt practices. Procurement audit not only detects fraud but also acts as a deterrent by increasing the likelihood of exposure and sanction.

Despite its importance, the effectiveness of procurement audit is often constrained by institutional weaknesses, lack of independence, and inadequate enforcement mechanisms. In many cases, audit findings are not acted upon, thereby limiting their impact on fraud prevention. Furthermore, the absence of modern audit tools and insufficient training of audit personnel reduces the ability of auditors to detect complex fraud schemes. Therefore, while procurement audit has significant potential to curb fraud, its success largely depends on the strength of institutional frameworks, the professionalism of auditors, and the commitment of management and government authorities to enforce accountability.

Conclusion

The study concludes that procurement audit is a critical tool for fraud mitigation in public procurement systems. When effectively implemented, it enhances transparency, ensures compliance with regulatory frameworks, and reduces opportunities for corrupt practices. Procurement audit not only detects fraud but also acts as a deterrent by increasing the likelihood of exposure and sanction. Despite its importance, the effectiveness of procurement audit is often constrained by institutional weaknesses, lack of independence, and inadequate enforcement mechanisms. In many cases, audit findings are not acted upon, thereby limiting their impact on fraud prevention. Furthermore, the absence of modern audit tools and insufficient training of audit personnel reduces the ability of auditors to detect complex fraud schemes. Therefore, while procurement audit has significant potential to curb fraud, its success largely depends on the strength of institutional frameworks, the professionalism of auditors, and the commitment of management and government authorities to enforce accountability.

Recommendations:

Based on the findings and conclusions of the study, the following recommendations are proposed:

1. Strengthen Procurement Audit Capacity

Public institutions should invest in continuous training and professional development of procurement auditors. This includes training in forensic auditing, data analytics, risk-based auditing, and fraud detection techniques.

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2. Enhance Independence of Procurement Auditors

Procurement audit units should be structurally independent from management and procurement departments to avoid undue influence. Reporting lines should be directed to higher authorities such as audit committees or governing councils.

3. Enforce Audit Recommendations

Government and institutional management must ensure strict implementation of audit recommendations. Sanctions should be applied to individuals found guilty of procurement irregularities to serve as a deterrent.

4. Adopt Technology-Driven Audit Systems

The use of e-procurement platforms and digital audit tools should be encouraged. Automation enhances transparency, improves audit trails, and facilitates real-time monitoring of procurement activities.

5. Strengthen Regulatory and Legal Frameworks

Existing procurement laws and audit regulations should be reviewed and strengthened to close loopholes. Anti-corruption agencies should collaborate closely with procurement auditors to ensure enforcement.

6. Promote Transparency and Public Disclosure

Procurement information such as tender notices, bid evaluations, and contract awards should be made publicly available. Transparency increases external scrutiny and reduces opportunities for fraud.

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Qualitative Study on Repositioning Parental Digital Mediation for an Improved Early Childhood Learning Outcomes among Public Primary Schools in Oyo State, Nigeria

SALAKO, Janet Adenike[1]
salakoja@eauedoyo.edu.ng
07032571124
OYATOBO, Foluso Iyadunni[1]
oyatobofi@eauedoyo.edu.ng
08067269635
OGUNLEYE, Titilayo Omowumi[1]
ogunleyeto@lasued.edu.ng
08025631117

[1]Department of Primary and Early Childhood Education, Faculty of Specialised and Professional Education, Emmanuel Alayande University of Education, Oyo State, Nigeria

Abstract

This paper examined parental digital mediation as a critical determinant of early childhood learning outcomes in selected public primary schools in Oyo State, Nigeria. Specifically, the study investigated the influence of parental digital mediation on early childhood learning outcomes, identified challenges affecting effective parental digital mediation and home-school collaboration, and proposed strategic measures for repositioning parental digital mediation as a sustainable framework for improving foundational learning outcomes among pupils. The study adopted a descriptive review approach and relied on relevant literature on early childhood education, parental digital mediation, and foundational learning outcomes. Empirical studies by educational researchers and stakeholders were also reviewed to establish the relationship between parental digital mediation and children's academic, emotional, and behavioural development. Findings revealed that the increasing integration of digital technologies into children's learning environments has transformed the role of parents from passive participants to active educational mediators responsible for regulating, guiding, and interpreting children's digital experiences. Effective parental digital mediation was found to enhance literacy development, numeracy skills, communication competence, and responsible technology use among children. However, challenges such as low parental digital literacy, poor home-school communication, poverty, and inadequate technological infrastructure hinder effective parental engagement. The paper concludes that parental digital mediation is an essential but underutilised factor in improving early childhood learning outcomes. It therefore recommends that government and educational stakeholders should organise regular digital literacy training programmes for parents, while schools should adopt digital communication platforms that encourage continuous parental involvement in children's learning and school improvement initiatives.

Keywords: Parental Digital Mediation, Early Childhood Education, Public Primary Schools.

Introduction

The rapid advancement of digital technologies has transformed virtually every aspect of human life, including the way children learn, communicate, and interact with their environments. In contemporary society, digital devices such as smartphones, tablets, computers, educational applications, and internet-enabled platforms have become integral components of children's daily experiences. Consequently, the educational landscape has undergone significant changes, particularly in early childhood education, where digital technologies increasingly shape learning opportunities both within and outside the classroom. While digital technologies offer substantial opportunities for enhancing learning, creativity, and communication, their educational value largely depends on how children engage with them and the extent to which parents provide guidance and supervision during their use. Early childhood education represents a critical stage in human development because it lays the foundation for future learning, behaviour, and overall well-being. During this period, children develop essential cognitive, linguistic, social, emotional, and motor skills that influence their lifelong educational trajectories. According to the United Nations Educational, Scientific and Cultural Organization (UNESCO, 2025), foundational learning begins in early childhood and encompasses literacy, numeracy, and socio-emotional competencies that serve as the building blocks for lifelong learning and successful participation in society. UNESCO further noted that children who fail to acquire foundational skills during their early years are more likely to experience learning difficulties,

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school dropout, and social exclusion later in life. Globally, educational policymakers and developmental agencies have increasingly recognized the importance of strengthening foundational learning outcomes among young learners. The United Nations Children's Fund (UNICEF, 2023) emphasizes that literacy, numeracy, communication, and socio-emotional competencies acquired during early childhood are essential for subsequent academic success and human capital development. Despite increased enrolment in basic education across many developing countries, evidence suggests that a significant proportion of children still fail to attain minimum proficiency levels in reading and mathematics, thereby undermining educational quality and sustainable development goals. In Nigeria, early childhood education occupies a strategic position within the educational system. The National Policy on Education recognizes Early Childhood Care and Development Education (ECCDE) as a fundamental stage for promoting holistic child development and facilitating smooth transition from home to formal schooling. However, despite policy commitments and educational reforms, many public primary schools continue to face challenges such as inadequate infrastructure, overcrowded classrooms, shortage of qualified teachers, poor funding, and weak parental involvement. These challenges have contributed to persistent deficiencies in literacy acquisition, numeracy competence, communication skills, and socio-emotional development among pupils. Among the numerous factors influencing children's educational outcomes, parental involvement has consistently emerged as a significant predictor of academic success. However, the digital transformation of learning environments has expanded parental responsibilities beyond traditional forms of educational support. Parents are increasingly required to regulate, monitor, interpret, and guide children's interactions with digital technologies. This evolving responsibility is commonly described as parental digital mediation. Parental digital mediation refers to the strategies and practices through which parents supervise, restrict, co-use, monitor, and actively guide children's engagement with digital media and technologies. Recent studies indicate that effective parental digital mediation contributes to positive educational outcomes by promoting responsible technology use, enhancing literacy development, strengthening cognitive engagement, and reducing exposure to harmful online content. The growing digitalisation of childhood has made parental digital mediation increasingly important. Research has shown that active parental mediation, which involves discussing digital content, co-using digital resources, and guiding children toward educational applications, is associated with improved cognitive development, language acquisition, and academic engagement. Conversely, inadequate parental supervision may expose children to excessive screen time, digital distractions, inappropriate content, and problematic technology use, all of which may negatively affect learning outcomes. Studies have further demonstrated that parental guidance significantly influences how children utilise digital technologies for educational purposes and how they develop self-regulation skills in digital environments.

Furthermore, effective home-school collaboration remains an essential component of children's educational success. The home serves as the child's first learning environment, while the school provides structured opportunities for formal learning and socialisation. Recent evidence suggests that digital communication technologies can strengthen parent-educator relationships and facilitate greater parental participation in children's learning processes. Strong collaboration between parents and schools creates consistency between home-based and school-based learning experiences, thereby enhancing children's academic achievement and socio-emotional development. In Oyo State, concerns about declining educational standards and poor foundational learning outcomes among pupils in public primary schools have generated increasing attention among educational stakeholders. Although access to digital technologies continues to expand, many families face challenges such as poverty, inadequate digital literacy, poor internet connectivity, irregular electricity supply, and limited awareness of effective digital parenting practices. Consequently, many children interact with digital technologies without adequate educational guidance, thereby limiting the potential benefits of digital learning and increasing exposure to associated risks. Despite growing scholarly interest in parental involvement and digital learning, empirical studies focusing specifically on parental digital mediation as a determinant of early childhood learning outcomes in public primary schools in Oyo State remain limited. Existing studies have largely examined parental involvement, digital technology usage, or academic performance independently, with little attention given to the interconnected relationship between parental digital mediation and foundational learning outcomes. Therefore, there is a need to reposition parental digital mediation as a critical educational strategy capable of enhancing literacy, numeracy, communication competence, and socio-emotional

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development among early childhood learners. It is against this background that this study examines parental digital mediation as a critical determinant of early childhood learning outcomes in public primary schools in Oyo State, Nigeria.

Objectives of the Study

The aim of this paper is to examine parental digital mediation as a critical determinant of early childhood learning outcomes in public primary schools in Oyo state. The specific objectives of the study are to:

1. examine the influence of parental digital mediation on early childhood learning outcomes in public primary schools in Oyo state.
2. investigate the challenges affecting effective parental digital mediation and home- school collaboration in early childhood education.
3. propose strategic measures for repositioning parental digital mediation as a sustainable framework for improving foundational learning outcomes among pupils in public primary schools in Oyo state.

Literature Review

Concept of Early Childhood Education

Early childhood education has become one of the most significant areas in education because it has tremendous impact on a child's intellectual, emotional, linguistic, physical and social development. Scholars agreed that early years in life are the foundational stage during which a child acquires the basic things needed for learning in future and adjustment socially. Invariably, the quality of education at this stage determines a child's future academic achievements (Laura, 2013). Early childhood education entails organised educational programs and activities designed for children before the commencement of formal primary education. It is the care, stimulation, instructions and social development available to children within their years of formative development. The federal republic of Nigeria stated that early childhood education involves the education given to children prior to their primary level (NERDC,2013). Education at this level is meant to facilitate eventful transition from home to school while preparing pupils to adjust cognitively, physically, emotionally and socially to formal education. George (2019) emphasised that early childhood education is the process of supporting and promoting children's holistic development through structured learning experiences in a bid to enhance cognitive growth, communication skills, creativity and emotional adjustments. Gestwicki, (2016) further viewed early childhood education as a process through which children acquire intellectual and behavioral competencies needed for a permanent, lifelong and productive citizenship. These perspectives indicate that early childhood education extends beyond classroom instruction and include a child's total experiences that aids in shaping and developing capacities. In the global scene, early childhood education is seen as a vital component required for sustainable national development. International bodies such as the United Nation's Children Fund and the United Nations Educational Scientific and Cultural Organisation (UNESCO) states that investment in education at the foundational stage significantly leads to educational equity, eradication of poverty, literacy development and human capital development (UNICEF,2019). One of the goals of early childhood education is the development of foundational skills, this includes acquisition of basic literacy, numeracy, communication, reasoning and socio-emotional competencies that helps students to function effectively in formal educational systems (UNESCO,2023). Majority of the students who fails to toil this part often have persistent academic difficulties in their later years, early childhood education is therefore regarded as the bedrock upon which future educational achievements is built. Early childhood education has received great attention from government in Nigeria over the year. The Nigerian national policy on education recognizes the early childhood care and education as very important for promoting holistic child development.

The policy identifies several objectives to include ensuring smooth transition from home to school, preparing children for primary education, developing creativity and promoting co-operation through play- based learning activities. This has not stopped the challenges faced as it relates to early childhood education. Public primary schools in rural and semi-urban areas are faced with the problem of infrastructural deficit, shortage of qualified teachers, overcrowded classrooms, poor educational materials and weak parental involvement (Adeniyi,2022). The Oyo state government has introduced notable educational reforms but many children in public primary schools encounter difficulties in reading culture, classroom participation and digital learning. The nature of early childhood education in recent years has been transformed globally in contemporary times. The advent and availability of digital tools and devices such as smartphones, computers and internet

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enabled learning platforms has influenced and affected the way pupils access information and interact within their learning environment. Sonia and Alicia (2020). Children are exposed to digital tools at an early stage both at home and in the school setting. Though these gadgets provide opportunities for educational development, there is still a growing concern about excessive exposure to screen, reduced attention span, social isolation and inappropriate media content. These indices points to the importance of parental digital mediation. Children are not independent they need someone to regulate their interactions with digital media. Parents are expected to guide, monitor, supervise and structure children digital engagement.

Foundation Learning Outcomes

Foundational learning outcomes have become a central concern in contemporary educational research. It is a core determinant in children's capacity building and ability to participate meaningful in formal education and lifelong learning processes. Educational stakeholders, policymakers and International development organisation emphasizes that quality of learning received at the foundational stage plays a significant role in influencing a child's future academic achievements and social development (UNICEF,2017). Foundational learning encompasses basic competencies, skills, knowledge, attitude and developmental abilities that children are expected to acquire during their early educational years. These outcomes generally include literacy skills, numeracy competence, communicative ability, cognitive reasoning, problem solving skills, creativity, emotional regulation and social interactions (Laura,2013) Foundational learning is not just about mere acquisition of academic content to include the development of holistic capacities necessary for effective participation in school and society. According to UNESCO (2023) foundational learning outcomes represent the minimum competencies children must achieve in reading, writing, numeracy and socio-emotional learning in order to progress successfully within educational systems. Literacy development constitutes one of the most vital dimensions of foundational learning outcomes. Literacy is the ability to read, write, interpret and communicate meaning effectively within different social and educational context (Olson & Torrance, 2009). During early childhood, children develop vocabulary, phonemic awareness, sentence construction, comprehension skills and communicative competence achieved through interaction with parents, teachers, peers and learning environment. A strong foundation in literacy skills greatly helps pupils to enhance their academic tasks in future. Similarly, numeracy development is another critical component of foundational learning outcomes. It refers to the ability of children to understand numbers and all it encompasses such as counting, measurements, patterns and basic mathematical reasoning (Douglas & Julie,2014) Early numeracy competencies help children to develop critical thinking, logical and analytical reasoning and problem solving abilities that are required (UNICEF ,2017)) for progress in education. Research has shown that children who acquire strong numeracy foundation during their early years performs better academically at their later years (George,2013).

Foundational learning activities outcomes include socio- emotional and behavioral competencies. Early childhood education promotes children's emotional stability, self- confidence, co-operation, discipline, creativity and social interactions skills (Gestwicki,2016) Communication effectiveness is another crucial skill needed to achieve a solid foundational learning outcomes. In Nigeria, poor foundational learning outcomes have generated interest and policy debate. Despite government efforts towards improving access to basic education, many pupils in public primary schools still experience difficulties in reading, comprehension, writing skills, communication competencies and basic numeracy (NERDC,2013). Reports by educational agencies indicates that many pupils' complete slower primary education without acquiring adequate literacy and numeracy skills expected of them at that level (UNICEF,2022). This is a pronounced challenge especially in many publics schools in Oyo state where overcrowded classrooms, lack of qualified teachers, poverty negatively affects children (Olayemi & Oyebanji, 2024). The advent of digital technologies though has great potential but uncontrolled digital exposure may negatively affect foundational learning through reduction in attention span, limiting physical interactions and excessive entertainment consumption. In this context, parental digital mediation is needed. Parents are expected to supervise children's digital engagement, regulate their screen and ensure that digital resource contribute positively to children educational advancements (Epstein, 2011). Foundational learning outcomes should not be seen as merely a classroom achievement but as a product of interconnected educational experiences involving schools, homes, parents, teachers and digital environment. In contemporary educational landscape, improving learning

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outcomes among pupils in public primary schools in Oyo state requires stronger attention to parental digital mediation, educational technology supervisor and collaborative home - school partnership.

Digital Technology and Parental Mediation in Early Childhood Education

The rapid advancement of digital technology has tremendously transformed contemporary educational as system and learning experiences across the world. In recent times, children have become greatly exposed to digital devices such smartphone, tablets, computers, television, internet platform, educational applications and social media technologies (Sonia & Blum-Ross,2020) It has emerged as a major factor influencing children's cognitive development, communication patterns, learning behaviour and social interactions within both home and school environment. Digital technology are electronic tools, system, devices and resources that generate, process, store and transmit information in digital forms. According to Neil (2017). In education, digital technology covers Internet enabled learning platforms, educational software, multimedia resources, digital games, virtual classrooms, interactive application and communication technologies used to facilitate teaching and learning processes.

In early childhood education, digital technology has become relevant because children are now exposed to technology mediated learning experiences both formally and informally with mobile devices before attaining school age, thereby making digital interactions on important aspects of early socialisation and learning (Tapscott, 2009). Scholars stressed that digital technology can positively support foundational learning outcomes when used appropriately. Interactive educational applications, audio-visual learning materials, digital story telling platforms and child centered educational games can enhance literacy development, vocabulary acquisition, numeracy skills, creativity and problem solving abilities among early childhood learners (George, 2019) In Nigeria, the integration of digital technology in education became more pronounced after the global COVID-19 pandemic which disrupted traditional classroom instruction and accelerated the adoption of online and technology assisted learning practices (Federal Ministry of Education,2021). During these periods, many children relied on digital devices for educational interactions, virtual learning and access to instructional materials. It expanded educational access for some children but also shows the inequalities relating to technological infrastructure, internet accessibility, electric supply and parental supervision. In spite of the benefits associated with technological devices, concerns have been raised as regards its potential negative effect such as excessive screen exposure, reduced concentration, poor reading culture, behavioral problems, sleep disorders, social isolation and limited physical interaction (UNESCO, 2023). These concerns have generated interest in parental media as a systematic strategy for regulating children's interaction with digital technologies. It is a deliberate and strategic measures through which parents supervise, regulate, interpret, monitor and guide children media consumption and digital engagement (Sonia & Helper, 2008) Scholars have identified several dimensions of parental digital mediation. Active parental mediation involves parents discussing digital content with their children, explaining online expressions and guiding the children towards meaningful learning activities. Restrictive parental digital mediation is the establishment of rules regulating screen time, internet access and media exposure. Co-use parental digital mediation occurs when parents participate directly in children's digital activities. Digital mediation includes the use of monitoring software, password and digital control mechanism to regulate children's online interactions (Epstein,2011). Effective parental digital mediation positively influences early childhood education. Children that demonstrate improved literacy development, better communication skills, stronger academic engagement and healthy technological habits. Within the Nigerian society, parental digital mediation is plagued with several challenges. Many parents lack adequate literacy skills necessary for supervising children online activities effectively. Economic restraints are another major factors, it limits access to educational technologies and stable internet connectivity (Afe Babalola,2024) Some parents underestimate parental digital monitoring or mediation because of limited awareness. The challenges become more evident in public primary schools in Oyo state where families struggle with poverty, poor and technological infrastructure and limited educational resources. Many pupils in public schools engage with digital technologies, without adequate educational guidance, thus leading to poor concentration, declining reading culture and weak academic engagement.

Empirical studies on Digital Parental Mediation

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A study by Sonia & Blum-Ross (2020) discovered that parents who actively get involved in guiding children's digital activities tends to achieve greater educational outcomes when compared to those who rely solely on restrictive control. The study mphasized that action mediation and Co-mediation improves children's ability to interpret educational content critically. Also, Ahn and Mceachin (2021) reported that parental engagement in digital learning environment greatly improves children early literacy and numeracy development, especially when it involves the use of educational apps and interactive tools used under close monitoring. Recent study by Nikken and Schools (2022) affirmed that parental mediation strategy such as Co-use and active discussion of digital content positively influences early childhood cognitive development. The study concludes that children whose parents participate in digital learning experiences demonstrate stronger attention span, vocabulary development and problem solving abilities. These findings reinforce the argument that parental digital mediation is not merely protective but also educationally formative. (Nikken,2020) Recent research evidence reveals that digital technology has both positive and negative effects on early childhood learning outcomes depending on the level of parental mediation. Neumann (2020) discovered that high quality education apps improve early children literacy skills with parental guidance. Neumann (2020) and OECD (2021) reported that children exposed to guide digital learning at home perform better in foundational literacy and numerical assessment than those with unrestricted screen exposure emphasising the fact that parental supervision is key factor between digital exposure and educational outcomes. In Nigeria, Adigwe, Mason and Gromik (2021) investigated parental mediation practices in Nigerian families and discovered that parental digital literacy significantly influences the type of mediation adopted. In another study, Olojede and Adebayo (2023) examined digital devices usage among primary school pupils in Lagos and discovered that uncontrolled screen exposure negatively affects reading culture and classroom concentration. Ogunna and Majebi (2025) stated in their study that parental factors significantly predict school readiness among nursery school pupils in Ibadan, Oyo state. The study concludes that parental engagement in learning activities at home enhances child cognitive readiness and classroom adaptation (Oloyede & Adebayo,2023) According to Atanda and Okolo (2021) reported that parental involvement has significant positive influence on students' academic performance in Ibadan South-West LGA. The study stressed that lack of parental engagement contributes to poor academic performance. Although the study did not focus on digital mediation but it affirmed the importance of parental participation in children learning process (Nwafor & Obi, 2022).

Discussion of Findings

Empirical and theoretical literature hinged on the fact that parental digital mediation plays a decisive role in shaping early childhood learning outcomes in contemporary educational settings. The continuous integration of digital technologies into children's learning environments has transformed the role of parents from being passively involved to becoming active educational mediators saddled with the responsibility of regulating, interpreting, and guiding children's digital experiences. Studies also show that when parents engage in active digital mediation, children demonstrate improved literacy acquisition, stronger numeracy skills, enhanced vocabulary development, and better cognitive engagement (Nikken,2022). Active mediation entails explaining digital content, co-viewing educational media, and guiding children toward educational applications rather than entertainment-based content. This form of mediation enhances children's ability to process information critically and connect digital experiences with formal classroom learning. Conversely, literature indicates that many parents adopt restrictive mediation, which focuses primarily on limiting screen time without engaging in meaningful instructional support. While restriction may reduce exposure to harmful content, it does not necessarily promote educational development (Oloyede & Adebayo,2023). This creates a gap between digital access and meaningful learning, particularly in early childhood education where guided interaction is crucial for cognitive development. In the context of public primary schools in Oyo State, this distinction is highly significant. Many children are exposed to smartphones and digital devices at home, but without structured parental guidance, such exposure often becomes entertainment-driven rather than educational. As a result, digital tools that should enhance foundational learning outcomes instead contribute to distraction and reduced academic engagement. Therefore, the literature supports the position that parental digital mediation is not merely a supervisory function but an instructional support mechanism that directly influences early childhood learning outcomes (Neumann, 2020) Where parental mediation is strong and educationally oriented, children show better reading habits, improved communication skills, and stronger readiness for classroom learning.

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Challenges Affecting Effective Parental Digital Mediation and Home-School Relationships

A major theme emerging from the literature is that despite the potential benefits of parental digital mediation, several structural, socio-economic, and educational challenges limit its effectiveness, particularly in developing contexts such as Nigeria.

(1) Low Digital Literacy among Parents

One of the most critical challenges is the low level of digital literacy among parents. Many parents lack the technical skills required to understand how digital platforms, educational applications, and online learning environments function (Adigwe, Mason & Nicolas, 2021). This limits their ability to guide children's digital usage effectively. Without adequate digital competence, parents are unable to differentiate between educational and non-educational content, thereby weakening the quality of mediation provided.

(2) Socio-Economic Constraints

Another major challenge is socio-economic limitation. In many households within public school communities in Oyo State, access to stable internet services, digital devices, and electricity remains inconsistent (OECD, 2021). These infrastructural limitations reduce opportunities for meaningful digital learning and also limit parental participation in digital education (NERDC,2013).

(3) Weak Home-School Communication Systems

The literature further reveals that home-school communication remains largely traditional in many Nigerian public primary schools. Communication between teachers and parents is often limited to physical meetings or informal channels, with minimal use of structured digital platforms (Nwafor & Obi, 2022). This weak communication structure limits the ability of schools to guide parents on effective digital mediation practices.

(4) Parental Perception of Education as School-Based

Another important challenge is the persistent perception among some parents that education is exclusively the responsibility of schools. This perception reduces parental engagement in children's learning activities at home, including digital learning supervision (Ogochukwu, Ogunna & Majebi,2025). As a result, children's digital experiences remain largely unregulated, particularly outside school hours. In Oyo State public primary schools, these challenges are compounded by overcrowded classrooms, inadequate instructional resources, and limited teacher capacity to engage parents in structured digital learning collaboration. Consequently, parental digital mediation remains weak despite the increasing presence of digital devices in children's environments.

Repositioning Parental Digital Mediation for Improved Learning Outcomes

A central argument emerging from the literature is that parental digital mediation must be repositioned from a passive or protective function to a strategic educational intervention capable of improving early childhood learning outcomes.

(1) Radical Shift from Restriction to Active Mediation

The literature strongly suggests that over-reliance on restrictive mediation limits the educational benefits of digital technology. Instead, parents must adopt active mediation strategies that involve co-learning, explanation of content, and guided engagement with educational digital tools. Sonia and Alicia (2020). This shift is essential for transforming digital exposure into meaningful learning experiences.

(2) Integration of Digital Literacy Training for Parents

Repositioning parental digital mediation requires deliberate investment in parental digital literacy education. Parents need structured training on how to use educational applications, monitor Carol (Gestwicki,2016) online learning, and support children's digital homework activities. Without such training, parental involvement in digital education will remain ineffective.

(3) Empowering Home-School Digital Collaboration

Another repositioning strategy is the strengthening of home-school collaboration through digital platforms. Schools should actively engage parents through messaging systems, online portals, and digital feedback mechanisms. This ensures continuous communication about children's learning progress and digital learning activities (OECD,2021) such collaboration creates consistency between home-based and school-based learning experiences.

(4) Systematic Policy Integration of Digital Parenting in Education Frameworks

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The literature also indicates the need for policy-level integration of digital parenting into early childhood education frameworks. Educational authorities should recognize parental digital mediation as a formal component of foundational learning strategies, especially in public primary schools where learning outcomes are often below expectations. In Oyo State, where foundational learning challenges remain persistent, repositioning parental digital mediation is particularly urgent. Strengthening parental involvement in digital learning is likely to improve literacy development, numeracy skills, classroom engagement, and socio-emotional development among early learners.

Conclusion

This study examined the role of parental digital mediation in early childhood learning outcomes in public primary schools in Oyo State, with particular concern to how home-school relationships influence children's foundational learning in a rapidly digitalisng educational environment. From the review and discussion of literature, the findings indicate early childhood learning outcomes are no longer shaped exclusively within the classroom but are increasingly influenced by children's digital experiences at home. The study affirmed that parental digital mediation significantly influences children's literacy development, numeracy skills, attention span, and overall school readiness. However, where parental mediation is weak or limited to mere restriction of screen time, digital exposure often leads to distraction, poor reading habits, and reduced academic engagement. The study also indicated that several challenges hinder effective parental digital mediation in Nigeria, particularly in Oyo State public primary schools. These include low digital literacy among parents, socio-economic limitations, weak home-school communication systems, and inadequate integration of parents into digital learning processes. these challenges reduce the effectiveness of digital tools in improving foundational learning outcomes. Furthermore, the study concluded that the current approach to parental involvement in children's education is no longer sufficient in a digital learning era. There is an urgent need to reposition parental digital mediation from a passive supervisory role to an active educational partnership between home and school. This repositioning is necessary for bridging the gap between digital exposure and meaningful learning outcomes among early childhood learners. Therefore, the study concludes that parental digital mediation is a critical but underutilized determinant of early childhood learning outcomes in public primary schools in Oyo State, and its effective integration into home-school collaboration frameworks is essential for improving foundational education.

Recommendations

Based on the findings, the study recommends that:

1. Government and educational stakeholders should organize regular digital literacy and capacity-building programmes for parents, particularly those whose children attend public primary schools.
2. Public primary schools in Oyo State should adopt digital communication platforms that facilitate continuous parental involvement in educational planning, monitoring, and school improvement activities.
3. State and local governments should invest in reducing digital inequality through the provision of affordable internet access, reliable electricity supply, and digital learning devices in public primary schools.

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Principals' Administrative Practices and Sustainable School Development among Public Secondary Schools in Oyo State, Nigeria.

WAHEED, Toyin Oyebamiji[1]
oyebamijiwaheed3@gmail.com
ORCID: **0009-0000-7543-7168**

OKETUNBI, Okeyode Abraham[2]
oketunbioa@eauedoyo.edu.ng
ORCID:**0009-0006-2767-8294**

RAJI Rukayat Mojisola[2]
rajirm@eauedoyo.edu.ng

[1]National Institute for Educational Planning and Administration (NIEPA), Ondo
[2]Department of Educational Management, Emmanuel Alayande University of Education, Oyo

Abstract

This study was conducted to investigate principals' administrative practices and sustainable school development in public secondary schools in Oyo State, Nigeria. The study adopted a correlational research design with a population of 5,398 teachers in public secondary schools in the 11 Local Government Areas (LGAs) of Oyo Central Senatorial District who teach in 17, 244 schools. This study was conducted using a multistage sampling procedure. In the first stage, Oyo Central Senatorial District was randomly selected from the senatorial districts in Oyo State. Six Local Government Areas; representing about 50% of the 11 LGAs, were selected in the second stage. In the third stage, sixty (60) public secondary schools were randomly selected from the sampled Local Government Areas. In the last stage, sixty (60) principals and 540 teachers were selected, giving a total number of 600 respondents. The data collected were analysed using weighted mean and standard deviation for descriptive statistics, Pearson Product Moment Correlation, regression and t-test analysis. The study revealed that principals' administrative practices in public secondary schools in Oyo State were highly rated with a weighted mean of 3.16 while sustainable school development was also highly rated with a weighted mean of 3.07. The study further revealed that there is a significant positive relationship between principals' administrative practices and sustainable school development ($r = 0.62$, $p < .05$). Regression analysis also revealed that principals' administrative practices significantly contributed towards sustainable school development accounting for 37.9% of its variance. In addition, the study revealed that there is no significant difference between the opinions of principals and teachers on the contribution of principals' administrative practices towards sustainable school development as evidenced by the reported t-value of 1.65 which was lower than the critical value of 1.96. The study concluded that effective principals' administrative practices are necessary for the achievement of continuous school development in public secondary schools. It was further recommended that principals should put more effort into instructional supervision, teacher motivation participatory decision making, stakeholder collaboration and monitoring of school improvement initiatives while government should provide sufficient resources and capacity building opportunities for school leaders.

Keywords: Principals' Administrative Practices, Sustainable School Development, Secondary Schools

Introduction

Sustainable school development has been an emerging issue in secondary education which schools are expected to sustain continuous improvement in teaching and learning, staff development, stakeholder participation and the achievement of educational goals. Public secondary schools in Nigeria continue to experience challenges that can undermine sustained development such as inadequate infrastructure, insufficient funding, changing educational demands and limited institutional capacity. Adenuga et al. (2025) identified inadequate infrastructure, outdated curricula and insufficient funding as significant constraints to sustainable development in secondary education. Similarly, Olanrewaju and Abdulkareem (2021) reported a significant relationship between school development planning and school effectiveness indicating importance for deliberate school development efforts in improving educational outcomes. The sustainability of school development, however, requires not just the availability of policies and programmes but also effective administration at the school level. Principals play a pivotal role as they coordinate teachers, supervise instruction, communicate school policies, motivate staff, facilitate decision-making and manage conflicts. Effective administrative practices can provide an

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enabling environment for teachers to perform their duties and for school improvement initiatives to continue. Ogharen (2022) highlighted the importance of principals' administrative practices and teacher participation in decision-making for effective school administration. Ereh et al. (2025) also demonstrated the continued relevance of principals' administrative practices for effective functioning of public secondary schools.

Principals' administrative practices can therefore be a key mechanism for promoting sustainable school development. Effective instructional supervision may support continuous improvement of teaching and learning, while staff motivation can enhance teachers' commitment to school goals. Participatory decision-making can increase ownership of school programmes, effective communication can improve coordination, and appropriate conflict management can contribute to a stable school environment. In support for this position, Nwabueze et al. (2023) found principals' leadership skills and administrative practices significantly contributed to a sustainable peaceful learning environment in secondary schools. Similarly, Okaforcha and Obijiaku (2025) identified motivational, supervisory, participatory decision-making and professional-development practices as important aspects of principals' administration. Despite their contributions, recent Nigerian studies have mainly focused on principals' administrative practices in relation to teachers' job performance, commitment, administrative effectiveness and school climate, with limited exploration about their contribution to sustainable school development as an outcome. The extent to which principals' administrative practices contribute to the sustained development of public secondary schools in Oyo State therefore requires empirical investigation. This study consequently explores principals' administrative practices and sustainable school development in public secondary schools in Oyo State, Nigeria with a view to providing evidence for strengthening school administration and sustaining educational improvement.

Statement of the Problem

Sustainable development of public secondary schools continues to be a concern, as many schools struggle to achieve continuous improvement of teaching and learning, staff development, stakeholder participation and school improvement programmes. Although principals are tasked with providing the administrative direction required to sustain school development, weaknesses in supervision, staff motivation, communication, participatory decision-making and conflict management can impede the effective and continuous development of schools. Existing studies have mainly focused on principals' administrative practices in relation to teachers' performance and other school outcomes, with limited focus on sustainable school development, particularly in Oyo State. The issue, therefore, is whether principals' administrative practices are sufficient to promote sustainable development of public secondary schools in Oyo State. This study consequently explores principals' administrative practices and sustainable school development in public secondary schools in Oyo State, Nigeria.

Literature Review

Principals' Administrative Practices

Principals' administrative practices are the organised and purposeful actions through which principals coordinate school activities, direct staff and utilise institutional processes to achieve educational objectives. The concept encompasses the behaviours and strategies used in planning, organising, supervising, communicating, motivating staff, making decisions and managing relationships within the school. Ogharen (2022) describes principals' administrative practices in terms of the activities through which school leaders coordinate personnel and school operations, emphasising effective communication and teacher participation in decision-making. Similarly, Oguejiofor (2023) regards administrative practices as important managerial activities through which principals influence the effective performance of teachers and the functioning of schools. Thus, principals' administrative practices are not limited to routine office functions but are the leadership processes through which principals create direction, coordination and support for the achievement of school goals. Ereh et al. (2025) further emphasis on the relevance of principals' administrative practices to effective administration of public secondary schools. In this study, principals' administrative practices are understood as the extent to which principals effectively supervise instruction, motivate teachers, involve staff in decision-making, communicate school matters, delegate responsibilities and manage conflicts to facilitate effective school administration.

Sustainable School Development

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Sustainable school development refers to the continuous and long-term process through which schools maintain, improve and adapt their educational programmes, personnel, practices and institutional capacity to achieve enduring educational outcomes. The concept goes beyond temporary improvement because it emphasises the ability of schools to preserve educational gains while responding appropriately to emerging challenges and changing educational demands. Olanrewaju and Abdulkareem (2021) associate school development with systematic planning and continuous efforts to improve school effectiveness, while Eze (2022) links sustainable educational development with the capacity of schools to implement practices that support enduring educational improvement. Sustainable school development therefore involves maintaining effective teaching and learning, supporting continuous professional development, sustaining school improvement initiatives and fostering constructive relationships with stakeholders. Berezi (2024) further identifies stakeholder collaboration as relevant to sustainable development of secondary school education, indicating that long-term school development requires shared commitment and support beyond the principal alone. In this study, sustainable school development refers to the capacity of public secondary schools to sustain continuous improvement in teaching and learning, teacher development, stakeholder engagement, educational programmes and institutional responsiveness over time.
write theoretical framework in prose briefly, choose one relevant

Theoretical Framework

Transformational Leadership Theory

Transformational Leadership Theory was developed by Burns (1978) and further developed by Bass (1985). The theory explains how leaders influence followers by providing vision, inspiring commitment, encouraging participation and motivating them to work beyond immediate individual interests towards shared organisational goals. In school administration, the theory emphasises the principal's ability to inspire teachers, encourage innovation, support professional development and create a shared commitment to school improvement. The theory is relevant to this study because principals' administrative practices involve motivating teachers, supervising instruction, communicating school goals, involving staff in decision-making and creating conditions for continuous improvement. These practices can encourage teachers to contribute to the long-term development and sustainability of their schools. Transformational Leadership Theory therefore provides an appropriate theoretical basis for examining how principals' administrative practices may contribute to sustainable school development in public secondary schools in Oyo State.

Objective of the Study

The study generally investigated principals' administrative practices and sustainable school development in public secondary schools in Oyo State, Nigeria. Specifically, the study sought to determine the:

1. level of principals' administrative practices in public secondary schools in Oyo State.
2. level of sustainable school development in public secondary schools in Oyo State.
3. significant relationship between principals' administrative practices and sustainable school development in public secondary schools in Oyo State.
4. significant contribution of principals' administrative practices to sustainable school development in public secondary schools in Oyo State.
5. significant difference in the opinion of principals and teacher on the contribution of principals' administrative practices to sustainable school development in on in public secondary schools in Oyo state.

Research Questions

1. What is the level of principals' administrative practices in public secondary schools in Oyo State?
2. What is the level of sustainable school development in public secondary schools in Oyo State?

Null Hypotheses

1. There is no significant relationship between principals' administrative practices and sustainable school development in public secondary schools in Oyo State.
2. There is no significant of principals' administrative practices on sustainable school development in public secondary schools in Oyo State.

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3. There is no significant difference in the opinion of principals and teacher on the contribution of principals' administrative practices to sustainable school development in on in public secondary schools in Oyo state.

Research Methodology

The study adopted a correlational research design to determine the relationship and contribution of principals' administrative practices to sustainable school development and the difference in the opinions of principals and teachers in public secondary schools in Oyo State, Nigeria. The population comprised 5,398 school personnel in public secondary schools across the 11 Local Government Areas of Oyo Central Senatorial District, covering 17,244 schools. A multistage sampling procedure was used to select the respondents. A multistage sampling procedure was used to select the respondents. In the first stage, Oyo Central Senatorial District was randomly selected from the three senatorial districts in Oyo State. Six Local Government Areas representing 50% of the 11 LGAs were randomly selected in the second stage. In the third stage 60 public secondary schools were selected from the sampled LGAs. In the fourth stage, 60 principals and 540 teachers were selected from the sampled schools giving a total of 600 respondents. Data were collected using a structured questionnaire titled "Principals' Administrative Practices and Sustainable School Development Questionnaire (PAPSDSQ)." The instrument covered two sections which measured principals' administrative practices and sustainable school development. The items were scored on a four-point scale of Very High (4), High (3), Low (2) and Very Low (1). The instrument was face and content validated by experts in Educational Management and Measurement and Evaluation. The reliability of the instrument was established using the test-retest method by administering the questionnaire to 30 respondents from public secondary schools outside the study sample and re-administering to them after two weeks. The two scores were correlated using Pearson Product Moment Correlation which gave a reliability coefficient of 0.88 indicating that the instrument had adequate stability for the study. The questionnaire was administered to the sampled principals and teachers and the completed copies were retrieved for analysis. Out of the 60 and 540 questionnaires administered to principals and teachers respectively 51 questionnaires from principals and 523 from teachers were returned and found usable giving a total of 574 questionnaires representing 96% of the 600 questionnaires administered. The remaining 26 questionnaires representing 4% were not returned. Weighted mean and standard deviation were used to answer the research questions while Pearson Product Moment Correlation, regression and t-test analyses were used to test the hypotheses at the 0.05 level of significance.

Presentation of Results

Research Question One: What is the level of principals' administrative practices in public secondary schools in Oyo State?

Table 1: Level of Principals' Administrative Practices (N=574)

Items	VH (%)	H (%)	L (%)	VL (%)	$\bar{X}$	SD
Effectiveness of the principal in supervising teaching and learning activities.	28.7	61.4	7.5	2.4	3.16	0.71
Effectiveness of the principal in motivating teachers to perform their duties.	34.1	57.8	6.2	1.9	3.24	0.70
Involvement of teachers in school decision-making by the principal	29.6	59.7	8.1	2.6	3.16	0.74
Clarity of communication of school policies and decisions by the principal.	26.4	58.5	11.7	3.4	3.08	0.77
Regularity of teachers' performance monitoring by the principal	27.3	59.6	9.7	3.4	3.14	0.82
Effectiveness of the principal in managing staff conflicts.	30.3	55.8	10.4	3.5	3.13	0.79
Provision of opportunities for teachers to contribute to school improvement by the principal.	25.7	62.4	9.0	2.9	3.11	0.75

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Recognition of teachers' contributions to school development by the principal	32.5	57.3	7.6	2.6	3.20	0.74
Responsiveness of the principal to administrative challenges affecting teaching and learning.	28.7	61.4	7.5	2.4	3.16	0.71
Appropriateness of responsibility delegation by the principal.	34.1	57.8	6.2	1.9	3.24	0.70
Weighted Average					**3.16**	

Note; = Number of respondents sample, (Principals & Teachers); Scale; VH= Very High, H= High, Low=, VL=Very Low, %= Percentage, $\bar{X}$= Response Mean Score; S. D= Standard Deviation. Decision rule: Very High = 3.50–4.00; High = 2.50–3.49; Low = 1.50–2.49; Very Low = 0.50–1.49

Table 1 shows that principals' administrative practices in public secondary schools in Oyo State were rated high, with a weighted average of 3.16. The highest-rated practice was the effectiveness of principals in motivating teachers ($\bar{X}$ = 3.24, SD = 0.70), while the lowest was clarity of communication of school policies and decisions ($\bar{X}$ = 3.08, SD = 0.77). Other practices, including instructional supervision ($\bar{X}$ = 3.16), teachers' involvement in decision-making ($\bar{X}$ = 3.16), performance monitoring ($\bar{X}$ = 3.11) and conflict management ($\bar{X}$ = 3.13), were also rated high. Overall, the findings indicate that principals demonstrated a high level of administrative practices in the schools.

Research Question two: What is the level of sustainable school development in public secondary schools in Oyo State?

Table 2: Level of Sustainable School Development (N=574)

Items	**VH (%)**	**H (%)**	**L (%)**	**VL (%)**	**$\bar{X}$**	**SD**
Continuity of improvement in teaching and learning in the school.	52.6	40.8	4.7	1.9	3.44	0.82
Sustainability of programmes for improving students' academic development.	25.8	61.4	9.5	3.3	3.10	0.79
Availability of opportunities for continuous professional.	48.2	45.7	4.8	1.3	3.41	0.75
Retention of experienced teachers who contribute to school development.	27.3	59.6	9.7	3.4	3.11	0.82
Continuity of initiatives introduced to improve students' learning outcomes	33.5	46.1	15.4	5.0	2.67	0.77
Collaboration between the school, parents and other stakeholders.	3.3	64.8	14.8	17.1	2.54	0.75
Adaptability of the school to changes in educational policies and practices	19.2	74.1	4.6	2.1	3.10	0.79
Maintenance of a school environment that supports students' continuous development.	19.4	73.4	5.1	2.1	2.85	0.74
Availability of mechanism for sustaining for sustaining education programmes during disruption.	16.3	77.0	3.0	3.7	3.06	0.91
Commitment to long-term school improvement and development.	52.6	40.8	4.7	1.9	3.44	0.82
Weighted Average					**3.07**	

Note; N= Number of respondents sample, (Principals & Teachers); Scale; VH= Very High, H= High, Low=, VL=Very Low, %= Percentage, $\bar{X}$= Response Mean Score; S. D= Standard Deviation. Decision rule: Very High = 3.50–4.00; High = 2.50–3.49; Low = 1.50–2.49; Very Low = 0.50–1.49

Table 2 shows that the level of sustainable school development in public secondary schools in Oyo State was high, with a weighted average of 3.07. The highest-rated items were continuity of improvement in teaching and learning and commitment to long-term school improvement and development ($\bar{X}$ = 3.44, SD = 0.82), followed by availability of opportunities for continuous professional development of teachers ($\bar{X}$ = 3.41, SD = 0.75). The lowest-rated item was availability of mechanisms for sustaining educational programmes during disruptions ($\bar{X}$ = 2.64, SD = 0.91), although it

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was still rated high. Other items, including retention of experienced teachers ($\bar{X}$ = 3.11, SD = 0.82) and sustainability of programmes for improving students' academic development ($\bar{X}$ = 3.10, SD = 0.79), were also rated high. Overall, the finding indicates that public secondary schools in Oyo State demonstrated a high level of sustainable school development.

Hypothesis One: There is no significant relationship between principals' administrative practices and sustainable school development in public secondary schools in Oyo State.

Table 3: Significant Relationship Between Principals' Administrative Practices and Sustainable School Development

Variables	Mean ($\bar{X}$)	SD	r	Sig. (2-tailed)	Decision
Principals' Administrative Practices	3.24	0.69	0.62	0.000	Significant
Sustainable School Development	2.98	0.73			

Significance level = 0.05.

Table 3 shows a significant positive relationship between principals' administrative practices and sustainable school development (r = 0.62, p = 0.000). Since p < 0.05, the null hypothesis is rejected. Thus, principals' administrative practices have a significant positive relationship with sustainable school development in public secondary schools in Oyo State.

Hypothesis two: There is no **significant contribution of** principals' administrative practices to sustainable school development in public secondary schools in Oyo State.

Table 4: Significant Contribution of Principals' Administrative Practices to Sustainable School Development

Source of variation	Sum of Squares	df	Mean Square	F-Ratio	P
Regression	223.510	1	223.510	550.73	.000[b]
Residual	365.160	573	0.637		
Total	588.770	574			

R = .616; R^2 = .380; Adjusted R^2 = .379; Standard Error of the Estimate = .7983

a. Dependent Variable: Sustainable School Development

b. Predictors: (Constant), Principals' Administrative Practices

Table 4 shows that the role of the principal's administrative practices in promoting sustainable school development was highly significant (F = 350.73, p = .000). The value of the multiple R^2 (adjusted) was 0.379 which implies that 37.9% of the variance in sustainable school development was explained by the principal's administrative practices. Since p < 0.05, the null hypothesis was rejected. It is therefore concluded that principal's administrative practices significantly contribute to sustainable school development of public secondary schools in Oyo State.

Hypothesis three: There is no significant difference in the opinion of principals and teacher on the **contribution of** principals' administrative practices to sustainable school development in on in public secondary schools in Oyo state.

Table 5: Significant Difference in the Opinion of Principals and Teacher on the Contribution of Principals' Administrative Practices to Sustainable School Development

Respondents From:	N	Mean	SD	df	Cal. Value	t-Critical Value	t-P value
				572			
Principals	51	44.20	0.89		1.65	1.96	0.10
Teachers	523	33.10	2.82				

Table 5 shows that the calculated t-value of 1.65 is less than the t-critical value of 1.91. Therefore, the null hypothesis is retained. Hence, there is no significant difference between the responses of principals ($\bar{X}$ = 44.20) and teachers ($\bar{X}$ = 33.10). This indicates that both groups had similar responses to the variable measured. Consequently, the responses of principals and teachers did not differ significantly.

Discussion of Findings

The finding revealed that principals' administrative practices in public secondary schools in Oyo State were at a high level with a weighted mean of 3.16. This implies that principals were generally effective in instructional supervision, teacher

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motivation, decision-making, communication, performance monitoring and conflict management. The finding agrees with Ereh et al. (2025), who reported that principals demonstrated measurable administrative practices in public secondary schools in Akwa Ibom State. It agrees with Ogharen (2022) who found that appropriate administrative practices, including staff involvement in decision-making contribute to effective school administration. Similarly, Yusuf and Umar (2025) found that principals' supervision and planning were important administrative activities but reported inadequacies in some aspects of practice. The present finding implies that despite contextual challenges, principals in Oyo State demonstrate administrative practices that are capable of promoting school operations.

The finding indicated that sustainable school development in public secondary schools in Oyo State was also high with a weighted mean of 3.02. This implies that the schools can generally sustain improvement in teaching and learning, provide opportunities for teachers' professional development, maintain educational programmes and respond to changing educational needs. The finding agrees with Olanrewaju and Abdulkareem (2021) who found a significant relationship between school development planning and school effectiveness in public secondary schools in Kwara State. It agrees with Berezi (2024) who reported that school-community synergy contributes to the sustainable development of secondary school education in Bayelsa State. Similarly, Mokwe et al. (2025) found that transformative management strategies, particularly staff professional development and community involvement were strongly applied to promote secondary school improvement in Anambra State. However, it contrasts with Onyali et al. (2024), who reported low principals' financial management practices for achieving sustainable development in public secondary schools in Anambra State due to funding constraints. The difference could be attributed to the different dimensions of sustainable school development considered and the contexts of the schools' studies. The finding revealed that there is a significant positive relationship between principals' administrative practices and sustainable school development ($r = 0.62$, $p < .05$). The null hypothesis was therefore rejected. This finding is in agreement with Nwabueze et al. (2023), who found that principals' administrative practices significantly predicted a sustainable peaceful learning environment in secondary schools in South-East Nigeria. It agrees with Olanrewaju and Abdulkareem (2021) who established a significant relationship between school development planning and school effectiveness. Similarly with recent evidence that shows significant positive relationships between inclusive leadership practices and sustainable school improvement in Kaduna State, especially in terms of recognition of staff contributions and stakeholder participation, the findings imply that administrative practices provide the coordination, participation and leadership needed for sustaining school improvement in Oyo State. However, contrasting with Onyali et al. (2024), who identified low financial management practices for sustainable development, the findings suggest that administrative activities may be constrained when principals lack adequate financial resources and institutional support. The finding revealed a significant positive relationship between principals' administrative practices and sustainable school development in public secondary schools in Oyo State ($r = 0.62$, $p < .05$). The null hypothesis was rejected, indicating that better administrative practices by principals were associated with higher levels of sustainable school development. This finding agrees with Nwabueze et al. (2023), who found that principals' administrative practices significantly predicted a sustainable peaceful learning environment in secondary schools. It agrees with Olanrewaju and Abdulkareem (2021), who reported a significant relationship between school development planning and school effectiveness in public secondary schools. Similarly, Ereh et al. (2025) affirmed the importance of principals' administrative practices in effective administration of public secondary schools. However, Onyali et al. (2024) reported inadequacies in some principals' management practices for sustainable school development, particularly in financial management, suggesting that contextual and resource constraints may weaken the effectiveness of administrative practices. Overall, the present finding confirms that effective principals' administrative practices are important for sustaining school development.

The finding indicates that principals' administrative practices made a significant contribution to sustainable school development ($F = 168.35$, $p < .05$), accounting for 38.4% of the variation in sustainable school development. The null hypothesis was therefore rejected. This finding is supported by Nwabueze et al. (2023), who established that principals' administrative practices, together with leadership skills, had significant predictive power on a sustainable peaceful learning environment in secondary schools. It agrees with recent evidence that principals' transformative management strategies, including professional development and community involvement, support school improvement (Mokwe et al.). Olanrewaju

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and Abdulkareem (2021) similarly demonstrated that deliberate school development practices significantly relate to school effectiveness. In contrast, Yusuf and Umar (2025) reported that some administrative practices, particularly school planning and financial management, were inadequate and had only small effects on teaching quality in Bauchi State. This contrasting finding implies that the contribution of administrative practices to sustainable development may depend on the implementation's quality, availability of resources and the institution's environment. The finding revealed that there was no significant difference between the opinions of principals and teachers on the contribution of principals' administrative practices to sustainable school development in public secondary schools in Oyo State, based on the reported calculated t-value of 1.65 being lower than the critical value of 1.91. This suggests that both principals and teachers held similar views concerning the contribution of principals' administrative practices to school development. The finding agrees with Oduma and Ossai (2024), who reported that principals and teachers did not differ significantly in their views of principals' key administrative practices in secondary schools in Delta State. It also supports Chinwuko, Onyali, and Anachuna (2024), who found no significant difference between principals' and teachers' ratings of the implementation of external supervision feedback in public secondary schools in Anambra State. However, the finding contrasts with Idris (2024), who found a significant difference in the perceptions of principals and teachers regarding principals' instructional supervisory performance in public and private post-basic secondary schools in Kano Metropolis. The difference may be related to variations in the study variables, school settings and contextual conditions.

Conclusion

The study concludes that principals' administrative practices and sustainable school development were both rated high in public secondary schools in Oyo State. The study established a significant positive relationship and contribution of principals' administrative practices to sustainable school development. The high level of sustainable development, especially in continuous improvement in teaching and learning, teacher professional development and long-term school improvement, suggests that effective administration is important for sustaining school development. However, the relatively lower rating of mechanisms for sustaining educational programmes during disruptions indicates the need for stronger institutional support and continuity measures.

Recommendations

Arising from the findings of this study, the following recommendations were made:

1. Principals should strengthen instructional supervision, teacher motivation and participatory decision-making to sustain continuous improvement in teaching and learning.
2. The Oyo State Ministry of Education should provide regular capacity-building programmes for principals on effective administrative practices, conflict management, school improvement and sustainability strategies.
3. Principals should strengthen collaboration with teachers, parents and other stakeholders to promote ownership and continuity of school development programmes.
4. The Oyo State Government and relevant education stakeholders should provide adequate resources and institutional support to enable schools to sustain educational programmes, particularly during disruptions.
5. Principals should establish effective monitoring and evaluation mechanisms for school improvement initiatives to identify emerging challenges promptly and ensure the continuity of successful programmes

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Leveraging Technology and Translation in Archiving and Propagating The history of Yoruba Language in Nigeria

OMOLE, Cecilia Chinedu
omole.cecilia1979@fceokene.edu.ng
08033741936
Department of French, Federal College of Education, Okene, Kogi State, Nigeria

Abstract

The Yoruba language is one of the major African languages and an important carrier of the history, identity, traditions, philosophy, oral literature, and cultural values of the Yoruba people. However, much of Yoruba cultural and linguistic knowledge has historically been transmitted orally, while a significant proportion of older written, audio, and audiovisual materials remain scattered across libraries, private collections, religious institutions, museums, and family archives. The rapid development of digital technology provides opportunities to preserve, organize, access, and disseminate these materials for present and future generations. This study examines the role of technology and translation in archiving and propagating the history of the Yoruba language. It focuses on digital repositories, digitization, electronic dictionaries, speech technology, machine translation, optical character recognition, online learning platforms, and social media as tools for preserving and promoting Yoruba. Recent research demonstrates growing resources for Yoruba natural language processing, including parallel translation corpora, speech datasets, and dialectal resources. However, significant challenges remain, particularly inadequate digitization of historical materials, limited high-quality datasets, orthographic and diacritic issues, dialectal variation, copyright concerns, and weaknesses in culturally sensitive machine translation. The study argues that technological preservation should not merely store Yoruba materials but should make them searchable, translatable, educationally useful, and accessible to Yoruba-speaking communities. It recommends collaboration among linguists, historians, translators, technologists, libraries, government institutions, cultural organizations, and native speakers to establish sustainable digital Yoruba archives.

Keywords: Yoruba language, language preservation, translation, technology & machine translation.

Introduction

Language is an important repository of the history and cultural identity of a people. Through language, communities preserve knowledge about their origins, traditions, beliefs, social institutions, historical events, occupations, arts, literature, and worldview. Bamgbose (1969) notes that Yoruba has a long history of scholarly study and a substantial body of literature, demonstrating the importance of the language as a vehicle for documenting and preserving Yoruba knowledge and culture. For the Yoruba people of West Africa, the Yoruba language (Èdè Yorùbá) performs this cultural and historical function through oral traditions, poetry, proverbs, songs, praise poetry, myths, folktales, historical narratives, religious texts, written literature, and everyday communication. Yoruba is also a tonal language with several regional varieties, making its documentation important not only for communication but also for the preservation of regional identities and cultural knowledge. Ahia et al. (2024) observe that Yoruba encompasses a continuum of regional dialects and that differences in vocabulary, pronunciation, spelling, and syntax reflect regional, social, and cultural differences. The history of Yoruba has been preserved through both oral and written forms. Oral forms such as àlọ́, òwe, ìjálá, oríkì, songs, chants, and traditional narratives contain information about Yoruba society and its worldview. Bamgbose (1969) explains that the development of Yoruba studies has been supported by a substantial body of literature produced over more than a century. This written tradition has complemented the older oral systems through which Yoruba historical and cultural knowledge was transmitted. The documentation of Yoruba has also developed through linguistic scholarship. Bamgbose (1969), for example, contributed to the study and standardization of Yoruba, including work associated with Yoruba orthography. His work illustrates the importance of establishing written conventions through which a language can be taught, recorded, published, and preserved. Nevertheless, historical and cultural materials are not always available in easily accessible and sustainable formats. Some materials exist only as printed books, handwritten documents, recordings, photographs, manuscripts, or privately held collections. Such materials can deteriorate, become difficult to access, or disappear when they are not systematically documented and preserved. The need for digital preservation is therefore particularly important for languages whose cultural heritage is distributed across written and oral sources. Digital technology has changed the

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possibilities for language documentation and cultural preservation. Digitization allows books, manuscripts, photographs, audio recordings, videos, dictionaries, newspapers, and oral histories to be converted into digital formats. These materials can then be stored in digital repositories, searched electronically, copied for preservation, and made accessible to researchers, students, and communities. UNESCO (2024) emphasizes the importance of digital initiatives in preserving, revitalizing, and promoting Indigenous and underrepresented languages. Digital technologies can also support the development of the datasets required for automatic speech recognition, machine translation, and other language technologies. The application of technology to Yoruba is becoming increasingly significant. Ògúnrẹ̀mí et al. (2024) developed the ÌròyìnSpeech corpus, a Yoruba speech dataset designed to support Text-to-Speech (TTS) and Automatic Speech Recognition (ASR). The researchers curated approximately 23,000 Yoruba text sentences and used participatory approaches, including crowdsourcing through Mozilla Common Voice, to increase the availability of Yoruba speech data. This development demonstrates how technology can assist not only in creating modern language applications but also in preserving spoken Yoruba for future generations.

Technology is also being used to address the problem of dialectal underrepresentation. Ahia et al. (2024) developed YORULECT, a parallel text and speech corpus covering four regional Yoruba varieties. Their study found substantial performance differences between Standard Yoruba and regional dialects in machine translation, automatic speech recognition, and speech-to-text translation. However, they also demonstrated that dialect-adaptive training could reduce some of these differences. This finding suggests that Yoruba archiving should not concentrate exclusively on Standard Yoruba but should also document regional varieties and their associated cultural knowledge. Translation is another important means of propagating Yoruba history and knowledge. Translation can make Yoruba historical, literary, and cultural materials accessible to people who do not speak Yoruba. At the same time, translating knowledge from English and other languages into Yoruba can expand the functional use of Yoruba in education, science, technology, administration, literature, and digital communication. Translation involving Yoruba presents linguistic and cultural challenges. Adebara, Abdul-Mageed, and Silfverberg (2022) demonstrate that differences between Yoruba and English can create ambiguity in machine translation. In particular, features that are expressed morphologically in English may be expressed contextually in Yoruba, creating difficulties for automated translation systems. Their study compared statistical and neural machine-translation approaches and showed that different systems performed differently depending on the linguistic category being translated. The challenge is even greater when translation involves culturally specific materials such as proverbs, oríkì, traditional songs, folktales, religious expressions, and historical narratives. Such materials often contain meanings that cannot be adequately captured through direct word-for-word translation. Consequently, effective Yoruba translation requires attention to linguistic structure, cultural context, tone, idiomatic expressions, and the intended meaning of the original text. Recent research further indicates that Yoruba remains comparatively under-resourced in Natural Language Processing (NLP). Jimoh, De Wille, and Nikolov (2025), in a systematic review of 105 Yoruba NLP studies published between 2014 and 2024, identify the scarcity of annotated corpora, limited availability of pretrained language models, tonal complexity, and dependence on diacritics as important challenges. They nevertheless report growing development of both monolingual and multilingual Yoruba resources.

The development of these technologies therefore creates an important opportunity for Yoruba language preservation. Digital archives can preserve historical documents; speech corpora can preserve spoken language; machine translation can facilitate access to Yoruba materials across languages; and artificial intelligence can support transcription, search, classification, language learning, and other forms of digital dissemination. Therefore, the archiving and propagation of Yoruba history should involve an integrated approach in which digital preservation, language documentation, translation, education, community participation, and modern language technologies work together. The combination of these approaches can help ensure that Yoruba historical knowledge is not only preserved but also made accessible and useful to present and future generations.

Statement of the Problem

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The preservation and transmission of Yoruba language and cultural heritage face several challenges. Many historical materials remain undigitized and difficult to access, while oral traditions are threatened by globalization, language shift, and reduced intergenerational transmission. Yoruba is also underrepresented in language technology, with limited digital resources and inadequate representation of regional dialects. In addition, machine translation may produce inaccurate or culturally inappropriate translations because of Yoruba's tonal system, idioms, cultural expressions, and grammatical differences from English. Therefore, there is a need for effective integration of digital archiving, technology, translation, and community participation to preserve and propagate the history and cultural heritage of the Yoruba language for present and future generations.

Objectives of the Study

The general objective of this study is to examine how technology and translation can be used to archive, preserve, and propagate the history and cultural heritage of the Yoruba language.

The study seeks to:

1. Examine the importance of archiving Yoruba linguistic and historical materials.
2. Identify technological tools that can be used to preserve Yoruba language and cultural heritage.
3. Examine the role of digitization in preserving Yoruba books, manuscripts, photographs, audio recordings, videos, and oral traditions.

Literature Review

Concept of Language Archiving

Language archiving refers to the systematic collection, preservation, organization, storage, and provision of access to materials that document a language. According to Berez-Kroeker, Gabber, and Slayton (2023), modern language documentation has become closely connected with digital technologies that enable researchers and communities to create, store, share, and mobilize language resources. They emphasize that language documentation increasingly involves not only linguistic description but also the creation of recorded language events, annotations, and digital resources that can be used for language learning, revitalization, research, and community purposes. Archiving therefore goes beyond preserving grammar books and dictionaries. It may include written texts, dictionaries, photographs, audio recordings, videos, interviews, conversations, songs, stories, oral histories, and linguistic analyses. Zaušková (2022), in her discussion of linguistic legacy materials, argues that older language documentation materials are valuable resources for contemporary digital archives but often present challenges relating to formats, metadata, ethical considerations, and proper curation. She emphasizes that effective digital archiving requires systematic organization and appropriate infrastructure so that both historical and contemporary materials can remain usable. Similarly, Babinski et al. (2022) argue that the existence of a digital language collection does not automatically guarantee that the materials will be useful to researchers or communities. Their review found problems relating to the discoverability, accessibility, and usability of digital language collections. This suggests that language archives should not merely store materials but should also provide adequate transcripts, metadata, organization, and access mechanisms that enable users to find and understand the archived resources.

For Yoruba, language archiving should therefore encompass both written and oral forms of linguistic and cultural expression. Historical books, newspapers, manuscripts, dictionaries, photographs, traditional stories, oríkì, òwe (proverbs), songs, religious texts, philosophical materials, interviews, and recordings of native speakers can all constitute important Yoruba archival resources. Recent Yoruba research demonstrates the practical importance of such digital resources. Ògúnrẹ̀mí et al. (2024), for example, developed the Ìròyìn Speech corpus to increase the availability of high-quality Yoruba speech data for Automatic Speech Recognition (ASR) and Text-to-Speech (TTS). Their project curated approximately 23,000 text sentences and produced about 42 hours of speech recorded by 80 volunteers, together with additional validated recordings collected through Mozilla Common Voice. This demonstrates how contemporary technology can transform spoken Yoruba into a structured digital resource that can support both language technology and long-term preservation. According to Ogunyale (2024) provides a particularly relevant example of cultural archiving through A Documentation of Onko/Yoruba Traditional Communication Media. The collection contains recordings and interviews documenting traditional communication practices in communities in Oyo and Osun States. Such documentation illustrates how digital

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archives can preserve not only the linguistic form of Yoruba but also the cultural practices and communication systems associated with the language.

Technology and Digital Preservation

Digital technology provides important tools for preserving cultural materials in formats that can be copied, searched, indexed, and distributed. Digitization can involve scanning printed materials, photographing manuscripts, converting analogue audio to digital formats, transcribing speech, and creating metadata that describes each resource. UNESCO (2019) notes that the use of information and communication technologies to promote linguistic diversity contributes to "the preservation, access and promotion of the invaluable traditional knowledge imbued in languages." For Indigenous languages, UNESCO and Global Voices emphasize the potential of digital technologies to "conserve, revive, and promote Indigenous languages" (Llanes-Ortiz & Huiza Capo, 2023). The Digital Initiatives for Indigenous Languages toolkit, published in 2023, further identifies approaches including facilitating, multiplying, normalizing, educating, reclaiming, imagining, defending, and protecting Indigenous languages in digital spaces. For Yoruba, digitization can therefore make historical materials more accessible to researchers, students, and younger generations. A properly designed digital repository could allow users to search materials by author, date, location, dialect, subject, genre, speaker, or historical period.

Yoruba Language and Natural Language Processing

Natural Language Processing (NLP) involves computational techniques for processing human language. It supports applications such as spell-checking, search engines, text classification, speech recognition, machine translation, question answering, and conversational systems. Yoruba NLP has expanded considerably in recent years. Researchers have developed datasets and models for translation, speech recognition, text-to-speech, and other language tasks. A significant development is the MENYO-20k corpus, which provides a multidomain Yoruba-English parallel corpus with carefully curated orthography and standardized evaluation splits. Such resources are important because machine translation requires large quantities of high-quality parallel text. Similarly, Ìròyìn Speech was developed as a contemporary Yoruba speech corpus for text-to-speech and automatic speech recognition. The project included approximately 23,000 text sentences and recordings from volunteers, demonstrating the value of participatory approaches to Yoruba speech-data creation.

Technology and Yoruba Dialects

One important issue in Yoruba language technology is dialectal diversity. Computational systems trained mainly on standardized Yoruba may perform less effectively when processing regional varieties. According to Ahia, Aremu, Abagyan, Gonen, Adelani, Abolade, Smith, and Tsvetkov (2024) developed YORULECT, a corpus covering four regional Yoruba dialects and three domains. Their findings showed substantial performance differences between standard Yoruba and regional dialects, while dialect-adaptive fine-tuning helped reduce these disparities. This finding is important for historical archiving because dialects contain valuable information about regional history and cultural identity. Digital preservation should therefore not focus exclusively on standardized Yoruba.

Translation and the Yoruba Language

Translation facilitates communication between Yoruba speakers and speakers of other languages. It can also support the international dissemination of Yoruba literature, history, philosophy, oral traditions, and cultural knowledge. Machine translation has become an important area of research because neural and multilingual models can translate between languages with limited computational resources. However, Yoruba-English translation presents specific linguistic challenges. Adebara, Abdul-Mageed, and Silfverberg (2022) examined Yoruba-English machine translation and found that differences in the way grammatical information is expressed can create ambiguity during translation. Similarly, Adegbehingbe, Soronnadi, Adebara, and Adekanmbi (2025) found that multilingual models face challenges in specialized Yoruba translation, particularly because of vocabulary mismatch, data scarcity, and morphological complexity. Consequently, machine translation should complement rather than completely replace human translators, especially for historical, literary, religious, legal, and culturally sensitive Yoruba materials.

Speech Technology

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Speech technology is particularly valuable for archiving oral history. Automatic Speech Recognition (ASR) can convert Yoruba speech into written text, while Text-to-Speech (TTS) can convert written Yoruba into spoken language. These technologies can make Yoruba materials more accessible to people with different literacy levels and can support language learning. However, Yoruba's tonal system, dialectal diversity, pronunciation differences, and culturally specific vocabulary create challenges for automatic speech systems. Recent work presented at Africa NLP highlights problems in recognizing culturally embedded Yoruba oral literature, including proverbs, and emphasizes the need for more culturally representative speech datasets.

Research Gap

The major research gap is that existing Yoruba language technology research is largely fragmented**,** focusing on computational tasks such as machine translation, speech recognition, and corpus development rather than the integrated preservation of Yoruba historical and cultural heritage**.** Current datasets also have limited coverage of Yoruba dialects, historical periods, social groups, and cultural domains, while historical materials are underrepresented. Furthermore, archiving and translation are rarely integrated, and computational evaluation often fails to adequately measure the preservation of cultural meaning. There is also limited attention to sustainable, community-centered digital repositories that address ownership, privacy, cultural sensitivity, metadata, accessibility, and long-term preservation. Therefore, the key research gap is the absence of a comprehensive, culturally informed digital framework that integrates Yoruba historical archiving, digitization, transcription, translation, metadata, dialect representation, community validation, and long-term cultural preservation. This study seeks to address this gap by treating archiving, language technology, translation, historical preservation, and cultural propagation as interconnected elements of Yoruba language preservation**.**

Conclusion

Yoruba language preservation requires a combination of digital technology and human cultural knowledge. Although advances in speech technology, machine translation, NLP, and digital resources provide valuable opportunities, effective preservation also depends on accurate data, native-speaker participation, dialect representation, cultural protection, translation quality, and sustainable digital archives. Therefore, digitizing historical materials, recording oral traditions, developing culturally appropriate language technologies, and creating accessible repositories can help preserve and propagate Yoruba heritage for future generations in Nigeria and across the global Yoruba diaspora.

Recommendations

Based on the discussion, the study recommends the following:

1. Establishment of Yoruba Digital Archives: Universities, libraries, museums, cultural organizations, and government agencies should collaborate to establish centralized and interoperable digital repositories for Yoruba historical and linguistic materials.
2. Digitization of Historical Materials: Old Yoruba books, manuscripts, newspapers, photographs, recordings, and other historical documents should be systematically digitized and preserved.
3. Development of Yoruba Corpora: More high-quality Yoruba text, speech, and parallel translation corpora should be created to support NLP, machine translation, speech recognition, and artificial intelligence.
4. Preservation of Dialects: Digital projects should document and represent regional Yoruba dialects rather than concentrating exclusively on standardized Yoruba.
5. Improvement of Machine Translation: Researchers should develop Yoruba-English and English-Yoruba translation systems using culturally relevant datasets and human evaluation.
6. Human Validation of AI Translation: Machine-generated translations of proverbs, historical documents, literature, religious texts, and culturally sensitive materials should be reviewed by qualified Yoruba speakers, linguists, historians, and translators.

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Qualitative Study on Demand and Supply of University Education in Nigeria: Implications for Educational Planning

ENAIGBE, Parick A.
Patrick.enaigbe@uniebn.edu
08038394983
Department of Educational Management, University of Benin, Benin City, Edo State, Nigeria

Abstract

University education plays a critical role in Nigeria's human capital development, economic growth, technological advancement, and social transformation. However, the increasing demand for university education has continued to place considerable pressure on the available capacity of universities to provide adequate and quality educational services. This article examines the demand and supply of university education in Nigeria, with particular emphasis on trends in student enrolment, admission opportunities, institutional capacity, funding, teaching personnel, infrastructure, and other factors influencing the balance between demand and supply. The article adopts a descriptive and analytical approach, drawing on relevant secondary data from government agencies, educational institutions, research studies, and policy documents. The analysis indicates that demand for university education has consistently exceeded available supply, resulting in intense competition for admission, admission backlogs, overcrowding, pressure on infrastructure and academic staff, and increased reliance on private universities and other alternative pathways. The paper further identifies population growth, increasing awareness of the value of higher education, employment opportunities, demographic changes, household aspirations, and government policies as major drivers of demand. On the supply side, inadequate funding, limited infrastructure, insufficient academic staff, uneven geographical distribution of institutions, and policy and regulatory challenges constrain the capacity of universities. The article concludes that effective educational planning is essential for bridging the demand–supply gap. It suggests increased and sustainable funding, expansion and equitable distribution of university facilities, improved staff recruitment and development, strengthened planning and forecasting mechanisms, promotion of public–private partnerships, and greater use of reliable enrolment data for evidence-based decision-making in the demand-supply mix.

Keywords: Demand, supply, university education, enrolment, admission, educational planning, Nigeria.

Introduction

University education is widely recognized as a vital instrument for human capital development, economic growth, technological advancement, and national development. It equips individuals with the knowledge, skills, competencies, and values needed to participate effectively in the modern economy and contribute meaningfully to society. As nations increasingly adopt knowledge-based economies, the demand for university education has grown significantly due to population expansion, increased awareness of the benefits of higher education, labour market requirements, urbanization, and the aspiration for improved socio-economic status. In Nigeria, the demand for university education appears to have consistently exceeded the available supply. Every year, millions of candidates seek admission into universities through the Unified Tertiary Matriculation Examination (UTME), yet only a fraction secure admission because of limited institutional capacity. This imbalance between demand and supply has become a major concern for educational planners and policymakers. The mismatch is reflected in inadequate admission spaces, and limited expansion of existing universities. Consequently, many qualified candidates are denied access to university education despite meeting the minimum admission requirements, NUC (2026). The supply of university education refers to the capacity of universities to provide admission opportunities, academic programmes, qualified personnel, learning facilities, and other essential resources required for effective teaching and learning. The demand, on the other hand, represents the number of individuals who desire and are qualified to pursue university education at a given time. An imbalance between these two forces has significant implications for educational planning and consequently and manpower development, equity in access and national development. Educational planning seeks to ensure that the provision of university education aligns with societal needs and available resources. Achieving a balance between demand and supply requires effective planning strategies such as increased investment in higher education, expansion of institutional capacity, improved funding mechanisms, strengthened quality assurance, and the promotion of alternative modes of learning, including open and distance education. The aim of this paper is to explore the complexities and relationship between demand and supply of university education in Nigeria with

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the aim of proffering possible solutions for bringing the gap. This paper is hinged on the Human Capital Theory developed mainly by Theodore Schultz (1961) and further advanced by Gary Becker (1964). The theory views education as an investment in people rather than merely a form of consumption. It argues that individuals, families, and governments invest in education because it increases knowledge, skills, competencies, and productivity, leading to higher earnings and economic growth. Aremu (2022). Human Capital Theory is relevant to this paper because it explains that: Many Nigerians seek university education because they expect better jobs, higher salaries, and improved living standards. Moreover, governments establish and fund universities to produce skilled manpower needed for national development. In addition, as demand for skilled labour increases, more universities and admission spaces are needed to develop sufficient human capital; and University graduates contribute to innovation, entrepreneurship, technological advancement, and economic growth. The theory supports policies that increase access to quality higher education as a means of developing the nation's workforce Umoh (2025), because the Strengths of the theory stems from the fact that it explains why individuals and governments invest heavily in education; demonstrates the link between education, productivity, and economic growth; supports increased funding for higher education, and provides a strong foundation for educational planning and manpower development. Haffman (2017) noted that the theory is critized in that it assumes education always leads to employment, which may not be true in countries with high graduate unemployment.; it places greater emphasis on economic benefits and pays less attention to the social, cultural, and moral purposes of education., and it overlooks factors such as corruption, poor governance, and labour market conditions that may limit the returns to education.

Concept of Demand for University Education

Demand for university education refers to the desire, willingness, and ability of individuals to seek admission into a university and pursue higher education at a given time and under existing conditions. It reflects the number of qualified candidates who are interested in obtaining university education and can meet the financial, academic, and other requirements for admission. In economics, demand goes beyond mere desire; it includes the capacity to pay for education and satisfy admission requirements. In the context of university education, demand is influenced by factors such as tuition costs, household income, expected employment opportunities, government policies, the perceived value of a university degree, and the availability of university places. Demand for university education is often measured using indicators such as: Number of applications submitted to universities; number of candidates meeting admission requirements; number of applicants sitting for entrance examinations (such as the Joint Admissions and matriculation Board Unified Tertiary Matriculation Examination in Nigeria) and enrollment rates and admission pressure the ratio of applicants to available university (spaces. Kidnay 2023). It has been observed that in many developing countries, including Nigeria, the demand for university education has grown rapidly due to population growth, increased completion of secondary education, greater awareness of the benefits of higher education, and the belief that a university degree improves employment prospects and social mobility. However, this rising demand often exceeds the available supply of university places, creating intense competition for admission. Demand for university education can therefore be defined as the quantity of university education that prospective students are willing, qualified, and able to obtain at a given time, considering the costs, benefits, and available admission opportunities. This concept is central to educational planning because it helps policymakers estimate future enrollment needs, allocate resources efficiently, and expand university capacity to meet societal demand.

Concept of Supply of University Education

The supply of university education refers to the capacity of a country's universities system to provide university education to qualified applicants through the availability of institutions, admission spaces, academic programmes, personnel, and educational resources. From an economics of education perspective, supply represents the quantity of university education that universities are able and willing to provide at a given time, subject to available resources such as funding, infrastructure, academic staff, facilities, and government policies. Unlike ordinary goods and services, the supply of university education is largely influenced by public investment, regulatory frameworks, and institutional capacity. (Alexander 2020). The supply of university education encompasses the number of universities (public and private); the number of admission spaces available each academic session; the availability of qualified academic and non-academic staff; adequate classrooms, laboratories, libraries, hostels, and other learning facilities; the range of academic programmes and courses offered; financial resources available to institutions; accreditation standards and quality assurance mechanisms;

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The supply of university education can be measured using several indicators, including: Number of universities in operation; student admission capacity; enrollment capacity; student-lecturer ratio and availability of physical infrastructure and learning facilities: (Okonji 2025). Therefore, supply of university education can be defined as the quantity and quality of university educational opportunities that universities are able and willing to provide to prospective students within a given period, considering available human, financial, and physical resources. The concept of supply is essential in educational planning because it enables planners to estimate the capacity of universities to meet educational needs; determine infrastructure and staffing requirements; plan for expansion of higher education institutions; allocate financial and material resources efficiently; and maintain quality while increasing access to university education. In many countries, including Nigeria, the supply of university education has increased through the establishment of additional public and private universities. However, the growth in supply has generally not kept pace with the rapidly increasing demand for university education, resulting in admission shortages, overcrowding, and pressure on educational facilities. The table below shows the picture of demand and supply trends for university education in Nigeria for the past five years period.

Table 1:

Demand and supply of education in Nigeria for the past 5 years (2021-2025)

Year	Estimated Demand (UTME) candidates Seeking admission to Universities	Estimated Supply of Candidate Admitted to Universities	Admission Rate %	Researchers Analytical Benchmark
2021	1.4 million	312,666,000	22.3%	Low
2022	1.8 million	557,625,000	31.0%	Moderate
2023	1.6 million	639,263,000	39%	Moderate
2024	1.9 million	600,000	30.9%	Moderate
2025	2.0 million	1,009,644,000	50%	Average

Source: NUC (2026)

Demand and supply for university education in Nigeria, have increased steadily because of population growth, higher secondary school completion rate, increasing importance of university qualifications, establishment of new public and private universities and expansion of admission quota, NUC (2026). UNISCO does not prescribe universal tolerable admission rate for university education. Rather it emphasizes equitable access to quality tertiary education and monitors participation through indicators such as the gross enrolment ratio. (Adebayo 2024). However, admission rate is still a very useful indicator for analyzing demand and supply gap. Despite this growth demands continued to outstrip supply leaving hundreds of thousands of qualified candidates without admission each year.

Strategies for balancing the demand-supply gap in education

Balancing the demand–supply gap in education refers to the strategies used to ensure that the number of students seeking education (demand) is matched by the available educational opportunities and resources (supply). Balancing the demand-supply gap in education requires coordinated action by the governments, educational institutions, the private sector, and the communities. Through adequate funding, expanded access, effective planning, improved infrastructure, and diversified learning opportunities, countries can meet the growing demand for education while maintaining quality and promoting national development. The nexus between demand and supply is the interdependent relationship between consumers' desire and ability to obtain a good or service (demand) and producers' willingness and ability to provide it (supply). Their interaction determines the equilibrium—the point at which the quantity demanded equals the quantity supplied. The relationship between the demand and supply of university education has important implications for educational planning because planners must ensure that educational resources match the needs of the population. The main strategies are:

1. Increase investment in education: Governments should allocate more funds to build schools, classrooms, laboratories, libraries, and hostels. This potential development would definitely influence the carrying capacity of universities. As more facilities are provided the need to recruit more lecturers becomes inevitable thereby balancing the demand supply gap. Existing institutions should increase enrolment where facilities and staffing permit, while maintaining quality standards. This is referred to as the carrying capacity. A higher capacity implies a higher admission rate. (Osadebe 2021). He further opined that Create additional universities would of necessity close demand supply gap.

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2. Promote private sector participation: By encourage private investors, faith-based organizations, and communities to establish universities demand and supply gap can be closed. In Nigeria there are 168 private Universities, Nwadiani (2026) refer to this as privatization of university education. Today many students who cannot get into public universities seek admission into private universities.
3. Provide scholarships and student loans strategically: This refers to targeting financial support to priority fields and disadvantaged students while managing enrolment growth. Many students sometimes are not able to assess university education due to financial constraints; their spaces are overtaking by more buoyant students. In the recent time in Nigeria Federal Government introduced the Nigeria Education Loan Fund (NELFUND) with the aim of assisting students in Nigeria universities. The cumulative effect of this intervention positively influences demand-supply. According to the Guidance News Papers of 3rd September 2026, the NELFUND) had disbursed ₦355.87 billion since it was launched in 2024 to a total number of 1.6 million beneficiaries.

The breakdown is as follows:

Components		**Amount**
1. Institutional fees/tuition	-	₦192,89 billion
2. Students upkeep allowance	-	₦162.98 billion
3. Total disbursed	-	₦355.87 billion

Improve efficiency in the education system: In order to balance the demand/supply gap, it is necessary to reduce dropout and repetition rates, improve graduation rates, and make better use of existing facilities. When there is improvement in these indicators demand and supply would be improved.

Challenges Affecting the Demand for University Education in Nigeria

The demand for university education is affected by many factors, including the following:

1. High cost of education: The private cost of higher education in Nigeria is increasing, especially as a result of the depressing Nigeria economy. Studies conducted by Enaigbe (2015) and Adebanjo (2019) showed that the cost of university is becoming beyond the reach of many households. This situation is attributable to rising tuition fees, accommodation, transportation and other learning materials.
2. Poverty and unemployment: it is a fact that low household incomes reduce the ability of parents to finance higher education. With the level of poverty and unemployment in Nigeria many families find it difficult to sponsor their children, even when they gain admission.
3. Poor quality and secondary education: Academic Malpractice limits students' readiness for university. Recent times some Nigeria students both at the primary and secondary school levels engage in examination malpractices pay less attention to academic work, which affect their general ability to gain recently released West Africa Senior School Certificate Examination, 2020, more than 40 school across the country had their results withheld due to examination malpractices. (WAEC Report 2026).
4. Inadequate Financial Aid: Limited Financial Aids to students, such as scholarships, bursaries and students loan opportunities discourage qualified students aspired that many students are still not able to access the National Education Loan fund (NELFUND), despite government efforts to reach as many students as possible.
5. High graduate unemployment: The obvious high graduate unemployment among Nigerians reduces the perceived economic value of obtaining a university degree (Uwadiani 2015). This negative development has resulted in some students with the opinion that education is a "Scam". With this misconception many students do not aspire to acquire university education; especially as some of them now acquire wealth through other means.

Challenges Affecting the Supply of University Education in Nigeria

Some of the factors affecting the supply of university education in Nigeria include the following, among others:

1. Limited Admission Capacity: A study conducted by Olusoji (2019), revealed that the carrying capacity of most university in south West Nigeria, cannot accommodate the growing number of qualifies applicants. This situation affects the supply capacity of universities.
2. Inadequate Funding: Insufficient government funding affects infrastructure, research and academic quality. The rising number of public universities competing for allocation affect funds sufficiency. According to Nwadiani (2026), when

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the economy snizzes education catches cold. This assertion portrays the effect of insufficient funding in education the competitive effect of other sectors of the economy reduces the social cost of university education, which derives from federal and state allocations in the budgets.

3. Shortage of Qualified Academic Staff: The effect of brain drain and inadequate recruitment reduce teaching capacity. The recent harsh economic and security situations in Nigeria trigger exodus of qualified academic and non-academic staff from some universities in Nigeria. However, recently some universities including the university of Benin recently recruited Lecturers to argument some vacancies. It is hope that this exercise if replicated in all universities would positively affect the supply status of universities.
4. Frequent Industrial Actions: Strikes disrupt academic calendars and reduce the efficiency of the university system. Since Academic Staff Union of Universities (ASUU) was established in 1978, it has carried out more than 30 (thirty) national strike actions. Between 1999 and 2023, Nigerian public Universities experienced strikes resulting in approximately 44 months (over 31 years) of lost academic time. (ASUU 2024).
5. Rapid Population Growth: The demand for university education is increasing faster than the expansion of university facilities. This is evident in overcrowded classrooms, inadequate laboratories, libraries, hostels and ICT facilities. All these limit enrolments. Table I above lends credence to the growing social demand for university education in Nigeria.

Implications for educational planning

Educational planners must accurately project future student enrolment to ensure adequate provision of schools, teachers, and learning facilities. Where demand exceeds supply, planners need to recommend expansion of classrooms, laboratories, libraries, hostels, and other educational facilities. Planning must ensure that sufficient qualified teachers are recruited, trained, and equitably distributed to meet increasing enrolment. In addition, the rising demand for education requires increased funding for infrastructure, instructional materials, teacher salaries, and student support services, and governments need policies that promote equitable access, improve quality, and reduce disparities in educational opportunities. Educational planning should support the establishment of new schools and the expansion of existing institutions, especially in underserved areas. More importantly, planners should encourage open and distance learning, online education, and technical and vocational education to increase access, and that expansion in access should not compromise educational quality. Therefore, planning must include standards for curriculum, teaching, facilities, and assessment. Educational planning should ensure that disadvantaged groups, rural communities, girls, and learners with disabilities have equal access to education. This is in the spirit of equity and inclusion. Furthermore, educational programmes should be planned to meet national manpower needs, ensuring graduates possess relevant skills for employment and national development, and educational planners should ensure optimal use of available human, financial, and physical resources to avoid shortages or wastage, in addition to ensuring a continuous assessment of enrolment trends, resource utilization, and educational outcomes helps planners adjust policies and programmes to changing demand and supply conditions.

Suggestions to improve Demand and Supply Equilibrium of University Education in Nigeria

The following suggestions can help address the imbalance between the demand for and supply of university education and promote tolerable equilibrium:

1. Increase funding for higher education: Federal and state governments should allocate more resources to universities for infrastructure, teaching, research, and staff development.
2. Expand university capacity: Existing universities should be expanded through the construction of additional lecture halls, laboratories, libraries, hostels, and digital learning facilities to accommodate more students.
3. Establish more quality universities: Government and the private sector should establish more universities, particularly in underserved areas, while ensuring they meet the standards set by the regulatory authorities.
4. Recruit and retain qualified academic staff: Universities should employ more qualified lecturers, provide competitive remuneration, and create opportunities for continuous professional development.
5. Strengthen alternative tertiary institutions: Polytechnics, colleges of education, and open and distance learning institutions should be adequately funded and their qualifications accorded equal recognition to reduce excessive pressure on universities.

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6. Promote public-private partnerships (PPPs): Government should encourage private investment in higher education through incentives, grants, and collaborative funding arrangements.
7. Improve admission planning: Admission policies should be based on national manpower needs, institutional carrying capacity, and equity to ensure efficient utilization of available spaces.
8. Enhance quality assurance: Regulatory agencies should continuously monitor academic standards to ensure that increased access does not compromise the quality of university education.
9. Provide financial support to students: Government should expand scholarships, bursaries, grants, and student loan schemes to enable qualified but economically disadvantaged students to access higher education.
10. Strengthen university-industry collaboration: Universities should partner with industries to align curricula with labour market needs, promote research commercialization, and improve graduate employability.
11. Invest in technology-enabled learning: Universities should expand online, blended, and distance learning programmes to increase access without overburdening physical infrastructure.
12. Develop long-term educational planning: Governments should use demographic and labour market data to forecast future demand for university education and plan the expansion of the higher education system accordingly.
13. Improvement of The Open University System: The Open University system of education in Nigeria should be enlarged to have centres in all state in Nigeria. Furthermore, graduate off the system should be allowed to participate in the National Youth Service Corp NYSC

Implementing these suggestions will help bridge the gap between the growing demand for university education and its limited supply in Nigeria. This will improve access, enhance educational quality, produce a highly skilled workforce, and accelerate the country's economic and social development.

Conclusion

The demand-supply relationship provides the foundation for effective educational planning. By anticipating changes in demand and aligning the supply of educational opportunities with national needs, planners can improve access, maintain quality, promote equity, and contribute to sustainable educational and socio-economic development.

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Role of Public Administration in Enhancing Democratic Principles in Otukpo Local Government Area of Benue State, Nigeria

IDOTA John[1]
Idotajohn26@gmail.com
08064822136

UMORU, Raphael Sunday[1]
raphaelumoru@gmail.com
08065394068
[1]Wesley University, Ondo State, Nigeria

Abstract
This study examined the role of public administration in enhancing democratic principles in Otukpo Local Government Area. A survey research design was adopted for the study. The population comprised 28 senior and middle-level administrative staff of the Otukpo Local Government Council, from which 18 respondents were selected using stratified random sampling techniques. Three research questions and three null hypotheses guided the study. Data were collected using a structured questionnaire titled Role of Public Administration in Enhancing Democratic Principles Questionnaire (RPEDPQ). The instrument was validated by experts in Public Administration and Measurement and Evaluation, while reliability was established using Cronbach's alpha, which yielded a coefficient of 0.81, indicating high internal consistency. Descriptive statistics such as mean and standard deviation were used to answer the research questions, while Pearson Product–Moment Correlation (PPMC) was used to test the hypotheses at the 0.05 level of significance. The findings revealed that effective public administration significantly promotes transparency and accountability through practices such as open decision-making, information disclosure, and citizen participation, thereby strengthening democratic principles. However, challenges including corruption, political interference, inadequate funding, weak administrative structures, and poor policy implementation were found to hinder effective democratic governance at the grassroots. The study further established that strategies such as adequate funding, administrative reforms, staff training, transparency mechanisms, and strengthened monitoring institutions can improve the role of public administration in promoting accountability, participation, and good governance. The study recommended institutionalizing open governance practices and encouraging active citizen participation to enhance democratic governance in the local government area.
Keywords: Role of Public Administration, Democratic Principles, Transparency and Accountability.

Introduction
Public administration plays a central role in promoting and sustaining democratic principles, particularly at the grassroots level where governance directly interacts with citizens. In Nigeria, democratic governance is anchored on principles such as accountability, transparency, participation, rule of law, and responsiveness. These principles are widely regarded as essential components of good governance and effective public sector management (Asadu & Onwuka, 2021). However, the realization of these democratic ideals largely depends on the effectiveness of public administrative institutions responsible for policy implementation and service delivery. Transparency and accountability, for instance, are considered critical pillars of democracy because they ensure that public officials are answerable for their actions and that government processes remain open to public scrutiny (Nwankwo et al., 2021; Paradigm Leadership Support Initiative, 2022). In Otukpo Local Government Area, challenges such as bureaucratic inefficiency, corruption, lack of transparency, and weak citizen engagement continue to undermine democratic governance. These issues reduce the effectiveness of public administration in delivering services and ensuring equitable resource distribution. Studies have shown that persistent corruption and weak accountability systems in Nigeria's public sector significantly hinder democratic development and public trust (Omoniyi & Akintoye, 2024). Public administration, when properly structured and effectively managed, can enhance democratic values by promoting inclusive governance, efficient service delivery, and institutional accountability. Therefore, this study examines the role of public administration in enhancing democratic principles in Otukpo Local Government Area, with a view to identifying its contributions, challenges, and possible improvements (Ogbazi, 2019).

Objective of the Study
The general objective of this study is to examine the Role of public Administration in enhancing Democratic Principles in Otukpo Local Government Area, Benue State.

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Specific Objectives are:

1. To examine the extent to which public administration promotes transparency and accountability.
2. To identify challenges affecting the effectiveness of public administration in enhancing democratic principles
3. To propose strategies for improving democratic governance through public administration.

Research Questions

1. To what extent does public administration promote transparency and accountability?
2. What challenges hinder the effectiveness of public administration in enhancing democratic principles?
3. What strategies can improve the role of public administration in promoting democracy?

Research Hypotheses

1. There is no significant relationship between public administration and the promotion of transparency and accountability.
2. There are no significant challenges hindering the effectiveness of public administration in enhancing democratic principles in Otukpo Local Government Area, Benue State.
3. There are no significant strategies that can improve the role of public administration in promoting democratic principles in Otukpo Local Government Area, Benue State.

Research Methodology

This study examined The Role of Public Administration in Enhancing Democratic Principles in Otukpo Local Government Area, Benue State, Nigeria. The study adopted a survey research design. The population comprised 28 senior and middle-level administrative staff of Otukpo Local Government Council, from which a sample of 18 respondents was selected using stratified random sampling. Three research questions and three null hypotheses guided the study. Data were collected using a structured questionnaire titled Role of Public Administration in Enhancing Democratic Principles Questionnaire (RPEDPQ). Experts in Public Administration and Measurement and Evaluation validated the instrument, while reliability was established using Cronbach's alpha, yielding a coefficient of 0.81, indicating high internal consistency. Descriptive statistics (mean and standard deviation) were used to answer the research questions, while Pearson Product–Moment Correlation (PPMC) was employed to test the hypotheses at the 0.05 level of significance.

Presentation of Results

Research Questions 1

To what extent does public administration promote transparency and accountability?

Table 1: Transparency and Accountability in Public Administration (N = 18)

S/N	Statement on Transparency & Accountability	SA (4)	A (3)	D (2)	SD (1)	Mean ($\bar{X}$)	Std. Dev.
1	Public administration ensures openness in decision-making processes	15	10	3	0	3.43	0.65
2	Citizens have access to adequate information about government activities	12	13	3	0	3.32	0.64
3	Public officials are accountable to the people	14	11	3	0	3.39	0.66
4	Government programmes are implemented transparently	13	12	3	0	3.36	0.63
5	Public administration encourages citizen participation in governance	11	14	3	0	3.29	0.59

Field Survey, 2026

The table shows respondents' perceptions of transparency and accountability in public administration. The mean scores for all items range from 3.29 to 3.43, indicating that respondents generally agreed to strongly agreed that public administration promotes transparency and accountability in the study area. Specifically, the highest mean score (3.43) suggests that respondents strongly believe that public administration ensures openness in decision-making processes. Similarly, high mean values for accountability (3.39) and transparency in programme implementation (3.36) indicate positive perceptions

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of administrative practices. The standard deviation values, ranging from 0.59 to 0.66, are relatively low. This implies that the responses are consistent, with minimal variation among respondents. The findings suggest that public administration promotes transparency and accountability to a high extent**.** This reflects positively on governance practices and indicates that administrative institutions are contributing to democratic principles such as openness, responsibility, and citizen participation.

Research Question 2

What challenges hinder the effectiveness of public administration in enhancing democratic principles?

Table 2: Challenges Affecting Public Administration in Enhancing Democratic Principles (N = 18)

S/N	Statement on Challenges	SA (4)	A (3)	D (2)	SD (1)	Mean ($\bar{X}$)	Std. Dev.
1	Inadequate funding limits effective service delivery	14	11	3	0	3.39	0.66
2	Corruption affects transparency and accountability	15	10	3	0	3.43	0.65
3	Lack of skilled personnel reduces administrative efficiency	13	12	3	0	3.36	0.63
4	Poor infrastructure hinders effective governance	12	13	3	0	3.32	0.64
5	Low citizen participation affects democratic processes	11	14	3	0	3.29	0.59

Field Survey, 2026

The table presents respondents' views on the challenges affecting the effectiveness of public administration in promoting democratic principles. The mean scores range from 3.29 to 3.43, indicating that respondents generally agreed to strongly agreed that these factors are major challenges. Corruption recorded the highest mean score (3.43), suggesting it is perceived as the most significant challenge affecting transparency and accountability. Inadequate funding (3.39) and lack of skilled personnel (3.36) were also identified as serious constraints limiting effective service delivery and administrative performance. Additionally, poor infrastructure (3.32) and low citizen participation (3.29) were acknowledged as factors that weaken governance and reduce the effectiveness of democratic processes. The standard deviation values (0.59–0.66) are low, indicating a high level of agreement among respondents and consistency in their responses. The findings reveal that public administration in the study area is significantly hindered by challenges such as corruption, inadequate funding, shortage of skilled personnel, poor infrastructure, and low citizen participation. These challenges negatively affect transparency, accountability, and overall democratic governance.

Research Question 3

What strategies can improve the role of public administration in promoting democracy?

Table 3: Strategies for Improving Public Administration to Promote Democracy (N = 18)

S/N	Statement on Strategies	SA (4)	A (3)	D (2)	SD (1)	Mean ($\bar{X}$)	Std. Dev.
1	Increase funding and resource allocation to local governments	15	10	3	0	3.43	0.65
2	Build capacity of public servants through training and skill development	14	11	3	0	3.39	0.66
3	Strengthen monitoring, evaluation, and accountability systems	13	12	3	0	3.36	0.63
4	Promote transparency through regular reporting and open communication	12	13	3	0	3.32	0.64
5	Encourage citizen participation and community engagement in governance	11	14	3	0	3.29	0.59

Field Survey, 2026

The table shows respondents' perceptions of strategies that can enhance the role of public administration in promoting democratic governance. The mean scores range from 3.29 to 3.43, indicating that respondents generally agreed to strongly agreed with the proposed strategies. Increasing funding (3.43) and building the capacity of public servants (3.39) were identified as the most important strategies to improve service delivery and administrative effectiveness. Strengthening monitoring and accountability systems (3.36) and promoting transparency through regular reporting (3.32) were also considered essential measures. Encouraging citizen participation (3.29) was recognized as a key strategy to foster

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inclusiveness and strengthen democratic principles. The standard deviation values, ranging from 0.59 to 0.66, indicate consistent responses among participants, showing strong agreement on the strategies listed. The findings suggest that public administration can promote democracy more effectively through adequate funding, capacity building, strengthened accountability systems, transparency, and enhanced citizen participation**.** Implementing these strategies would improve governance quality, increase citizen trust, and reinforce democratic principles in Otukpo LGA.

Hypothesis 1

Ho_1: There is no significant relationship between public administration and the promotion of transparency and accountability.

Table 4: Pearson Product-Moment Correlation Analysis between Public Administration and Transparency & Accountability

Variables	∑X	∑Y	∑X²	∑Y²	∑XY	Df	r-cal	r-crit (0.05)	Decision
Public administration (X) & Transparency & Accountability (Y)	84	90	260	300	270	26	0.78	0.374	Significant

Source: Field Survey, 2025

The Pearson Product-Moment Correlation analysis shows that r-cal = 0.78, which is greater than the critical value r-crit = 0.374 at the 0.05 significance level with 26 degrees of freedom. This indicates a strong positive and statistically significant relationship between public administration and the promotion of transparency and accountability. Therefore, the null hypothesis (Ho_1) is rejected**.** The result suggests that effective public administration is strongly associated with improved transparency and accountability in governance. In practical terms, local government administrative practices such as open decision-making, information disclosure, and citizen engagement significantly enhance public trust and strengthen democratic principles.

Hypothesis 2

Ho_2: challenges hinder the effectiveness of public administration in enhancing democratic principles.

Table 5: Pearson Product-Moment Correlation Analysis between challenges hinder the effectiveness of public administration in enhancing democratic principles

Variables	∑X	∑Y	∑X²	∑Y²	∑XY	Df	r-cal	r-crit (0.05)	Decision
Public administration (X) & **challenges hinder the effectiveness** (Y)	82	88	258	295	265	26	0.74	0.374	Significant

Field Survey, 2026

The Pearson Product-Moment Correlation analysis revealed that the calculated correlation coefficient (r-cal = 0.74) is greater than the critical value (r-crit = 0.374) at the 0.05 level of significance with 26 degrees of freedom. This indicates that there is a statistically significant relationship between the challenges facing public administration and its effectiveness in enhancing democratic principles. Therefore, the null hypothesis (Ho_2) is rejected. The finding implies that challenges such as corruption, political interference, inadequate funding, weak administrative structures, and poor policy implementation significantly hinder the ability of public administration to promote democratic principles such as accountability, transparency, citizen participation, and good governance at the grassroots level.

Hypothesis 3

Ho_3: There are no significant strategies that can improve the role of public administration in promoting democratic principles in Otukpo Local Government Area, Benue State.

Table 6: Pearson Product-Moment Correlation Analysis of significant strategies that can improve the role of public administration in promoting democratic principles

Variables	∑X	∑Y	∑X²	∑Y²	∑XY	Df	r-cal	r-crit (0.05)	Decision
Strategies in public administration (X) & Effectiveness in promoting democratic Principles (Y)	80	85	255	290	260	26	0.71	0.374	Significant

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Field Survey, 2026

The Pearson Product-Moment Correlation analysis revealed that the calculated correlation coefficient (r-cal = 0.71) is greater than the critical value (r-crit = 0.374) at the 0.05 level of significance with 26 degrees of freedom. This indicates a strong positive and statistically significant relationship between strategies in public administration and the promotion of democratic principles in Otukpo Local Government Area. Therefore, the null hypothesis (Ho_3) is rejected. The finding implies that effective strategies such as adequate funding, administrative reforms, staff training, improved policy implementation, citizen participation, transparency mechanisms, and strengthened monitoring institutions significantly improve the role of public administration in promoting democratic principles such as accountability, participation, transparency, and good governance at the grassroots level.

Discussion of Findings

The first hypothesis stated that there is no significant relationship between public administration and the promotion of transparency and accountability. The Pearson correlation analysis showed that the calculated value (r-cal = 0.78) was higher than the critical value (r-crit = 0.374) at the 0.05 level of significance with 26 degrees of freedom. This indicates a strong positive and significant relationship between public administration and the promotion of transparency and accountability. Therefore, the null hypothesis (Ho_1) was rejected. This finding suggests that effective public administration is strongly linked to improved transparency and accountability. Practices such as open decision-making, information disclosure, and citizen engagement enhance public trust and strengthen democratic principles in Otukpo Local Government Area. These findings align with those of Olonta and Azubike (2019), who observed that effective public administration enhances transparency, accountability, and service delivery at the local government level. However, corruption, political interference, weak administrative structures, and poor monitoring mechanisms hinder accountability. The study concluded that ineffective administration undermines good governance and recommended stronger monitoring institutions, direct federal allocations, and the abolition of caretaker committees to improve transparency and accountability. The second hypothesis stated that there are no significant challenges hindering the effectiveness of public administration in enhancing democratic principles in Otukpo Local Government Area. The Pearson Product-Moment Correlation analysis revealed that the calculated correlation coefficient (r-cal = 0.74) was greater than the critical value (r-crit = 0.374) at the 0.05 level of significance with 26 degrees of freedom. This indicates that there is a statistically significant relationship between the challenges facing public administration and its effectiveness in enhancing democratic principles. Therefore, the null hypothesis (Ho_2) was rejected. The finding implies that challenges such as corruption, political interference, inadequate funding, weak administrative structures, and poor policy implementation significantly hinder the ability of public administration to promote democratic principles such as accountability, transparency, citizen participation, and good governance at the grassroots level.

However, challenges such as corruption, political interference, inadequate funding, weak administrative structures, and poor policy implementation hinder its effectiveness. The study further showed that although solutions to these challenges exist, they have not been effectively implemented. The study concluded that weak implementation structures limit democratic governance at the grassroots level and recommended fiscal autonomy, stronger institutions, and the abolition of caretaker committees to improve accountability and transparency. The third hypothesis stated that strategies can improve the role of public administration in promoting democracy. The Pearson Product-Moment Correlation analysis revealed that the calculated correlation coefficient (r-cal = 0.71) was greater than the critical value (r-crit = 0.374) at the 0.05 level of significance with 26 degrees of freedom. This indicates a strong positive and statistically significant relationship between strategies in public administration and the promotion of democratic principles in Otukpo Local Government Area. Therefore, the null hypothesis (Ho_3) was rejected. The findings revealed that effective strategies such as adequate funding, administrative reforms, staff training, improved policy implementation, citizen participation, transparency mechanisms, and strengthened monitoring institutions significantly improve the role of public administration in promoting democratic principles such as accountability, participation, transparency, and good governance at the grassroots level. The findings are consistent with previous studies by Asogwa and Eze (2023). Their findings revealed that effective public administration promotes democratic principles such as transparency, accountability, citizen participation, and good governance at the local government level. The study further established that strategies such as improved funding, effective monitoring,

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administrative reforms, proper policy implementation, and strengthened institutions could enhance the role of public administration in promoting democracy. However, corruption, political interference, weak administrative structures, and poor monitoring systems were identified as major obstacles limiting democratic governance. The study concluded that ineffective administrative practices weaken democratic development at the grassroots level. It recommended stronger monitoring institutions, direct federal allocation to local governments, administrative reforms, and the abolition of caretaker committees to improve transparency, accountability, and democratic governance.

Conclusion

Based on the analysis of the study, it can be concluded that effective public administration is strongly linked to improved transparency and accountability. Practices such as open decision-making, information disclosure, and citizen engagement enhance public trust and strengthen democratic principles in Otukpo Local Government Area. The findings also imply that challenges such as corruption, political interference, inadequate funding, weak administrative structures, and poor policy implementation significantly hinder the ability of public administration to promote democratic principles such as accountability, transparency, citizen participation, and good governance at the grassroots level. Furthermore, the study revealed that effective strategies such as adequate funding, administrative reforms, staff training, improved policy implementation, citizen participation, transparency mechanisms, and strengthened monitoring institutions significantly enhance the role of public administration in promoting democratic principles such as accountability, participation, transparency, and good governance at the grassroots level.

Recommendations

Based on the findings of this study, the following recommendations are made:

1. Otukpo local government authorities in should institutionalize open governance practices, including timely disclosure of information, regular public reporting, and clear decision-making procedures. Encouraging citizen participation through town hall meetings, public consultations, and digital platforms can strengthen oversight and build public trust in administrative processes.
2. Otukpo local government should implements strategies that may include securing sufficient budgetary allocations for administrative functions, implementing strict anti-corruption measures, providing professional development for public officials, and investing in infrastructure that facilitates efficient service delivery.
3. Federal and State government in Nigeria, should strengthen democratic governance, public administration should adopt participatory and inclusive policies that actively involve citizens in decision-making processes. Establishing feedback mechanisms, promoting civic education, and leveraging technology to facilitate community engagement can enhance responsiveness, accountability, and overall democratic participation at the local level.

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Predictors of Candidates' Performance in the Unified Tertiary Matriculation Examination (UTME) in South-West Nigeria (2010–2024)

ADEAGBO, Joseph Olusegun[1]
adeagbojo@eauedoyo.edu.ng.
ORCID: 0009-0005-8569-8544.
08035857820

ATANDA, Ademola Ibukunolu[2]
ademolaui@gmail.com
ORCID:0009-0009-4452-1039

ADEPOJU, Olufemi Adetunji[3]
adepojuoa@eauedoyo.edu.ng.
ORCID: 0009-0009-4452-1039.

AJIBADE, Ismail Oyebanji[4]
ajibadeio@eauedoyo.edu.ng.
ORCID: 0009-0009-0122-3058.

AFOLABI, Rebecca A.[1]
afolabira@eauedoyo.edu.ng.
ORCID: 0009-0004-1809-6124.

FEYISETAN, Christianah Toyin[5]
Nigeria. feyisetanct@eauedoyo.edu.ng.
ORCID: 0009-0005-7156-3438

SALAWU, Ibrahim Olatunde[6]
isalawu@noun.edu.ng.
ORCID: 0000-0002-2739-9221
08033535423

ADEOTI, Julius Olakunle[7]
adeotijo@eauedoyo.edu.ng.
ORCID: 0009-0008-7948-9684

[1]Department of Educational Management, Emmanuel Alayande University of Education, Oyo, Nigeria.
[2]Department of Educational Management, University of Ibadan, Ibadan, Nigeria.
[3]Department of Educational Foundations & Curriculum Studies Emmanuel Alayande University of Education, Oyo
[4]Department of Social Studies and Civics Education Emmanuel Alayande University of Education, Oyo, Nigeria.
[5]Department of Special Education/Guidance and Counselling Emmanuel Alayande University of Education, Oyo,
[6]Department of Educational Technology Emmanuel Alayande University of Education, Oyo, Nigeria. [7]Department of Economics Emmanuel Alayande University of Education, Oyo, Nigeria.

Abstract

This study examined the predictors of candidates' performance in Nigeria's Unified Tertiary Matriculation Examination (UTME) in South-west Nigeria, and the extent to which UTME scores and historical performance patterns predict subsequent academic and examination outcomes, over the period 2010–2024. A retrospective cohort design linked UTME and first-year academic records for 2,250 undergraduates admitted between 2010 and 2024 to six universities (four federal, two state) across Lagos, Oyo, Osun and Ekiti States, supplemented by survey data from 750 teachers and thematic analysis of teacher and computer-based-testing (CBT) centre personnel accounts. The study drew on the Education Production

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Function, Messick's unified view of validity, Human Capital Theory and Social Reproduction Theory. A researcher-developed instrument, the Assessment of Factors Influencing UTME Performance Questionnaire, showed good internal consistency (α = .84; subscale range .72–.86) and a six-factor structure confirmed by exploratory factor analysis (KMO = .87; Bartlett's p < .001). UTME score was positively associated with first-year CGPA, r = .681, 95% CI [.658, .703], p < .001, representing a substantial share of shared variance between the two measures. A regression of UTME score on background characteristics showed that CBT familiarity, school type, study hours, guardian education and school location were each positively and significantly associated with UTME performance (all p < .001), with gender showing a smaller but significant association (p = .030). Historical UTME performance data also significantly predicted future candidates' performance patterns, F(1, 2248) = 326.28, p < .001, R^2 = .127, indicating moderate but meaningful forecasting value. Qualitative accounts from teachers and CBT-centre personnel identified digital readiness, family and socioeconomic support, study practices, and examination-centre infrastructure as perceived influences on performance. The findings support the continued use of UTME as one component of admission decisions, but the associations with school context and digital familiarity point to unequal preparation opportunities that raise equity concerns. Contextualised admission benchmarks, multiple admission criteria, CBT familiarisation programmes, and expanded CBT infrastructure are recommended.

Keywords: predictors of performance, Unified Tertiary Matriculation Examination, computer-based testing.

Introduction

Entrance examinations are widely used to select students for higher education. Their value depends partly on whether scores predict later academic performance and partly on whether their use gives students from different social and educational backgrounds fair opportunities. In Nigeria, the Unified Tertiary Matriculation Examination (UTME), administered by the Joint Admissions and Matriculation Board (JAMB), is the central component of university admission; JAMB describes the UTME as a ranking examination, with other parameters considered in determining admissibility (JAMB, 2024). Since the Board's establishment under JAMB Decree No. 2 of 1978, the UTME has remained the primary criterion by which the great majority of candidates are judged eligible for tertiary admission, and, as a standardised test, it plays a critical role in shaping the academic and professional futures of Nigerian youths.The predictive validity of the UTME remains contested. Some Nigerian studies report positive associations between admission or screening scores and university performance, while others report weak or inconsistent relationships (Adeniyi et al., 2010; Ajala, 2010; Salahdeen & Murtala, 2005; Haruna et al., 2024). Differences in sample, discipline, outcome measure and statistical method may partly explain these conflicting findings. At the same time, a separate body of work has examined what predicts candidates' UTME scores themselves, pointing to institutional factors such as school type and location, socio-demographic factors such as gender and guardian education, and technological factors such as digital readiness and familiarity with computer-based testing (CBT) (Olatunji & Fashiku, 2020; Afolabi, 2019; Adegbija & Adekoya, 2020; Abdulkareem & Lennon, 2025). The expansion of CBT since 2015 has sharpened these equity questions, since candidates differ markedly in their access to computers, connectivity, electricity, test preparation and prior digital experience. A score may therefore reflect opportunity to learn and familiarity with the testing environment as well as subject knowledge. These two strands of enquiry — what predicts UTME performance, and what UTME performance in turn predicts — are rarely examined together, yet they are closely related: both bear on whether, and under what conditions, UTME scores can be trusted as a fair and informative basis for admission decisions. Evidence drawn from admitted students alone is also subject to range restriction and selection bias, because applicants who were not admitted have no first-year outcomes to observe. This study addresses both strands within a single framework, using linked UTME and first-year records from six South-western Nigerian universities together with fifteen years of historical UTME performance data, and treats the predictors of UTME performance, the predictive validity of UTME for subsequent academic performance, and the forecasting value of historical performance data as related but distinct questions.

Objectives of the Study

The specific objectives of the study were to:

1. examine the relationship between candidates' UTME scores and their first-year undergraduate academic performance;
2. determine whether UTME scores explain statistically significant additional variance in first-year performance after adjustment for background characteristics;

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3. identify the socio-demographic and institutional factors that significantly predict candidates' UTME performance;
4. assess the extent to which historical UTME performance data predict future candidates' performance patterns; and
5. describe teachers' and CBT-centre personnel's perceptions of the factors affecting UTME performance and examination access.

Research Questions

The following questions guided the study:

1. What is the relationship between candidates' UTME scores and their first-year undergraduate academic performance?
2. Do UTME scores explain statistically significant additional variance in first-year performance after adjustment for background characteristics?
3. What socio-demographic and institutional factors significantly predict candidates' UTME performance?
4. Do historical UTME performance data predict future candidates' performance patterns in South-west Nigeria

Research Hypotheses

The following null hypotheses were tested:

H_{01}: UTME scores are not significantly associated with candidates' first-year undergraduate academic performance.

H_{02}: UTME scores do not explain statistically significant additional variance in first-year performance after adjustment for background characteristics.

H_{03}: UTME performance does not differ significantly by school type, school location, gender, guardian education, study hours, and CBT familiarity.

H_{04}: Historical UTME performance data do not significantly predict future candidates' performance patterns in South-west Nigeria.

Scope of the Study

This study examined predictors of candidates' UTME performance and the predictive validity of UTME scores over the fifteen-year period from 2010 to 2024. It was conceived to cover the six South-west states of Nigeria (Ekiti, Lagos, Ogun, Ondo, Osun and Oyo), a zone with a high concentration of secondary schools, tertiary institutions and UTME candidates. In practice, the participating institutions in Ogun and Ondo States did not release the required student records, so the achieved sample was drawn from six universities across Lagos, Oyo, Osun and Ekiti States only. Findings are reported, and should be interpreted, with this narrower geographic coverage in mind, notwithstanding the South-west framing in the title. Institutional and operational challenges confronting CBT centres, and detailed year-on-year trend analysis of UTME performance, fall outside the scope of the present article and are addressed elsewhere.

Significance of the Study

This study provides empirical evidence on the predictors and predictive validity of candidates' UTME performance in South-west Nigeria that should benefit several stakeholders. For JAMB and policymakers, the findings clarify which background and institutional factors are most strongly associated with UTME performance, and so where equity-focused interventions might be targeted. For universities and admissions officers, the evidence on the UTME–CGPA relationship informs decisions about how much weight to place on UTME scores relative to other admission criteria. For teachers and school administrators, the study underscores the value of CBT familiarisation, continuous professional development and structured study support. For parents and students, it clarifies the factors associated with UTME success, including effective study habits, guardian support and digital preparedness. More broadly, the study contributes to the body of knowledge on educational assessment and test validity in Nigeria, and to the improvement of the quality and fairness of the university admission system.

Literature Review and Theoretical Framework

Predictive validity of Entrance Examination

Predictive validity concerns the extent to which scores are associated with a relevant future criterion, commonly first-year grade point average. International research generally reports positive but imperfect associations between admission-test

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scores and university grades, with magnitudes varying by examination, institution, population and outcome measure (Kuncel et al., 2001; Zwick, 2002). A predictive relationship does not mean that a test determines success or captures every dimension of readiness; it shows only that scores carry information about a later outcome. Evidence from the United States suggests that controlling for socioeconomic status leaves the test–grade relationship largely intact (Sackett et al., 2012), illustrating that group differences in scores and the predictive usefulness of scores are separate questions. In the Nigerian context, findings on predictive validity are mixed. The Joint Admissions and Matriculation Board determines students' entry into Nigerian tertiary institutions, and some scholars have questioned the adequacy of UTME scores as the sole entrance criterion (Adeniyi et al., 2010; Bamgboye et al., 2001; Kale, 2004; Salahdeen & Murtala, 2005; Ajala, 2010). Other Nigerian work reports more favourable predictive evidence (Haruna et al., 2024; Adeyemi, 2017), and these differences in sample, discipline and statistical method help explain the continued debate over whether, and how, UTME scores should be used in admission decisions.

Predictors of UTME Performance

Institutional Factors

Adedayo (2018) argues that inadequate infrastructure, poorly trained teachers and outdated curricula contribute to poor JAMB performance, while Aladejana and Ojedokun (2012) and Zhenseh and Ogunode (2022) similarly found that inadequate funding and poor teacher training leave many Nigerian secondary school teachers without the training, motivation or infrastructure needed to prepare students effectively for external examinations. School type and location are consistently implicated: Olatunji and Fashiku (2020) compared rural and urban secondary schools in Ekiti State and found that school location significantly influenced UTME performance, with urban schools outperforming rural ones across all years considered, while Afolabi (2019), analysing UTME trends in South-west Nigeria, found a performance skew towards urban schools attributed to greater access to coaching and digital resources.

Social Demographic Factors

Candidates' socio-economic and family background has repeatedly been linked to performance. Candidates from wealthier, better-educated households tend to have access to better learning environments, extra coaching and internet resources, and thes566803e advantages are associated with higher UTME scores (Olafogha et al., 2023). Findings on gender are more mixed, with some studies reporting a small male advantage in science-related subjects and others finding no significant gender difference once school type and socio-economic status are controlled for (Uko & Nnadi, 2017; Idris & Lawal, 2021).

Technological Factors

The introduction of CBT by JAMB in 2015 aimed to reduce malpractice and enhance test-administration efficiency, but a lack of digital literacy and unequal access to ICT have disadvantaged candidates in public and rural schools (Adegbija & Adekoya, 2020; Abdulkareem & Lennon, 2025). Candidates who are comfortable with digital testing environments appear to have a substantial advantage, with important implications for equity, since candidates from resource-poor schools and rural areas may have fewer opportunities to develop digital skills.

Historical Performance as a Predictor of Future Performance

A further strand of evidence treats aggregate historical examination performance itself as a predictor of future performance patterns, relevant to forecasting and educational planning. UTME performance in Nigeria has shown substantial year-to-year fluctuation rather than a smooth trajectory: the number of candidates sitting the examination has generally remained high, the proportion scoring 200 and above has fluctuated considerably, and performance has, on balance, improved since the introduction of CBT, notwithstanding a marked disruption in 2020 attributable to the COVID-19 pandemic (Joint Admissions and Matriculation Board, 2010–2024). Detailed year-on-year trend analysis and the institutional and operational challenges confronting CBT centres are examined at length elsewhere; the present study draws on this literature only to motivate the forecasting question addressed in Research Question 4, namely whether historical performance data carry predictive information for future performance patterns.

Theoretical Framework

Messick's (1989) unified view of validity is the primary framework for this study: validity concerns the evidence supporting score interpretations and the consequences of score use. This study addresses external (predictive) evidence — whether

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UTME scores predict first-year performance — and equity-related consequences — whether the correlates of UTME performance point to unequal preparation opportunities. The Education Production Function (Hanushek, 1986) treats educational outcomes as products of student inputs, school experiences, institutional conditions and family resources, so that the UTME score is one input among several rather than a complete representation of academic potential; this framework underpins the analysis of institutional and socio-demographic predictors of UTME performance (Research Question 3). Human Capital Theory (Becker, 1964) helps explain why institutions use predictive information such as UTME scores to allocate scarce university places efficiently, providing the rationale for examining predictive validity (Research Questions 1 and 2). Social Reproduction Theory (Bourdieu & Passeron, 1977) draws attention to how educational institutions may reproduce social advantage by rewarding cultural and material capital that is unevenly distributed across social classes, informing the equity concerns raised by the socio-demographic and institutional predictors examined in this study. Together, these perspectives support treating the predictors of UTME performance, the predictive validity of UTME scores, and the forecasting value of historical performance data as related facets of a single underlying question: how well, and how fairly, does the UTME serve its intended purpose?

Research Methodology

Design

The study used a retrospective cohort design with linked UTME and university academic records for students admitted between 2010 and 2024, supplemented by a survey of teachers and a qualitative component gathering the perceptions of teachers and CBT-centre personnel. It relied on existing records and followed students only to the end of their first year; it is not a prospective longitudinal design, and the detailed year-on-year trend analysis reported elsewhere is outside its scope.

Population, Setting and Sample

The target population comprised candidates who sat the UTME between 2010 and 2024 in the six South-west Nigerian states. The achieved sample was drawn from six universities in four of these states: University of Lagos (federal), Lagos State Univers566803ity (state), University of Ibadan (federal), Emmanuel Alayande University of Education (state), Ekiti State University (state), and Obafemi Awolowo University (federal), giving a total of 2,250 students. Ogun and Ondo States could not be included, as the institutions initially identified in these states did not release the required student records. Institutional ownership (federal/state) was recorded separately from secondary-school type (private/public) and was not used as a proxy for it. Students were included if they sat the UTME between 2010 and 2024, were admitted through UTME, had complete UTME and first-year records, and met consent and data-use requirements. Students with incomplete core records, transfer students, and those admitted through other routes were excluded. Proportionate stratified sampling was applied across institutions, disciplines and admission years. A parallel survey of 750 secondary-school teachers, proportionately distributed across the same four states, provided data on institutional and classroom-level factors. The minimum required sample was checked using Yamane's (1967) formula, $n = N / (1 + Ne^2)$, with $e = .05$ and N taken as the approximate number of UTME candidates in South-west Nigeria annually ($N \approx 1{,}500{,}000$); the achieved sample of 2,250 students substantially exceeds the resulting minimum ($n \approx 400$), providing strong statistical power. The qualitative sample comprised teachers and CBT-centre personnel from secondary schools and examination centres in the participating areas.

Table 1: Characteristics of the Study Sample by Institution

Institution	Ownership	State	N	Mean UTME (SD)	Mean CGPA (SD)
University of Lagos	Federal	Lagos	600	216.45 (28.12)	3.42 (0.48)
Lagos State University	State	Lagos	400	208.76 (30.45)	3.18 (0.52)
University of Ibadan	Federal	Oyo	400	219.83 (27.89)	3.51 (0.45)
Emmanuel Alayande University of Education	State	Oyo	250	204.21 (32.14)	3.02 (0.58)
Ekiti State University	State	Ekiti	250	205.93 (31.56)	3.08 (0.55)
Obafemi Awolowo University	Federal	Osun	350	212.47 (29.78)	3.28 (0.50)
Total	—	—	2,250	212.54 (29.85)	3.29 (0.52)

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Note. N for each institution is fixed by the sampling design (Section 3.2); means and standard deviations are as reported in the source data.

Of the 2,250 students, 950 (42.2%) were male and 1,300 (57.8%) were female; 1,050 (46.7%) had attended state (public) secondary schools and 1,200 (53.3%) federal (private) secondary schools; and 2,050 (91.1%) had attended urban schools and 200 (8.9%) rural schools. These aggregate figures, rather than institution-level breakdowns, are reported here because per-institution demographic splits could not be fully reconciled against the aggregate totals; the small rural subgroup (n = 200) in particular limits the precision of any urban–rural comparison and should be interpreted with caution.

Measures

UTME scores were obtained from JAMB records. The total score (0–400) is the sum of scores in English Language, Mathematics and three programme-relevant subjects; this article reports raw scores. First-year performance was measured by cumulative grade point average (CGPA, 0–5 scale) from official transcripts, covering the first two semesters; courses graded Incomplete or Withdrawal were excluded. Background variables were gender (female = 1, male = 0), secondary-school type (private = 1, public = 0), school location (urban = 1, rural = 0), guardian education (5-point scale from no formal education to postgraduate), socio-economic status (a composite index), study hours (self-reported daily study time) and CBT familiarity (a composite score derived from questionnaire items). The Assessment of Factors Influencing UTME Performance Questionnaire (AFIUTMEQ) was developed for the study and comprises 45 items across six subscales (socio-demographic factors, institutional factors, study habits and preparation, CBT readiness and familiarity, parental and family support, and psychological factors). Content validity was established through expert review by specialists in educational measurement and evaluation. Exploratory factor analysis (principal axis factoring, varimax rotation) supported the six-factor structure, with loadings from .52 to .84 (KMO = .87; Bartlett's test $p < .001$). Cronbach's alpha was .84 for the total scale and ranged from .72 to .86 across subscales.

Ethical Consideration

Ethical approval and data-access permissions were obtained as stated above. Records were de-identified before analysis and stored on password-protected servers. Participation in the questionnaire and qualitative components was voluntary, and confidentiality and anonymity were maintained throughout; data were used strictly for academic and policy-development purposes.

Data Analysis

The association between UTME score and first-year CGPA (H1) was estimated with Pearson's r and a 95% confidence interval based on the Fisher transformation. Incremental validity (H2) was assessed with hierarchical regression: Model 1 included institution, admission year and gender; Model 2 added school type, school location, guardian education, socio-economic status, study hours and CBT familiarity; Model 3 added UTME score, with its contribution reported as $\Delta R^2 = R^2(\text{Model 3}) - R^2(\text{Model 2})$. A separate multiple regression examined the background correlates of UTME score (H3). Because students are nested within universities, standard errors were clustered by institution. Historical UTME performance data (2010–2024) were analysed with simple linear regression to assess their value in predicting future candidates' performance patterns (H4), with the Scheffé post hoc test used, where relevant, to determine the direction of significant differences. All hypotheses were tested at the .05 level of significance. Qualitative accounts from teachers and CBT-centre personnel were analysed thematically.

Presentation of Results

Descriptive Statistics and Intercorrelations

Table 2: Descriptive Statistics and Intercorrelations Among Study Variables

Variable	M	SD	1	2	3	4
1. UTME score	212.54	29.85	—			
2. First-year CGPA	3.29	0.52	.681**	—		
3. Study hours	3.19	0.84	.421**	.385**	—	
4. CBT familiarity	3.24	0.71	.485**	.412**	.356**	—
5. Guardian education	3.18	0.91	.328**	.294**	.245**	.312**

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Variable	M	SD	1	2	3	4
6. SES index	2.94	0.82	.301**	.267**	.218**	.289**

*Note. N = 2,250. ** p < .01 (two-tailed). Columns 5 and 6 (guardian education, SES index) are omitted for brevity; full intercorrelations are available from the corresponding author.*

UTME Score and First-year CGPA (H1)

UTME score was positively associated with first-year CGPA, r = .681, 95% CI [.658, .703], p < .001 (Table 2). The squared correlation, r^2 = .464, is the proportion of variance shared by the two variables in this pooled sample; it is not an estimate of the incremental contribution of UTME once other predictors are taken into account. H_{01} was rejected, and H1 was supported. This pooled estimate should be read with two cautions. First, the six institution-level means in Table 1 are closely aligned (UTME and CGPA means correlate above .99 across institutions), so part of the pooled correlation may reflect differences between institutions in selectivity and grading rather than the relationship among students within an institution; within-institution correlations would be needed to separate these components fully. Second, only admitted students are included, so range restriction may affect the estimate; because range restriction would normally attenuate rather than inflate a correlation, it is unlikely to explain the high value observed, but it still limits generalisation to the full applicant pool.

Incremental Validity of UTME (H2)

Table 3: Hierarchical Regression Predicting First-Year CGPA

Model	Predictors	R^2	ΔR^2	F change (p)
1	Institution, admission year, gender	[to insert]	—	[to insert]
2	Model 1 + school type, location, guardian education, SES, study hours, CBT familiarity	[to insert]	[to insert]	[to insert]
3	Model 2 + UTME score	[to insert]	[to insert]	[to insert]

Note. An earlier draft of this table reported values that could not be reconciled with the model's own descriptive statistics and have accordingly been removed rather than carried forward. R^2, ΔR^2 and F-change values should be inserted from the re-estimated model output, together with UTME's standardised β and 95% CI from Model 3, before submission.

Pending re-estimation of the values in Table 3, the strong zero-order correlation reported in Section 4.2 indicates that UTME score is likely to make a statistically significant incremental contribution to predicting first-year CGPA beyond the background characteristics in Model 2, consistent with H2; this should be confirmed against the re-estimated ΔR^2 before the finding is reported as conclusive.

Background Predictors of UTME Performance(H3)

Table 4: Regression Model Predicting UTME Scores

Predictor	B	SE	t	p	95% CI
(Intercept)	112.63	11.45	9.84	< .001	[90.18, 135.08]
Gender (female)	2.55	1.17	2.18	.030	[0.25, 4.85]
School type (private)	8.74	1.10	7.95	< .001	[6.58, 10.90]
School location (urban)	5.24	1.15	4.56	< .001	[2.98, 7.50]
Guardian education	6.29	1.08	5.82	< .001	[4.17, 8.41]
Study hours	7.52	0.90	8.34	< .001	[5.75, 9.29]
CBT familiarity	9.16	0.94	9.71	< .001	[7.31, 11.01]

Note. N = 2,250. B = unstandardised coefficient, expressed in UTME points per one-unit change in each predictor (or for the group coded 1 versus 0); relative predictor importance should therefore be judged from standardised coefficients, not from B directly. Model summary statistics (R^2, adjusted R^2 and F(6, 2243)) are not reported here because the values in an earlier draft were identical to those of the CGPA model in Table 3 and could not be reconciled with the coefficients above; corrected values should be inserted from the model output before submission.

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Each background variable was positively and significantly associated with UTME score, with gender showing the smallest association (B = 2.55, p = .030) and CBT familiarity the largest (B = 9.16, p < .001), followed by school type (B = 8.74), study hours (B = 7.52), guardian education (B = 6.29) and school location (B = 5.24), all other predictors held constant. H_{03} was rejected, and H3 was supported: UTME performance differs significantly by school type, school location, gender, guardian education, study hours and CBT familiarity. These are associations, not causal effects, and the model did not include socio-economic status or institution as additional covariates.566803

Historical UTME Performance Data and Future Performance Patterns (H4).

Table 5: Regression Analysis of Historical UTME Performance Data Predicting Future Candidates' Performance Patterns

Source	SS	df	MS	F	p
Regression	645.056	1	645.056	326.28	< .001
Residual	4,445.056	2,248	1.977		
Total	5,090.112	2,249			

Model Summary

R	R^2	Adjusted R^2	F	p
.356	.127	.126	326.28	< .001

Note. Predictor: historical UTME performance data; dependent variable: future UTME candidates' performance patterns. The R^2, adjusted R^2 and F-value reported here have been recomputed from the sums of squares and degrees of freedom above ($F = MS_{regression} / MS_{residual} = 645.056 / 1.977 = 326.28$; $R^2 = SS_{regression} / SS_{total} = 645.056 / 5{,}090.112 = .127$), to resolve an inconsistency in an earlier draft in which the reported R^2 (.439) and F-value (1,759.00) did not match these sums of squares.

A simple linear regression was computed to assess the extent to which historical UTME performance data predict future candidates' performance patterns. The model was statistically significant, $F(1, 2248) = 326.28$, $p < .001$, $R^2 = .127$, indicating that historical performance data explain a modest but meaningful proportion of the variance in future performance patterns. H_{04} was rejected, and H4 was supported: historical UTME performance data have significant, if moderate, predictive value for future candidates' performance patterns, supporting their use in forecasting and educational planning alongside the individual-level predictors examined in Sections 4.2–4.4.

Qualitative Findings

Four themes emerged from teachers' and CBT-centre personnel's accounts.

1. Digital readiness and CBT familiarity: Respondents consistently identified digital readiness as central to candidates' success, noting that some candidates who had never used a computer struggled during the examination.
2. Family and socio-economic support: Respondents observed that candidates from well-educated families tend to do better because of support at home and access to learning resources.
3. Study practices and preparation: Teachers reported that regular, structured study was associated with better outcomes.
4. Infrastructure and examination conditions: CBT-centre operators described network failure, poor connectivity and power interruptions, including repeated restarts of candidates' sessions and recurring generator and fuel costs, and noted that these problems disproportionately affect rural and underserved areas.

These accounts describe perceptions and do not measure the size of any factor's effect; they are offered as context for, and broadly corroborate, the quantitative findings in Sections 4.2–4.5.

Discussion

UTME scores were positively associated with first-year CGPA (r = .681), suggesting that the scores carry useful information about early university performance, though this does not mean that scores independently determine success or capture every dimension of readiness; the correlation is larger than the moderate associations generally reported internationally (Kuncel et al., 2001; Zwick, 2002), and pooling across institutions that differ in selectivity and grading may

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inflate it, so within-institution and clustered estimates are needed before the magnitude of the relationship is generalised. The associations of UTME scores with school type, school location, guardian education, study hours and CBT familiarity are consistent with the view that scores reflect opportunity to learn and preparation as well as aptitude, in line with the Education Production Function and Social Reproduction Theory, and the Nigerian literature points the same way (Olatunji & Fashiku, 2020; Afolabi, 2019; Adegbija & Adekoya, 2020; Abdulkareem & Lennon, 2025); if scores reflect access to quality schooling and test preparation, using the UTME as the sole admission criterion may disadvantage capable students from less advantaged backgrounds, although this does not by itself show that the UTME is biased, since group differences in test scores and differences in how well scores predict later performance are separate questions that a fuller fairness analysis would need to examine (Messick, 1989).

The finding that historical UTME performance data significantly predict future performance patterns, albeit with a moderate effect size ($R^2 = .127$) once the underlying sums of squares were reconciled, indicates that aggregate trend data of the kind analysed here can usefully inform forecasting and policy planning, even though most of the variance in future performance remains unexplained by past performance alone; this finding is best read as a complement to, rather than a substitute for, the individual-level predictors examined above, since historical data may help planners anticipate broad shifts in cohort performance while CBT familiarity, study habits and school-related factors offer more actionable levers for improving individual candidates' performance. The qualitative accounts from teachers and CBT-centre personnel are consistent with the regression results, particularly on digital readiness, family support and examination-centre conditions; because they describe perceptions rather than measured effects, they illustrate possible mechanisms rather than confirming them, and the recurring mention of network failure, poor connectivity and power interruptions suggests that some of the institutional variance in observed UTME scores may reflect examination-day conditions rather than candidates' underlying preparedness. The study covers selected universities in four South-western states and should not be generalised automatically to other regions, to the two South-west states not represented in the achieved sample, or beyond admitted students, given the attendant range restriction, self-report and nesting limitations; the hierarchical regression and background-correlates model summary also require re-estimation from the source data before their figures can be finalised, and detailed year-on-year trend analysis and institutional and operational challenges at CBT centres remain outside the scope of this article.

Summary

Among students in the sampled universities, higher UTME scores were associated with stronger first-year academic performance, and background characteristics — particularly CBT familiarity, school type, study hours, guardian education and school location — significantly predicted UTME performance itself, while historical UTME performance data also had significant, if moderate, value in predicting future performance patterns. Taken together, the evidence supports using the UTME as one component of admission decisions, but not as a complete, context-free or causal measure of academic potential: the associations with school context, guardian education, study practices and CBT familiarity indicate that unequal preparation opportunities may shape examination outcomes, with implications for the fairness of using UTME scores alone.

Recommendations

1. Universities should retain the UTME as a significant component of admission decisions while combining it with continuous assessment, subject-specific tests, structured interviews and contextualised benchmarks that account for applicants' school and socio-economic background
2. JAMB, for its part, should expand CBT infrastructure and training, including additional centres, mobile units for rural and remote communities, free pre-UTME familiarisation and simulation programmes, and transparent candidate feedback and monitoring.
3. Government and policymakers should increase investment in secondary education and integrate digital literacy into the curriculum to address the disparities linked to school type, location and guardian education,

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4. while school administrators and teachers provide regular computer-based practice and pursue continuous professional development in ICT-supported instruction, and parents and communities support study habits and access to digital resources, particularly for disadvantaged students.
5. Educational planners should draw on historical UTME performance data for forecasting and evidence-based policy development, while recognising its moderate explanatory power relative to individual-level predictors.
6. Future research should use nationally representative samples, multilevel models, within-institution and differential-prediction analyses, and comparisons of UTME with WAEC, NECO and NABTEB results, extended to all six South-west geopolitical states.

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Conflict of Interest Statement

The authors declare that they have no competing interests.

Data Availability Statement

The data supporting the findings of this study are held by the Joint Admissions and Matriculation Board (JAMB) and the participating universities. Because the dataset contains examination and educational records subject to institutional restrictions, individual-level data are not publicly available. Aggregated or fully de-identified data may be made available by the corresponding author on reasonable request, subject to the necessary permissions.

Ethical Approval Statement

Ethical approval was obtained from the Emmanuel Alayande University of Education Research Ethics Committee (Approval No. EAUED/ERC/2024/018). Permission to access records was obtained from JAMB and the participating universities. Questionnaire and interview participants gave informed consent.

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Effect of Hands-on Activities on Numeracy Achievement in Mathematics among Public Primary School Pupils in Itu Local Government Area, Akwa Ibom State, Nigeria

OLOTA, Philip O.[1]
philipoolota@uniuyo.edu.ng
08060690742

EFIOK, Itohowo Bassey[1]
[1]Department of Early Childhood and Special Education, Faculty of Education, University of Uyo

Abstract

This study examined the effect of hands-on activities on the numeracy achievement of ECC II pupils in public primary schools in Itu Local Government Area, Akwa Ibom State, Nigeria. A quasi-experimental pretest–posttest non-equivalent control group design was adopted. The sample comprised 152 pupils in six intact classes from six randomly selected schools; the experimental group (n = 72) received six weeks of hands-on numeracy instruction, while the control group (n = 80) was taught by the conventional method. Data were collected with a researcher-developed Numeracy Achievement Test (NAT; KR-20 = 0.80). Means and standard deviations answered the research questions, and analysis of covariance (ANCOVA) tested the hypotheses at the 0.05 level of significance. Pupils taught with hands-on activities significantly outperformed those taught conventionally in counting (mean gains of 5.47 against 0.68) and in addition (5.64 against 0.64), $p < .001$. Among pupils who received the treatment, school location (urban versus rural) made no significant difference to numeracy achievement ($p = .527$). Hands-on activities are therefore an effective strategy for early numeracy in both settings. Teachers should integrate hands-on activities and manipulatives into numeracy lessons, and education authorities should provide instructional materials and in-service training for their use.

Keywords: hands-on activities, numeracy achievement, early childhood education, manipulatives, school location, Nigeria

Introduction

Numeracy, the ability to understand, interpret and apply mathematical knowledge in varied contexts (Organisation for Economic Co-operation and Development [OECD], 2023), underpins logical reasoning, problem-solving and later academic success (Hidayah & Retnawati, 2024). Early mathematics skill is an especially strong signal: in a six-study analysis, mathematics skills at school entry predicted later achievement more strongly than reading or attention skills (Duncan et al., 2007). Yet foundational numeracy remains weak in many low- and middle-income countries, where an estimated 70 per cent of ten-year-olds lack foundational literacy and numeracy skills (World Bank, 2025), and gaps are already visible before formal schooling in Sub-Saharan Africa (Buhl-Wiggers et al., 2025). In Itu Local Government Area, many ECC II pupils perform poorly in counting, number recognition and basic arithmetic. This has been attributed to ineffective teaching methods, a shortage of instructional materials and limited opportunities for pupils to participate actively. Conventional numeracy teaching relies mainly on verbal explanation, chalkboard demonstration and recitation, with little or no use of concrete objects. Hands-on activities offer an alternative. They use concrete materials such as blocks, counters, beads and shapes to help learners grasp abstract mathematical ideas (Clements & Sarama, 2021). Three theories support the approach: Piaget (1952) holds that children construct knowledge by acting on objects; Vygotsky (1978) stresses guided, social learning within the zone of proximal development; and Skinner (1953) emphasises reinforcement and repeated practice. Empirically, a meta-analysis of 55 studies found small-to-moderate positive effects of manipulative-based instruction (Carbonneau et al., 2013), and a scoping review of 102 studies found gains in counting from curriculum-based mathematics programmes, although most studies were conducted in the United States (Byrne et al., 2023). In Nigeria, primary two pupils taught with a guided, activity-based scaffolding strategy achieved higher mathematics scores than those taught by lecture (Olota, 2015). The evidence also carries a caution: manipulatives help only when pupils understand what the objects represent (Uttal et al., 1997). Findings on school location are mixed. Rural students outperformed urban students after a games-and-simulations intervention in geometry (Ajai & Imoko, 2013), whereas school location moderated mathematics achievement in favour of urban pupils, who generally had better access to resources (Iroko et al., 2024). This suggests that the effect of location depends on teaching method and resource availability. This study, therefore, examined

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the effect of hands-on activities on the counting and addition skills of ECC II pupils in Itu Local Government Area, compared with conventional instruction, and whether numeracy achievement under hands-on instruction differed between urban and rural schools.

Research Objectives

The main objective of the study is to determine the effect of hands-on activities on numeracy achievement of ECC II pupils in Itu Local Government Area of Akwa Ibom State. Specifically, the study seeks to:

1. determine the mean difference in the counting ability of pupils exposed to hands-on activities and those exposed to conventional methods of instruction;
2. ascertain the mean difference in the addition ability of pupils exposed to hands-on activities and those exposed to conventional methods of instruction; and
3. examine the mean difference in numeracy achievement between urban and rural pupils exposed to hands-on activities.

Research Questions

1. What is the mean difference in the counting ability of pupils exposed to hands-on activities and those exposed to conventional methods?
2. What is the mean difference in the addition ability of pupils exposed to hands-on activities and those exposed to conventional methods?
3. What is the mean difference in numeracy achievement between urban and rural pupils exposed to hands-on activities?

Research Hypotheses

1. There is no significant mean difference in the counting ability of pupils exposed to hands-on activities and those exposed to conventional methods.
2. There is no significant mean difference in the addition ability of pupils exposed to hands-on activities and those exposed to conventional methods.
3. There is no significant mean difference in numeracy achievement between urban and rural pupils exposed to hands-on activities.

Research Methodology

This study adopted a quasi-experimental pretest–posttest non-equivalent control group design, in which random assignment of pupils is not possible (Campbell & Stanley, 1963). Intact classes served as the experimental and control groups. The independent variable was the method of instruction (hands-on activities versus conventional), the moderator was school location, and the dependent variable was numeracy achievement. The population comprised 761 ECC II pupils in 39 public primary schools in Itu Local Government Area (Source: Local Education Authority, Itu). Six schools were selected by simple random sampling, and one intact class in each gave a sample of 152 pupils: 72 in the experimental group (three schools) and 80 in the control group (three schools). Both urban and rural schools were represented. The instrument was the researcher-developed Numeracy Achievement Test (NAT). Section A collected personal data and Section B contained five tasks (counting, number writing, number identification, addition and subtraction), each scored out of 20 marks; this paper reports the counting and addition tasks and the total score. The same test served as pretest and posttest. Face and content validity were established by an early childhood education expert, a tests and measurement expert and an ECC II mathematics teacher. A pilot test on 20 pupils outside the sample gave a Kuder-Richardson Formula 20 reliability coefficient of 0.80. After permission was obtained from head teachers, trained research assistants helped to administer the pretest to both groups. For six weeks the experimental group was taught using counting objects, beads, blocks, number charts and interactive numeracy games, while the control group was taught the same concepts through explanation, demonstration and discussion without hands-on materials. The NAT was re-administered as a posttest in the seventh week. Informed consent was obtained, and pupils completed the test anonymously.

Data Analysis

Mean and standard deviation were used to answer the research questions, while analysis of covariance (ANCOVA) was used to test the hypotheses at the 0.05 level of significance. Pretest scores served as the covariate for the posttest scores. ANCOVA was chosen because it adjusts for initial differences between intact classes. The group with the higher mean gain was judged to have performed better. A null hypothesis was rejected if $p < .05$ and retained if $p > .05$.

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Presentation of Results

Research Question One

What is the mean difference in the counting ability of pupils exposed to hands-on activities and those exposed to conventional methods?

Table 1

Mean and Standard Deviation of Counting Scores of Pupils Taught with Hands-on Activities and Those Taught with the Conventional Method of Instruction (Each Skill Scored Out of 20)

Group	*N*	Pretest		Posttest		Mean Difference
		$\bar{X}$	*SD*	$\bar{X}$	*SD*	
Hands-on Activities	72	6.97	1.41	12.44	1.71	5.47
Conventional Method of Instruction	80	7.12	1.50	7.80	2.53	0.68

Table 1 shows the pretest and posttest means of the experimental group (hands-on activities) as 6.97 and 12.44, with standard deviations of 1.41 and 1.71 respectively. The control group (conventional method of instruction) had pretest and posttest means of 7.12 and 7.80, with standard deviations of 1.50 and 2.53 respectively. The comparison reveals a clear difference in counting mean scores between pupils taught with hands-on activities and those taught with the conventional method. Pupils exposed to hands-on activities recorded the higher mean gain (5.47 against 0.68).

Research Question Two

What is the mean difference in the addition ability of pupils exposed to hands-on activities and those exposed to conventional methods?

Table 2

Mean and Standard Deviation of Addition Scores of Pupils Taught with Hands-on Activities and Those Taught with the Conventional Method of Instruction (Each Skill Scored Out of 20)

Group	*N*	Pretest		Posttest		Mean Difference
		$\bar{X}$	*SD*	$\bar{X}$	*SD*	
Hands-on Activities	72	6.66	1.53	12.30	1.63	5.64
Conventional Method of Instruction	80	7.21	1.41	7.85	2.64	0.64

Table 2 shows the pretest and posttest means of the experimental group (hands-on activities) as 6.66 and 12.30, with standard deviations of 1.53 and 1.63 respectively. The control group (conventional method of instruction) had pretest and posttest means of 7.21 and 7.85, with standard deviations of 1.41 and 2.64 respectively. Pupils taught addition with hands-on activities therefore recorded a much higher mean gain (5.64) than those taught with the conventional method (0.64).

Research Question Three

What is the mean difference in numeracy achievement between urban and rural pupils exposed to hands-on activities?

Table 3

Mean and Standard Deviation of Numeracy Achievement Scores of Urban and Rural Pupils Taught with Hands-on Activities (Total Score Out of 100)

Location	*N*	Pretest		Posttest		Mean Difference
		$\bar{X}$	*SD*	$\bar{X}$	*SD*	
Urban	45	34.64	3.32	61.68	3.23	27.04
Rural	27	35.22	3.17	62.25	4.06	27.03

Table 3 shows that urban pupils had a pretest mean of 34.64 (*SD* = 3.32) and a posttest mean of 61.68 (*SD* = 3.23), with a mean gain of 27.04. Rural pupils had a pretest mean of 35.22 (*SD* = 3.17) and a posttest mean of 62.25 (*SD* = 4.06), with a mean gain of 27.03. For both groups, posttest means were higher than pretest means, and the two groups gained almost identically.

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Hypothesis One

There is no significant mean difference in the counting ability of pupils exposed to hands-on activities and those exposed to conventional methods.

Table 4

Analysis of Covariance (ANCOVA) of Counting Scores of Pupils Taught with Hands-on Activities and Those Taught with the Conventional Method of Instruction

Source	Type III Sum of Squares	*df*	Mean Square	*F*	Sig.
Corrected Model	826.478[a]	2	413.239	87.026	< .001
Intercept	494.576	1	494.576	104.155	< .001
Pretest	9.055	1	9.055	1.907	.169
Method of Instruction	824.211	1	824.211	173.574	< .001
Error	707.522	149	4.748		
Total	16734.000	152			
Corrected Total	1534.000	151			

Note. [a]R^2 = .539 (Adjusted R^2 = .533).

Table 4 shows an *F*-ratio of 173.574 (*df* = 1, 149), $p < .001$, for the difference in counting mean scores between pupils taught with hands-on activities and those taught with the conventional method of instruction. Since $p < .05$, the null hypothesis was rejected. This indicates a significant difference in counting mean scores, with hands-on activities being more effective (partial $\eta^2 = .54$). The pretest covariate was not significant ($p = .169$), confirming that the groups were comparable at the outset.

Hypothesis Two

There is no significant mean difference in the addition ability of pupils exposed to hands-on activities and those exposed to conventional methods.

Table 5

Analysis of Covariance (ANCOVA) of Addition Scores of Pupils Taught with Hands-on Activities and Those Taught with the Conventional Method of Instruction

Source	Type III Sum of Squares	*df*	Mean Square	*F*	Sig.
Corrected Model	782.867[a]	2	391.434	79.446	< .001
Intercept	535.456	1	535.456	108.677	< .001
Pretest	6.949	1	6.949	1.410	.237
Method of Instruction	776.570	1	776.570	157.614	< .001
Error	734.126	149	4.927		
Total	16697.000	152			
Corrected Total	1516.993	151			

Note. [a]R^2 = .516 (Adjusted R^2 = .510).

Table 5 shows an *F*-ratio of 157.614 (*df* = 1, 149), $p < .001$, for the difference in addition mean scores between pupils taught with hands-on activities and those taught with the conventional method of instruction. Since $p < .05$, the null hypothesis was rejected. This indicates a significant difference in addition mean scores, with hands-on activities being more effective (partial $\eta^2 = .51$). The pretest covariate was not significant ($p = .237$).

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Hypothesis Three

There is no significant mean difference in numeracy achievement between urban and rural pupils exposed to hands-on activities.

Table 6

Analysis of Covariance (ANCOVA) of Numeracy Achievement Scores of Urban and Rural Pupils Taught with Hands-on Activities

Source	Type III Sum of Squares	*df*	Mean Square	*F*	Sig.
Corrected Model	5.897[a]	2	2.949	0.229	.796
Intercept	2275.016	1	2275.016	176.691	< .001
Pretest	0.407	1	0.407	0.032	.859
Location	5.194	1	5.194	0.403	.527
Error	888.422	69	12.876		
Total	276795.000	72			
Corrected Total	894.319	71			

Note. [a]R^2 = .007 (Adjusted R^2 = −.022).

Table 6 shows an *F*-ratio of 0.403 (*df* = 1, 69), *p* = .527, for the difference in numeracy achievement mean scores of urban and rural pupils taught with hands-on activities. Since *p* > .05, the null hypothesis was retained. This indicates no significant difference in numeracy achievement between urban and rural pupils.

Discussion of Findings

The results revealed that hands-on activities produced significantly higher achievement than the conventional method in both counting and addition, with large effects in each case. This is consistent with meta-analytic evidence that manipulative-based instruction improves mathematics learning (Carbonneau et al., 2013), with evidence that hands-on mathematics programmes improve counting in young children (Byrne et al., 2023), and with Olota's (2015) Nigerian findings on guided, activity-based instruction. The study's three theories offer plausible explanations. In line with Piaget (1952), handling counters and beads gave pupils concrete experiences from which to build number concepts. In line with Vygotsky (1978), teacher modelling and peer discussion probably scaffolded tasks that pupils could not yet complete alone. In line with Skinner (1953), repeated practice with immediate feedback reinforced correct responses. By contrast, the control group, taught by explanation and demonstration alone, gained less than one point on average. Because manipulatives help only when pupils understand what they represent (Uttal et al., 1997), and because the type of material matters (Petersen & McNeil, 2013), these benefits depend on how activities are structured and guided, not on materials alone. The absence of a location difference suggests that hands-on teaching works similarly in urban and rural classrooms. The activities relied on simple materials, such as counters, beads, blocks and improvised aids, which schools in either setting can obtain or make. This is in line with Ajai and Imoko's (2013) conclusion that the choice of method can outweigh the effect of location, although it contrasts with the urban resource advantage reported by Iroko et al. (2024). Because location was compared only among pupils who received the treatment, the study cannot show whether hands-on teaching narrows a gap that exists under conventional teaching.

Conclusion

Hands-on activities significantly improved the counting and addition skills of ECC II pupils in Itu Local Government Area compared with conventional instruction, and the benefit did not depend on whether pupils attended urban or rural schools. The strategy offers a practical response to weak early numeracy where teaching has relied on verbal explanation and chalkboard demonstration. The study used intact classes, a six-week treatment and no delayed posttest, so the lasting effect of the gains remains unknown.

Recommendations

1. ECC II teachers should integrate hands-on activities into daily numeracy lessons, using counters, beads, blocks, number cards and locally available or improvised materials.
2. The State Universal Basic Education Board (SUBEB) and curriculum planners should include hands-on numeracy activities in the early childhood curriculum and supply manipulatives to urban and rural schools.

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3. Education authorities should organise regular workshops and in-service training on structuring and guiding hands-on activities, and colleges of education should include these methods in pre-service programmes.

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Influence of Local Government Management on Service Delivery in Ado Local Government Area of Benue State, Nigeria

ATTAH, Okibe Onazi [1]
okibeattahonazi75@gmail.com
0703353399
UMORU, Raphael Sunday[1]
raphaelumoru@gmail.com
Tel: 08065394068
[1]Wesley University, Ondo State, Nigeria

Abstract

This study examined the influence of government management on service delivery in Ado Local Government Area of Benue State, Nigeria. The study was motivated by the persistent challenges of poor service delivery at the grassroots level despite increased government funding and policy interventions. Specifically, the study focused on assessing the effect of government management on education, healthcare and infrastructure service delivery. A descriptive survey research design was adopted, incorporating both qualitative approaches. Data were collected from a sample 300 respondents selected through stratified random sampling. The primary instrument for data collection was a structured questionnaire designed on a four-point likert scale. Data were analyzed using the statistical package for social sciences (SPSS), employing descriptive statistics, chi-square (X^2) and multiple regression analysis. The findings revealed that government management has a significant influence on service delivery in Ado Local Government Area. The chi-square results showed that government management significantly affects education (x2 = 60.00), healthcare (x2 = 51.32), and infrastructure (x2 = 44.66) service delivery at 0.05 level of significance. Regression analysis further indicated that government management accounts for 52% of variations in service delivery outcomes (R2 = 0.520), with education having the highest impact, followed by healthcare and infrastructure. The study concluded that poor management practices, including lack of transparency, corruption, political interference and weak accountability for adequate service delivery in Ado LGA . the study recommends strengthening transparency and accountability systems, improving resource management, enhancing capacity building for local government officials and promoting citizen participation in governance. In conclusion, effective government management is essential for improving service delivery and achieving sustainable development at the local government level in Nigeria.

Keywords: government management, service delivery, local government, education, health, infrastructure, Nigeria.

Introduction

The role of government management in the provision of public services has been a critical factor in the development of any society, especially in developing countries like Nigeria. Service delivery is a key indicator of governance quality and its impact on the lives of citizens. The performance of Local Government Areas (LGAs) in Nigeria is central to the delivery of services such as healthcare, education, infrastructure, and social welfare to communities. The local government, being the closest to the people is expected to manage resources effectively and ensure that public services are delivered efficiently. However, the quality and timeliness of service delivery in many LGAs, including Otukpo Local Government Area of Benue state are often hindered by a variety of challenges such as mismanagement, corruption, inadequate funding, and political interference. The significance of this study lies in understanding how government management practices affect service delivery at the local level, particularly in Otukpo Local Government. By examining this, the research seeks to uncover both the successes and failures of the local government in its role as a service provider and explore how these outcomes impact the quality of lief for the resident. Nigeria's federal system of government delegates certain responsibilities to local governments, which are mandated to serve as the primary delivery point for various services to the grassroots. These responsibilities include public health, education infrastructure development, and social welfare programs. Despite these critical duties, many local governments face systemic issues such as poor governance, insufficient funding, and inadequate managerial capabilities, all of which undermine effective service delivery. According to

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a recent study by Odo & Adama (2023), Poor service delivery in Nigeria's Local Governments is primarily due to a lack of accountability, ineffective management, and political corruption.

Objectives of the Study

The main objective of this study is to examine the influence of government management on service delivery in Ado Local Government Area of Benue State.

The specific objective were to:

1. Examine the effect of government management on education service delivery in Ado Local Government Area of Benue State, Nigeria
2. Assess the influence of government management on healthcare service delivery in Ado Local Government Area of Benue State, Nigeria
3. Evaluate the impact of government management on infrastructure in Ado Local Government Area of Benue State, Nigeria

Research Questions

1. How does government management affect education service delivery in Ado Local Government Area of Benue State, Nigeria?
2. What is the influence of government management on health care services in Ado Local Government Area of Benue State, Nigeria?
3. How does government management affect infrastructure development in Ado Local Government Area of Benue State, Nigeria?

Research Hypothesis

H0: Government management has no significant effect on service delivery in Ado Local Government Area.
H1: Government management has a significant effect on service delivery in Ado LGA.

Research Methodology

Research Design

The study adopts a descriptive survey research design, which is considered appropriate for examining the existing conditions of fiscal transparency, accountability, public trust, and development outcomes within Benue State. This design enables the researcher to collect data from respondents and systematically describe their perceptions of governance issues as they relate to public financial management. The descriptive survey approach is particularly suited to studies in public administration and governance because it facilitates the statistical analysis of relationships among variables while capturing the views of a broad range of stakeholders in a structured and efficient manner.

Population of the Study

The population comprises key stakeholders involved in fiscal governance in Benue State. This includes staff of the Ministry of Finance, budget and planning officials, personnel of the Auditor-General's Office, members of the State House of Assembly serving on finance and appropriation committees, representatives of civil society and accountability watchdog groups, and finance officers from local government councils. Collectively, these categories of respondents form an estimated population of approximately one thousand two hundred individuals across the relevant institutions.

Sample Size and Sampling Technique

The sample size for the study is determined using Yamane's formula for finite populations, with a margin of error set at five percent. The calculation yields a sample size of three hundred respondents, which is considered adequate for generating statistically reliable results. To select participants, the study adopts a stratified random sampling technique. This approach ensures that different stakeholder groups are adequately represented, reduces sampling bias, and enhances the accuracy and generalizability of the findings. The strata are defined to reflect government financial institutions, legislative bodies, civil society organizations, and local government finance units, thereby

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capturing the diversity of perspectives within the fiscal governance system. The sample size is determined using the Yamane (1967) formula, which yielded a sample size of 300 respondents

Method of Data Analysis

Data collected through the questionnaire are analyzed using appropriate statistical techniques. The Chi-Square test is employed for hypothesis testing to determine the significance of relationships among the study variables. The decision rule adopted is that the null hypothesis is accepted when the p-value exceeds 0.05 and rejected when the p-value is less than 0.05. This analytical approach ensures that conclusions drawn from the study are grounded in empirical evidence and can inform policy recommendations aimed at strengthening fiscal governance in Benue State.

Presentation of Results

This chapter presents the analysis of data collection from respondents on fiscal transparency and accountability in Benue State Government and their implications for public trust and development. Data were analyzed using SPSS – style descriptive statistics (frequency, percentage, mean) and inferential statistics (regression and chi-square tests).

Research question 1: How does Government management delivery on Education Delivery in Ado Local Government Area of Benue State?

Table 1: Response on Fiscal Transparency among Respondents in Ado Local Government of Benue State

Item	SA	A	D	SD	Mean
Adequate infrastructure	40	90	80	60	2.37
Qualified teachers	35	85	90	60	2.30
Teaching materials	30	70	100	70	2.11

The result show low fiscal transparency, as all mean scores fall below 2.50

Research question 2: What is the effect of government management on health care services in Ado Local Government Area of Benue State?

Table 2: Response on Level of Health Care Delivery Service in Ado Local Government of Benue State

Item	SA	A	D	SD	Mean
Adequate facilities	50	80	90	50	2.41
Medical personnel	45	75	95	55	2.33
Drug availability	40	70	100	60	2.20

Health Care deliveries are weak and ineffective in Ado Local Government of Benue State, Nigeria

Research question 3: How does government affect infrastructure Development in Ado Local Government Area of Benue State?

Table 3: Response on Infrastructural Development in Ado Local Government of Benue State

Item	SA	A	D	SD	Mean
Good road	60	100	70	40	2.67
Water supply	70	110	60	30	2.82
Sanitation	40	70	100	90	2.20

There is weak infrastructural service delivery.

Research question 4: Does Fiscal Transparency influences development outcomes in Ado Local Government Area of Benue State?

Table 4: Response on Fiscal Transparency on Development in Ado Local Government of Benue State

Item	SA	A	D	SD	Mean
Transparency improves project delivery	65	100	70	35	2.73
Accountability Reduces project Abandonment	60	95	80	35	2.67

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Fiscal transparency positively influences development outcomes in Ado Local Government Area of Benue State, Nigeria

Hypotheses Testing

Hypothesis one

H_{01}: Fiscal transparency has no significant relationship with public trust in Benue State

H_1: Fiscal transparency has a significant relationship with public trust in Benue State.

Hypothesis one test

Strongly agree	110	75	35	16.33
Agree	90	75	15	3.00
Disagree	60	75	-15	3.00
Strongly disagree	40	75	-35	16.33
Total	300	300		38.66

X^2cal = 38.66, df = 3, x^2tab = 7.815; Decision: since x2cal > x2tab, reject H01

Conclusion: Government management significantly affects education service delivery.

Chi-square test for hypothesis two (health service delivery)

Chi-square analysis of government management and health care service delivery

Response	O	E	O-E	(O – E)2/E
SA	105	75	30	12.00
A	95	75	20	5.33
D	60	75	-15	3.00
SD	40	75	-35	16.33
Total	300	300		36.66

X^2cal = 36.66, df = 3, x^2tab = 7.815; Decision: rejected H_{02}

Conclusion: government management significantly affects health care service delivery.

Chi-square test for hypothesis three (infrastructure service delivery)

Chi-square analysis of government management and infrastructure service delivery

Chi-square calculation table

Response Category	**O**	**E**	**O-E**	**(O – E)2/E**
SA	100	75	25	8.33
A	90	75	15	3.00
D	70	75	-5	0.33
SD	40	75	-35	16.3
Total	**300**	**300**		**27.9**

X^2cal = 27.99, df = 3, x^2tab = 7.815

Decision: Rejected H_{03}

Conclusion: Government management significantly affects infrastructure service delivery

Conclusion

The findings of the study confirm that fiscal transparency and accountability are critical determinants of public trust and development in Benue State. Where fiscal transparency is weak, public confidence in government declines, and citizens become less willing to participate in governance processes. Similarly, inadequate accountability systems undermine the effective utilization of public resources, resulting in poor development outcomes. The study further shows that citizens are more likely to engage constructively in governance when budget processes are open, accessible, and subject to public scrutiny. On the basis of these findings, it is concluded that improving fiscal governance practices is essential for strengthening democratic accountability and achieving sustainable development in Benue State.

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Recommendations

Based on the findings, the study recommends the strengthening of fiscal transparency through the timely publication of comprehensive budget and expenditure reports that are accessible to the public. Accountability mechanisms should be enhanced by reinforcing internal controls, supporting the independence of audit institutions, and ensuring that sanctions are applied consistently in cases of financial mismanagement. Public participation in budget formulation and monitoring should be improved by creating structured platforms for citizen engagement and feedback. Anti-corruption reforms need to be pursued more vigorously to address financial leakages and restore confidence in public institutions. Finally, institutional capacity building is necessary to equip public officials with the skills and tools required for effective financial management and transparent reporting.

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From Origins to Practice: Learner Achievement Monitoring by the United Kingdom Department for Education and its Implications for Child Development

AVULE, Igbawase[1]
avuleigba@gmail.com,
08132032467
KUMAGA, Tavershima Joseph[1]
kumagataddy94@gmail.com
0802204068
[1]Department of Mathematics Education, Rev. Fr. Moses Orshio Adasu University, Makurdi.

Abstract
This paper conceptually reviews the origins and evolution of learner achievement monitoring (LAM) within the united kingdom Department for Education (DfE) and examines its implications for child development. It traces the development of educational monitoring from curriculum attainment and national assessments towards a broader system incorporating progress measures, inspection, early-years assessment, equity-related indicators, and data-informed educational decision making. The review highlights the value of assessment evidence for identifying learning needs, monitoring progress, informing instructional interventions, and supporting school improvement. Drawing on developmental psychology theory, the paper argues that learner achievement should be interpreted within the broader context of cognitive, social, emotional, and developmental outcomes. Based on these insights, the paper proposes a Development-Linked Monitoring Model. Comprising assessment for development, progress over scores, data for support, and equity focus. The model provides a conceptual basis for connecting educational measurement with learner development, targeted support, and educational equity. The paper concludes that effective monitoring should generate actionable evidence for improving learning and development rather than functioning primarily as a tool for ranking performance.

Keywords: Department for Education, Learner Achievement Monitoring, Child Development, Performance Measurement, Assessment Policy, UK, Education

Introduction
Education is an evolving art that is continually being reshaped by changes in society, knowledge, and technology guided by innovation and research. As a result, education has undergone a paradigm shift from the traditional practices towards the systematic use of research evidence, assessment information and learner-performance data to inform educational decisions (United Nations Educational Scientific and Cultural Organization [UNESCO], 2021). Effective educational practices therefore, require teachers and institutions to continually rethink pedagogical approaches, assessment practices, and learning experiences (Ayua & Kwagh, 2026). Within this global development, LAM has become an important component of educational improvement. It involves the systematic collection, interpretation and use of information about learners' knowledge, skills, progress, and achievement over time to track learner progress and guide learning instructional decisions (Rezky et al., 2024). LAM can provide continuous feedback for teachers, schools, policymakers, and other stakeholders. Evidence obtained through formative assessment, classroom-based assessment, national assessments, and other forms of educational measurement constitute LAM and can therefore be used to identify learning gaps and inform instructional and policy decisions. International organizations have contributed significantly to this movement by emphasizing learning outcomes, educational quality, equity, and the use of reliable data in educational planning. Consequently, contemporary education systems increasingly view assessment and monitoring not merely as mechanisms for judging learners but as tools for understanding and improving educational processes

Overview of the United Kingdom's (UK) Department for Education's Role in Assessment and Accountability
The UK Department for Education (DfE) is responsible for making national education policies. One of such policy is the is learner achievement monitoring. The achievement progress of learners is monitored at different stages of education through national assessments and examinations which provide information that can be used to understand educational

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outcomes, support accountability and enhance evaluation of educational systems. The DfE's approach illustrates how learner-performance information can support learning at different levels. Thus learner monitoring can become part of a wider system that informs school and national educational decision-making.

Statement of the Problem

Despite the transformation of education in the 21st century, achievement monitoring practices are still summative and do not measure the learners' holistic development (Arsyad-Arrafii, 2023; Yusuf & Nurul, 2025). while assessment scores provide valuable information about particular aspects of achievement, it does not constitute a holistic measure of learners development commonly referred to as Blooms taxonomy of educational objectives which includes the: cognitive, affective and psychomotor developmental outcomes. Accordingly, Mursalin et al. (2025) proposed innovative assessment and learner achievement monitoring practices that are designed to track students' progressive development, and which are aligned with their learning trajectories. This problem makes it necessary to examine learner achievement monitoring conceptually.

Conceptual And Theoretical Frameworks

This section reviews the following concepts

Concept of Learner Achievement Monitoring and Performance Measurement: LAM is a comprehensive analysis of student achievement that includes not only student performance but the quality of teaching, teachers' performance, conditions of the educational environment and models of educational process management (Kovalchuk & Kozoriz, 2020). It goes beyond making decisions using a single examination result to examining patterns of learning over time and identifying areas of strength and difficulty . Performance measurement is closely related but focuses on determining the extent to which predetermined educational objectives have been achieved.

Theoretical Bases

The framework is informed by the following theory

Developmental psychology: provides a basis for understanding learners as they develop cognitively. Piaget theory of cognitive development focuses on the cognitive, social and emotional growth of children from infancy through adolescence and adulthood (Piaget, 1952). A learner is first an individual before he or she becomes a learner. From this perspective, learner achievement monitoring should consider not only what learners can reproduce in tests but also their developmental needs, social relationships, motivation, self-regulation, and capacity to apply knowledge. LAM should be holistic. That is to say it should be focused on the total and complete development of the learners' cognitive, affective and psychomotor abilities.

Link Between Assessment Data and Child Development: Assessment data can provide important evidence about learner development. Assessment should provide a road-map to track learners' development. The cognitive domain can be examined through evidence lower-order and higher-order mental skills such as knowledge, understanding, reasoning and problem-solving. The affective domain includes indicators such as interests, motivation, attitudes, curiosity, integrity, humility and confidence among several others (Ayua, 2018a; Broman & Parchmann, 2020). When assessed comprehensively, these abilities can constitute a report on learner development

Principles of Effective Monitoring Systems in Education

An effective learner-monitoring system should be guided the principles such as Validity, reliability, Inclusivity, developmental appropriateness, continuity, multiple sources of evidence, data-informed improvement, transparency and accountability, ethical data use, and child-centredness (Allehaiby & Al-Bahlani, 2021; Ayua et al., 2024).

Historical Origin And Evolution Of The Dfe's Monitoring Framework

The development of learner achievement monitoring in the UK has evolved from a previous emphasis on curriculum attainment toward a broader system which incorporates assessment, progress, inspection, early learning, and selected developmental indicators (Department for Education [DfE], 2025). A major foundation was the Education Reform Act of 1988, which established the National Curriculum and created a stronger basis for nationally comparable assessment. Over time, Key Stage assessments, school performance tables, progress measures, Ofsted inspections, phonics screening, and the Early Years Foundation Stage (EYFS) Profile were incorporated into the wider monitoring system. This evolution

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reflects an increasing attempt to obtain evidence not only about pupils' expected standards, but also about their overall progress and development.

From the 1988 Education Reform Act to National Curriculum Assessments

The Education Reform Act of 1988 was a major turning point in English education because it established a statutory National Curriculum for maintained schools. The reform introduced nationally specified programmes of study and attainment targets, providing a common framework against which pupil learning achievement could be assessed. The development of the National Curriculum assessment followed this reform. National Curriculum tests were introduced progressively, with assessments at the end of Key Stage 1 beginning in 1990 and Key Stage 2 national tests following in 1994 (DfE, 2023). The significance of this development was that learner achievement could be examined using common expectations rather than relying entirely on individual schools' assessment practices. This strengthened the relationship between curriculum standards, assessment evidence, and educational accountability.

Development of Key Stage Assessments and Progress Measures

The monitoring framework subsequently developed beyond the measurement of attainment at particular points in schooling. Key Stage assessments provided information about pupils' performance against expected standards while progress measures sought to establish how much progress pupils made from their previous levels of attainment (DfE, 2025). At secondary level, the introduction of Progress 8 and Attainment 8 represented another significant development. Attainment 8 summarizes pupils' achievement across a specified set of subjects, whereas Progress 8 measures pupils' progress in comparison with pupils nationally who had similar prior attainment (Lackie & Goldstein, 2017). Thus, the historical development of assessment in England demonstrates the use of evidence to interpret learner achievement.

Role of the Office for Standards in Education (Ofsted) and School Performance Tables in Monitoring

Ofsted provides an inspection framework through which the quality of education and other regulated services can be evaluated (Ofsted, 2025). School performance data provide another form of accountability by making information about educational outcomes publicly available. Ofsted inspection and performance data therefore provide different forms of evidence. Performance measures are primarily quantitative, providing indicators of pupil outcomes, while inspection provides broader qualitative evidence concerning educational provision, leadership, teaching, behaviour, and other aspects of school quality.

Shift Toward Holistic Measures:

Although Standard Assessment Tests (SATs) remain important components of assessment system in the UK, learner monitoring increasingly incorporates measures that address different stages and aspects of leaner development (Leckie & Goldstein, 2017).

DfE's Approach to Linking Assessment with Child Development

The United Kingdom's Department for Education (DfE) has developed a monitoring approach that establishes a relationship between assessment outcomes and learners' educational progress and broader development (DfE, 2026). Rather than relying on examination results, the framework incorporates early-years assessments, attainment and progress measures, disadvantage-related indicators, and the use of school-level data to identify pupils who may require additional support.

Early Years Foundation Stage (EYFS) and Tracking Child Development from Age 5

The Early Years Foundation Stage (EYFS) provides the foundation for monitoring learners development before and around the beginning of compulsory schooling. The EYFS framework covers learners from birth to age five and identifies seven areas of learning and development: communication and language, physical development, personal, social and emotional development, literacy, mathematics, understanding the world, and expressive arts and design (DfE., 2026). Assessment at the end of the reception year provides information about children's attainment against the Early Learning Goals (ELGs).

Use of Progress 8 and Attainment 8 to Measure Growth, Not Just Achievement

At secondary level, the DfE uses Attainment 8 and Progress 8 to provide different report on pupils' educational outcomes. Attainment 8 summarizes pupils' performance across a defined set of qualifications at the end of Key Stage 4, whereas

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Progress 8 is intended to indicate the progress pupils make between their previous attainment at the end of primary education and their outcomes at the end of secondary education (Leckie & Goldstein, 2017).

Data Use

Assessment and examination data can be analyzed at the pupil, school, local and national levels. Schools can use information about attainment, progress, attendance, disadvantage and other indicators to identify patterns of underachievement and determine where additional support may be necessary (Leckie & Goldstein, 2017; Prior et al., 2021). At school level, monitoring data can help in early identification of pupils who are falling behind, providing targeted intervention, curriculum planning and evaluation of teaching strategies.

Implications for Performance Measurement and Monitoring in Education

The development of learner-performance monitoring systems has influenced how education systems measure and improve educational quality. The experience of the United Kingdom Department for Education (DfE) demonstrates a movement from simple measurement of examination attainment towards a broader system in which assessment information is used to monitor learner progress, identify educational inequalities and support school improvement (DfE, 2025).

Strengths:

One of the major strengths of systematic educational monitoring is its capacity to provide progressive information about learner development rather than considering achievement as a single event at the end of a school stage. Another strength is increased transparency. Public reporting of educational outcomes provides information to parents, schools, policymakers, researchers, and other stakeholders about patterns of educational performance. The monitoring of progress also creates opportunities for early identification of learners who may require additional support. When assessment data reveal difficulties in particular subjects or groups of learners, schools can investigate possible causes and introduce appropriate interventions.

Criticisms:

One frequently identified concern is teaching to the test. This is when teachers devote instructional time to the content and skills that are likely to be assessed (Muth & Luftenegger, 2025). This reduces opportunities for exploratory learning, creativity, practical activities, scientific inquiry, and other educational experiences that are difficult to capture through standardized tests (Suleiman et al., 2022). Another concern is curriculum narrowing. This occurs when schools allocate more instructional time to particular subjects or outcomes which receive greater accountability attention at the expense of subjects and activities that are less directly represented in performance indicators (Balarabe, 2020; Pinga et al., 2025).

Lessons for Other Countries:

Developing countries can draw the following lessons. Firstly, accountability and child development should not be treated as mutually exclusive (Suleiman et al., 2022; Balarabe, 2020). Secondly countries developing monitoring systems should integrate standardized achievement measures with classroom assessment, progress indicators, attendance, participation, inclusion, and other relevant information (Ayoko, 2026). Finally, monitoring systems should be designed around the principle that achievement data should improve learning rather than merely describe or rank performance.

Proposed Conceptual Framework: "Development-Linked Monitoring" (DLM) Model

The DLM model consists of four interconnected principles: Assessment for Development, Progress Over Scores, Data for Support, and Equity Focus.

Assessment for Development: This principle proposes that educational monitoring should recognize the multidimensional nature of child development. Cognitive monitoring may include learners' knowledge, understanding, application, reasoning-ability, problem-solving, critical thinking skills (Ayua et al., 2022; Jomen & Ayua, 2026) and subject-specific competencies. Social and emotional development known as the affective domain may involve integrity, honesty, humility, communication, collaboration, self-regulation, motivation, interpersonal relationships, confidence, and other appropriate indicators of affective domain (Ayua, 2018b).

Progress Over Scores: The DLM model therefore gives considerable attention to individual growth. Progress measures should help estimate the contribution of educational experiences to learner outcomes while taking prior attainment into account (Mursalin et al., 2025).

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Data for Support: The third principle is Data for Support. Assessment information should be treated primarily as a resource for educational decision-making. Data collected through assessment should help teachers identify misconceptions, learning gaps, strengths, and areas requiring intervention. This implies that achievement monitoring data should be diagnostic.

Equity Focus: The fourth principle is Equity Focus. Equity is inclusivity driven (Ayua et al., 2026; Terhemba & Ayua, 2026). The DLM model proposes a systematic monitoring that accounts for differences in socioeconomic status, disabilities, gender, prior attainment, geographic location, or other categories.

Implications For Policy and Practice

The Development-Linked Monitoring model has the following implications:

1. **For Policymakers:** Policymakers should design assessment and monitoring systems that promote accountability while also supporting teaching and learning. This requires careful selection of indicators and avoidance of excessive dependence on a single measure of achievement.
2. **For Schools:** School assessment information should be integrated into instructional planning and learner-support systems. Teachers and school leaders can use assessment evidence to identify learners who are struggling, determine areas of strength, and organize appropriate interventions (Elliot et al., 2020).
3. **For Teacher Training:** Teacher education and professional development should therefore include competencies in formative assessment, data interpretation, developmental assessment, feedback, differentiation, and ethical use of learner data.

Conclusion

The evolution of learner achievement monitoring in the UK Department for Education demonstrates the increasing importance of evidence in educational decision-making. Assessment and performance data can provide valuable information about attainment, progress, inequalities, and areas requiring intervention. The proposed Development-Linked Monitoring (DLM) Model connects assessment with broader child development. Its four principles: Assessment for Development, Progress Over Scores, Data for Support, and Equity Focus, provide a conceptual basis for balancing accountability with learner-centred educational improvement.

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Economic Inequality and Access to Early Childhood Education in Nigeria: A Cost of Unequal Beginning Perspective

VINCENT-OTERI, Chinwendu Emmanuela[1]
chinwenduvincentoteri@gmail.com
08131038418

IKHIELEA, Usigbe Edna[1]
Usigbe.ikhielea@uniben.edu
08057046368
[1]Department of Early Childhood Education, Institute of Education, University of Benin

Abstract
Early childhood education is widely regarded as a foundation for learning, development, and social participation, yet access to quality provision in Nigeria remains strongly shaped by economic inequality. Drawing on nationally representative data from the 2021 Nigeria Multiple Indicator Cluster Survey (MICS) and related evidence, this perspective article examines how household income, parental education, geography, insecurity, disability, and the availability of public services determine children's opportunities before primary school. While private early childhood centres have expanded access in some communities, heavy dependence on household payment risks creating a two-tier system in which wealthier families obtain better-resourced services and poorer children receive limited or low-quality provision. The article argues that early childhood education should be treated not only as a child development intervention but also as a public investment that supports parental employment, gender equality, and long-term economic development. It proposes equity-based public financing, targeted subsidies, stronger regulation of private providers, employer-supported childcare, and improved national data on participation and quality. Nigeria cannot reduce educational inequality without addressing unequal beginnings.

Keywords: early childhood education, economic inequality, Nigeria, educational access, childcare, equity.

Introduction
The earliest years of a child's life are not merely a prelude to formal education. They form the foundation upon which later learning, health, and wellbeing are built. By age five, a child's brain has reached a substantial proportion of its adult volume, with the most rapid volumetric growth occurring in the first few years of life (Bethlehem et al., 2022; Gilmore et al., 2018). During this critical window, children acquire the cognitive, social, and emotional skills that shape school readiness and life trajectories. Quality early childhood education provides structured stimulation, nurtures curiosity, and builds foundational literacy and numeracy. When children miss this window or receive only limited stimulation, they tend to enter primary school already behind, and those who start behind rarely catch up fully (Ulferts et al., 2019). Across Nigeria, this essential foundation remains a privilege rather than a right. According to the 2021 Multiple Indicator Cluster Survey, only 38 percent of children aged three to four years attend early childhood education programmes (National Bureau of Statistics [NBS] & United Nations Children's Fund [UNICEF], 2022). This national figure conceals deeper inequality. Seventy-five percent of children aged 36–59 months from the richest wealth quintile attend early childhood education, compared with only 11 percent from the poorest quintile (NBS & UNICEF, 2022). Geography intensifies the disparity. Attendance rates in several northern states remain substantially lower than the national average, with children in the north least likely to participate in preschool education and facing a persistent crisis in access for the region's youngest children (Federal Ministry of Budget and Economic Planning & UNICEF, 2024). Downstream effects are already visible in primary-school outcomes. Foundational literacy rates in the North-West lag far behind those recorded in Lagos and other southern states (UNICEF Nigeria, 2024). Field-level data from Jigawa, Kano, and Katsina states illustrate the scale of this shortfall: UNICEF's Kano field office has reported that early childhood education reaches only about a quarter to a third of children across the three states, with foundational literacy in some communities falling below 15 percent (Bamalli, 2026). These patterns are not inevitable. They arise from the interaction of household economic resources with a mixed public–private system in which quality is frequently tied to ability to pay. This article examines the pathways through which economic inequality shapes access to, and the quality of, early childhood education in Nigeria. It argues that treating early learning primarily as a

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private household responsibility reproduces disadvantage from the earliest years and that a more deliberate public investment strategy is required if the country is to pursue equitable human capital development.

Early Childhood Education as a Developmental and Social Investment

Investment in early childhood education yields benefits that extend beyond the individual child. During the early years, children develop foundational cognitive, language, social, and emotional capacities that influence school readiness and later learning. Quality programmes can reduce developmental gaps associated with socioeconomic disadvantage (Vindrola et al., 2023). Recent World Bank analysis of Nigerian household data confirms that attendance in early learning programmes is associated with better literacy, numeracy, and social-emotional outcomes among young children (World Bank, 2025). The value of investment also extends to families and society. Accessible early learning services support parents, particularly mothers who often carry a disproportionate share of childcare responsibilities, to participate more fully in employment and productive activities. At the national level, investments made during the earliest years strengthen the foundations of human capital upon which later education, skills acquisition, and productivity rest. The World Bank has therefore emphasised that Nigeria's long-term economic and human development prospects are closely connected to investments in children's health, nutrition, learning, and development from the earliest stages of life (World Bank, 2026). Early childhood education should be understood not simply as preparation for primary school, but as a social and developmental investment whose benefits reach families, communities, and national development.

The Nigerian Contradiction: Unequal Access Despite Policy Recognition

Despite policy recognition of the importance of early childhood education, meaningful and quality provision remains deeply unequal. The circumstances into which a child is born continue to shape the learning opportunities available. Data from successive rounds of the Nigeria MICS illustrate the scale of the disparity. The 2021 survey shows that attendance among children aged 36–59 months is strongly associated with household wealth: 75 percent of children from the richest quintile attend an early childhood education programme, compared with only 11 percent of those from the poorest (NBS & UNICEF, 2022). Earlier analyses of the 2016–2017 MICS revealed a similar pattern (78 percent versus 8 percent), indicating that the wealth gradient has persisted over time (NBS & UNICEF, 2018). Economic advantage influences not only whether children attend but also the type and quality of provision they receive. Families with greater resources are better positioned to pay for private centres and the additional costs of materials, transport, meals, and other services. Research on private education in Nigeria demonstrates that higher-cost schools provide stronger educational inputs and remain largely accessible only to households at the upper end of the income distribution (Baum et al., 2018). More recent national analysis confirms that wealth, parental education, and location remain major determinants of private school enrolment, and that even low-cost private schools often fail to reach the poorest children, particularly in rural and northern areas (Obiakor, 2025). Children from economically advantaged households therefore tend to experience better-resourced learning environments, more qualified educators, richer materials, and additional services. Children from poor households face a different reality: delayed enrolment, irregular attendance, centres with inadequate facilities, or exclusion from organised early learning altogether. The result is that many Nigerian children do not begin their educational journeys from the same starting point. While early childhood education has the potential to reduce inequality, unequal access to quality provision allows existing economic differences to become embedded in children's learning experiences long before primary school.

Conceptualising Economic Inequality and Access

Economic inequality refers to disparities in the resources and opportunities available to individuals and households. It is reflected in differences in income, wealth, employment security, purchasing power, and the ability to obtain essential services. In Nigeria these differences exist alongside widespread poverty and significant variation in living conditions across households and communities (World Bank, 2026). For families with limited economic resources, decisions about children's education are made within the constraints of competing household needs. Income that might support educational expenses is often required for food, housing, healthcare, or transport. Economic inequality therefore shapes the range of opportunities available to parents and their capacity to invest consistently in children's development. The relationship is especially consequential during early childhood, when many services still require direct or indirect household expenditure. Access itself must be understood more broadly than enrolment. Physical availability, affordability, social inclusion,

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programme quality, and continuity of participation all matter. A child may be formally enrolled yet attend irregularly, experience overcrowded or poorly equipped settings, or receive care from under-prepared staff. Contemporary evidence reviews emphasise that expanding participation must be accompanied by attention to quality and equity if developmental gains are to be realised (Vindrola et al., 2023).

The Structure of Early Childhood Education Provision

Nigeria's National Policy on Education and related frameworks provide for pre-primary education and, in principle, guarantee one year of free and compulsory provision. Efforts have been made to strengthen curriculum and teacher capacity. Implementation, however, remains uneven. Only a minority of children in the relevant age group participate in organised early childhood education, and substantial disparities persist across socioeconomic groups and locations (NBS & UNICEF, 2022; UNICEF Nigeria, 2024). Provision is shaped by the coexistence of public and private institutions. This mixed structure creates choice for some families, but choice is not equally available. Households with greater financial resources can select better-resourced private services. Households experiencing economic hardship have fewer options, particularly where publicly supported provision is insufficient or difficult to reach. Urban–rural and regional differences further complicate the picture. Educational inequalities in Nigeria are strongly associated with both location and household wealth (NBS & UNICEF, 2022). The structure of provision therefore raises a fundamental question about responsibility for financing children's earliest learning. Where publicly accessible services are insufficient, households must rely more heavily on private providers or finance a greater share of costs themselves. Under such conditions, economic inequality becomes directly connected to educational opportunity. A child's access may depend not only on educational need but also on the financial capacity of the family into which the child is born.

How Economic Inequality Shapes Access

Economic inequality influences access through multiple overlapping pathways. Its effects extend beyond the ability to pay fees. Household economic circumstances affect whether children are enrolled, the type of centre they attend, the regularity of participation, and the quality of the learning experiences available to them. The affordability of early childhood education cannot be assessed by fees alone. Participation typically involves registration and tuition costs, uniforms, books, materials, transport, meals, and contributions to other activities. Even where public provision is nominally available, families may still encounter costs. For households living with limited and unstable incomes, these expenses become significant barriers. In a context of widespread poverty, educational expenditure competes with immediate priorities. The decision not to enrol a young child may therefore reflect economic constraint rather than parental indifference. Studies of private schooling in Nigeria confirm that affordability is closely linked to the opportunities available to households, and that higher-cost providers remain largely out of reach for poorer families (Baum et al., 2018; Obiakor, 2025). For many poor households, early childhood education is economically desirable but financially inaccessible. The expansion of private provision has increased the range of options, particularly in urban areas. At the same time, a market-based system produces substantial differences in educational experiences because access is closely linked to ability to pay. Evidence from Lagos shows that higher-cost private schools offer stronger inputs and are more accessible to higher-income households (Baum et al., 2018). National analysis reaches a parallel conclusion: socioeconomic status remains a primary determinant of private enrolment, and low-cost private schools do not adequately reach the poorest children (Obiakor, 2025). Within early childhood education this pattern can produce a two-tier structure. Children from affluent households gain access to better infrastructure, richer materials, smaller groups, and additional activities. Children from economically disadvantaged households have fewer options and may attend poorly resourced centres or remain outside organised learning altogether. Private providers can usefully expand supply where public capacity is limited. The deeper problem arises when access to quality becomes strongly dependent on household purchasing power. Under such conditions, early childhood education risks functioning less as an equalising public good and more as a market commodity through which existing advantages are reproduced. Economic inequality also has a geographical dimension. Opportunities are not distributed evenly, and the effects of household poverty are shaped by where children live. Urban residence does not automatically confer advantage. Nigerian cities contain striking socioeconomic contrasts. Physical proximity to schools does not guarantee access when costs and quality vary widely. A child from a high-income household may attend a well-resourced preschool while another child living nearby has access only to a poorly resourced provider or none at all. Urban averages can therefore conceal

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deep inequalities within cities. Children in rural communities face a different combination of barriers. Services are often less readily available, and households encounter greater difficulties related to distance, transport, and infrastructure. Where public provision is weak and private alternatives are scarce or unaffordable, children may enter primary school without structured early learning. National evidence consistently documents lower early childhood attendance in rural areas and in northern zones (NBS & UNICEF, 2022; UNICEF Nigeria, 2024). Geographical and economic disadvantage frequently reinforce each other, creating a double burden for the poorest rural households. This pattern is compounded further up the education pipeline: education specialists estimate that Kano, Katsina, and Jigawa states together account for close to a third of Nigeria's out-of-school children, illustrating how early access gaps in the region compound into later educational exclusion (Leadership, 2026).

The Hidden Costs of Unequal Beginnings

The consequences of unequal access extend beyond the preschool years. Differences in early learning opportunities influence the skills and experiences children bring into primary school and may shape later trajectories. Quality early childhood education supports the development of foundational language, literacy, numeracy, and socio-emotional skills that ease the transition into formal schooling (Vindrola et al., 2023). Children who have experienced meaningful early learning enter primary school with greater familiarity with structured activities and peer interaction. Children without comparable opportunities begin with fewer experiences upon which formal instruction can build. When access is strongly influenced by household wealth, differences in family economic circumstances become reflected in differences in school readiness. Educational inequality can therefore begin before children enter the primary system that is often expected to provide equal opportunity. These early differences can accumulate. Family economic position shapes access to early learning; early learning experiences influence preparation for school; differences in preparation can affect later engagement and achievement; and educational attainment is closely connected to adult opportunities. The process is not a simple causal chain, family relationships, subsequent school quality, community conditions, and public policy all matter, but it provides a useful framework for understanding how inequalities can build over time. Unequal access to early learning also forms part of the broader problem of intergenerational transmission of poverty. When economically disadvantaged children repeatedly encounter barriers to quality education, the capacity of education to serve as a pathway of upward mobility is weakened (World Bank, 2026).

Gender, Care, and Intersecting Disadvantages

Economic inequality in access intersects with gender and the organisation of care within households. Affordable and reliable early childhood services support parents, particularly mothers, to participate more fully in employment and training (UN Women, 2021). The absence of accessible services can compel women, especially those in low-income households, to limit employment or rely on informal arrangements (UN Women, 2021). Investment in accessible early childhood education can therefore generate dual benefits: expanded developmental opportunities for children and reduced care-related constraints on women's economic participation. Some children experience poverty alongside other forms of disadvantage related to disability, displacement, insecurity, or exclusion from essential services. Children with disabilities may face barriers related to physical accessibility and specialised support (Ikhide, 2021). Children in conflict-affected or displaced settings encounter disrupted services and unstable livelihoods (UNICEF, 2024). Economic disadvantage becomes more severe when combined with geographical, social, and institutional barriers. Equity requires particular attention to those children whose circumstances place them furthest from available services.

Policy Gaps and Institutional Challenges

Nigeria has recognised the importance of early childhood education within its educational and development agenda. The persistence of substantial inequalities, however, raises questions about the relationship between policy commitments and implementation. Public investment remains inadequate relative to the scale of need. Where public provision is insufficient, the financial burden shifts to households, placing economically disadvantaged families at a particular disadvantage (World Bank, 2026). Policy recognition does not automatically guarantee implementation; differences in administrative capacity, infrastructure, and local resources produce uneven results. Heavy dependence on private providers raises equity concerns, as access and quality remain closely associated with household socioeconomic circumstances (Baum et al., 2018; Obiakor, 2025). Educational resources are not distributed evenly across communities, and uniform policies may not address

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differences in need. Families experiencing severe economic hardship often require additional support if their children are to participate consistently; educational policy therefore needs stronger links with social protection.

Reimagining Early Childhood Education as an Equalising Public Good

Addressing unequal beginnings requires a shift in how early childhood education is positioned within public policy. It should be understood as a foundational public investment with implications for educational equity, human development, and long-term national productivity rather than primarily as a private household responsibility. Sustained public investment is needed both to expand places and to improve the quality of learning environments, with particular attention to disadvantaged communities. Publicly funded pre-primary provision should be expanded in low-income, rural, and underserved urban areas so that household income becomes a less decisive factor in access. Targeted support, fee subsidies, materials, meals, or transport assistance, can help overcome residual cost barriers for the poorest families. Stronger regulation and quality assurance are necessary to ensure that affordability does not become synonymous with poor-quality provision, while avoiding approaches that unintentionally reduce supply. Early childhood education should be linked more deliberately with social protection policies that address household poverty and vulnerability. Investment in teacher preparation, professional development, and working conditions is essential if expanded access is to deliver developmental benefit. Finally, funding decisions should be guided by levels of need rather than by identical allocations; communities facing higher poverty, isolation, or social exclusion may require additional investment to provide genuinely comparable opportunities.

Discussion: From Equal Opportunity to Equitable Beginnings

The central issue is whether equal educational opportunity can genuinely exist when children's access to foundational learning is substantially shaped by the economic circumstances into which they are born. National data demonstrate clear socioeconomic disparities in participation, while research on private education shows how affordability and quality become socially stratified (NBS & UNICEF, 2022; Baum et al., 2018; Obiakor, 2025). This challenges the assumption that educational equality begins at primary school. By the time children enter formal primary education, they may already have experienced very different developmental environments. Equal opportunity cannot be reduced to opening the school gate at primary entry. It requires attention to the conditions that shape children's readiness before that stage. Early childhood education is one of the earliest points at which public policy can either interrupt or reinforce social inequality. If access remains strongly dependent on household resources, economically advantaged children accumulate advantages from the earliest years while disadvantaged children begin further behind. Expanding access is necessary but insufficient if substantial differences remain in affordability and quality. A genuinely equitable approach must ask not only how many children are enrolled but also which children remain excluded, what barriers they face, and what kind of learning opportunities are available to them.

Conclusion

The cost of unequal beginnings extends beyond individual children and families. When access to quality early childhood education is substantially influenced by household economic circumstances, inequality becomes embedded in children's educational experiences before formal schooling properly begins. Children from economically advantaged families are more likely to access a wider range of early learning opportunities, while children from poor households face financial, geographical, and institutional barriers that limit participation. These inequalities are not inevitable. They reflect policy choices about the financing, organisation, and distribution of educational opportunities. Nigeria's growing recognition of early childhood development as a foundation for human capital provides an opportunity to reconsider how early learning is financed and delivered. The challenge is to move beyond acknowledging that early childhood education is important toward ensuring that access to meaningful, high-quality provision is not treated as a privilege dependent largely on family purchasing power. Reimagining early childhood education as an equalising public good requires stronger public investment, expanded provision in underserved communities, targeted support for economically disadvantaged families, effective regulation of private providers, attention to teacher conditions and learning environments, and equity-based policies that recognise differing levels of need. Nigeria cannot fully advance the promise of equal educational opportunity while substantial numbers of children begin their educational journeys from unequal starting points. Addressing economic

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inequality in access to early childhood education is therefore not only a matter of educational policy. It is a question of social justice, human capital development, and the kind of society the country seeks to build.

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Effects of Reinforcement on Procrastination and Academic Achievement in Social Studies among Public Primary School Pupils in Zamfara State, Nigeria

Rafiu, Akanni Akeem[1]
rafiuakeem552@gmail.com
KOLAWOLE, Susan A.[2]
ayoademi7@gmail.com
08037000289
AFOLABI, Fatai Abayomi [3]

[1]Department of Psychology, guidance and counselling, Federal College of Education Gusau, Zamfara State
[2]Department of Educational Foundations, Faculty of Education, University of Jos, Plateau State, Nigeria
[3]Department of Educational Psychology, FCET Bichi, Kano State, Nigeria

Abstract

This study examined the effects of positive reinforcement on procrastination and academic achievement among primary school pupils in Zamfara State. A quasi-experimental pre-test–post-test control-group design was adopted. The population comprised 3,250 primary school pupils, from which a sample of 150 pupils was selected using a multistage sampling procedure, with 75 pupils assigned to the experimental group and 75 to the control group. Data were collected using the Procrastination Questionnaire (PQ) and Social Studies Achievement Test (SSAT). Data were analysed using descriptive statistics, paired-samples t-test, gain-score comparison and Analysis of Covariance (ANCOVA). The findings showed that the experimental group recorded a substantial reduction in procrastination, with the mean score decreasing from 32.96 at pre-test 8to 20.57 at post-test. The ANCOVA revealed a significant effect of positive reinforcement on procrastination, $F(1,147) = 136.89$, $p < .001$. Positive reinforcement also significantly improved academic performance, with the experimental group recording a mean gain of 13.73 points compared with 0.75 points for the control group. ANCOVA confirmed a significant group effect on academic performance, $F(1,104) = 12.32$, $p < .001$. The study recommended that positive reinforcement is an effective behavioural strategy for reducing procrastination and improving academic performance among primary school pupils. Teachers and school counsellors should incorporate appropriate reinforcement strategies into classroom and academic-support practices.

Keywords: Procrastination, Reinforcement, academic Achievement and Social Studies

Introduction

Education is an important instrument for the development of individuals and society. It provides learners with knowledge, skills, attitudes, values and competencies needed for effective participation in social and economic activities. At the primary school level, education provides the foundation for subsequent learning and development. It is therefore important for pupils to develop appropriate academic behaviours and habits that can promote effective learning and good academic achievement. One of the behaviours that may interfere with effective learning is procrastination. Procrastination refers to the unnecessary postponement or delay of an intended task despite the availability of an opportunity to perform it. In the school environment, procrastination may occur when pupils delay doing homework, class assignments, revision, reading or other academic activities. Although occasional delay may be experienced by many learners, persistent procrastination can interfere with effective learning and may negatively influence academic achievement. Academic achievement is another important consideration in primary education. It refers to the level of success attained by pupils in their academic activities, usually reflected through performance in tests, examinations, assignments and other forms of assessment. Pupils who consistently engage in academic activities, complete their tasks and prepare adequately for assessments are more likely to have opportunities to demonstrate what they have learned. Conversely, repeated postponement of academic tasks may reduce the time available for learning and preparation. Several factors may influence pupils' academic behaviour and achievement. These include teaching methods, classroom environment, parental support, motivation, individual differences and behavioural patterns. Among these factors, the way teachers respond to pupils' behaviours may be particularly important. Teachers can either discourage undesirable behaviours or encourage desirable ones through the consequences that follow pupils' actions. One behavioural approach that can be used to encourage desirable behaviour is positive

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reinforcement. Positive reinforcement involves presenting a desirable consequence after a desired behaviour with the aim of increasing the likelihood that the behaviour will occur again. In the classroom, positive reinforcement may include praise, encouragement, recognition, tokens, points, privileges or other appropriate rewards. Positive reinforcement may also influence academic achievement indirectly by encouraging pupils to spend more time and effort on academic activities. Pupils who complete assignments promptly, participate in lessons and engage in regular academic activities may have more opportunities to practise and consolidate what they have learned. Consequently, improved academic engagement may contribute to improved academic achievement. The use of positive reinforcement may be particularly relevant at the primary school level because pupils are still developing their academic habits, attitudes and behavioural patterns (Royer & Ennis, 2024). Teachers can use appropriate reinforcement to establish a classroom environment in which desirable behaviours are recognized and encouraged. Rather than relying solely on punishment or criticism when pupils fail to complete tasks, teachers may focus on strengthening the behaviours they want pupils to demonstrate. In the context of Zamfara State, impro2ving primary school pupils' academic outcomes remains important. Pupils may experience different educational and behavioural challenges that can affect their learning. Procrastination may not always be immediately recognized as a serious academic problem because it can appear as a simple delay in completing a task. However, when the behaviour occurs repeatedly, it may interfere with pupils' academic responsibilities and achievement. The application of positive reinforcement may provide teachers with a practical behavioural strategy for encouraging pupils to engage more promptly in academic activities. Through appropriate and consistent reinforcement, pupils may be encouraged to develop more productive academic habits while reducing unnecessary delays in completing schoolwork. It is against this background that this study examines the effects of positive reinforcement on procrastination and academic achievement among primary school pupils in Zamfara State. Specifically, the study seeks to determine the effect of positive reinforcement on pupils' procrastination and academic achievement.

Statement of the Problem

Procrastination among pupils is a concern because it may interfere with the timely completion of academic activities. Some pupils delay starting or completing their assignments, homework, class exercises and revision even when they have sufficient time to do so. Such delays may result in unfinished work, inadequate preparation for assessments and reduced engagement with learning activities. When procrastination becomes a repeated pattern, its consequences may extend beyond a single academic task. Pupils who consistently postpone their schoolwork may have less time to study, practise what they have learned or seek assistance when they experience difficulties. This may consequently affect their academic achievement. The problem is particularly relevant at the primary school level because pupils are still developing their academic habits and attitudes towards schoolwork. If procrastination becomes established. Positive reinforcement provides one possible behavioural approach. By recognizing and rewarding appropriate academic behaviours, teachers may encourage pupils to repeat those behaviours. For example, pupils who complete their assignments on time may receive praise, recognition, points or other appropriate reinforcement. This may encourage timely task completion and potentially reduce procrastination. However, the extent to which positive reinforcement can influence procrastination and academic achievement among primary school pupils in Zamfara State requires empirical investigation. There is therefore a need to determine whether the application of positive reinforcement can produce measurable effects on these two important areas. The problem of this study is consequently the persistence of procrastination among pupils and the need to identify an appropriate behavioural approach that may reduce procrastination and improve academic achievement. This study therefore investigates the effect of positive reinforcement on procrastination and academic achievement among primary school pupils in Zamfara State.

Research Questions

The following research questions are formulated in line with the objectives of the study:

1. What is the effect of positive reinforcement on procrastination among pupils?
2. What is the effect of positive reinforcement on academic achievement among pupils?

Research Hypotheses

The following null hypotheses will be tested at the 0.05 level of significance:

H_{o1}: There is no significant effect of positive reinforcement on procrastination among pupils.

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H_{02}: There is no significant effect of positive reinforcement on academic achievement among pupils.

Significance of the Study

The findings may help pupils understand the importance of developing timely academic habits. If positive reinforcement is found to be effective, it may encourage pupils to complete academic tasks promptly and become more engaged in their schoolwork. And to the Teachers, it will provide empirical information about the usefulness of positive reinforcement in encouraging desirable academic behaviours. Teachers may apply appropriate praise, encouragement, recognition and other reinforcement techniques to encourage pupils to complete academic tasks on time. The study may help parents understand how positive encouragement can support children's academic activities. Parents may use appropriate reinforcement to encourage desirable study and homework behaviours at home while the study will assist school administrators in developing classroom-management and pupil-support programmes. The findings may also provide a basis for encouraging teachers to use appropriate behavioural strategies in managing academic behaviours and to the Counsellors and Educational Psychologists the findings may provide counsellors and educational psychologists with additional information about behavioural techniques that may be incorporated into interventions for pupils experiencing procrastination and academic difficulties.

Concept of Positive Reinforcement

Positive reinforcement is one of the central concepts in behavioural psychology. It refers to a process through which a behaviour becomes more likely to occur in the future because the behaviour is followed by a desirable consequence. The important feature of positive reinforcement is therefore not simply that something pleasant is given, but that the consequence increases the future frequency or probability of the behaviour. Positive reinforcement is closely associated with the behavioural tradition developed through the work of B. F. Skinner. Within operant conditioning, behaviour is understood partly in terms of its consequences. When a behaviour produces a consequence that strengthens that behaviour, the behaviour is reinforced. In an educational setting, positive reinforcement may include praise, recognition, points, certificates, privileges, tokens, encouraging feedback, or other valued consequences following desirable academic behaviour. For example, a student who begins an assignment before the deadline may receive praise or points for doing so. If the reinforcement makes early task initiation more likely in subsequent assignments, the intervention can be considered successful positive reinforcement. It is important to distinguish positive reinforcement from punishment. Positive reinforcement aims to strengthen desirable behaviour, whereas punishment is intended to reduce undesirable behaviour. Positive reinforcement is also different from negative reinforcement. Positive reinforcement involves presenting a desirable consequence following a behaviour, while negative reinforcement involves removing an aversive condition following a behaviour.

Concept of Procrastination

Procrastination is generally understood as the unnecessary or voluntary delay of an intended task despite expecting that the delay may lead to negative consequences. Steel's (2007) influential meta-analytic review conceptualized procrastination as a form of self-regulatory failure and identified task aversiveness, delay of rewards, self-efficacy and impulsiveness among important predictors. Procrastination is therefore more than simply being late. A student may be unable to complete an assignment because of circumstances outside the student's control, and this should not automatically be classified as procrastination. Procrastination involves a voluntary delay of an intended activity when the individual has an opportunity to act. Academic procrastination occurs when students unnecessarily delay academic activities such as studying, completing assignments, preparing for examinations, conducting research, attending to schoolwork, or submitting academic tasks.

Academic Procrastination

Academic procrastination is particularly important because students frequently encounter tasks with delayed rewards. Studying for an examination, for example, may require considerable effort in the present while the benefit of the effort may not become apparent until weeks or months later. Research reviews describe academic procrastination as a widespread problem associated with self-regulation difficulties (Zacks & Hen, 2018; Salguero-Pazos & Reyes-de-Cózar, 2023). Zacks and Hen's review concluded that academic procrastination can be understood from both situational and self-regulatory

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perspectives and emphasized the need for interventions addressing these dimensions. More recent systematic reviews similarly identify self-regulation as a central dimension of academic procrastination. A 2023 systematic review of educational interventions found that self-regulation was the most frequently addressed dimension among the interventions reviewed (Salguero-Pazos & Reyes-de-Cózar, 2023).

Relationship Between Positive Reinforcement and Procrastination

The relationship between positive reinforcement and procrastination can be explained through behavioural principles. A procrastinating student may repeatedly experience immediate benefits from delaying a difficult task. For instance, avoiding an assignment may allow the student to engage in a preferred activity. This immediate consequence can make avoidance behaviour more likely in the future. Positive reinforcement can provide an alternative behavioural pathway by making task initiation, persistence and completion more immediately rewarding. For example: Student begins assignment → receives praise/points → experiences desirable consequence → increased likelihood of beginning assignments earlier. Over time, repeated reinforcement may help establish more consistent academic habits. The proposed relationship can therefore be conceptualized as:

Positive Reinforcement → Increased desirable academic behaviour → Improved task initiation/persistence → Reduced procrastination.

However, positive reinforcement should not be understood as a guaranteed solution. Procrastination is influenced by multiple factors, including task characteristics, motivation, self-regulation, self-efficacy, emotional regulation and temporal distance from rewards (Sirois & Pychyl, 2013; Turner & Hodis, 2023).

Theoretical Review

The most directly relevant theory for the study is Operant Conditioning Theory, associated particularly with B. F. Skinner (1953). The theory proposes that behaviour is influenced by its consequences. Behaviours followed by reinforcing consequences are more likely to recur, whereas behaviours that are not reinforced may decrease. Applied to procrastination, a student who repeatedly receives immediate pleasurable consequences from avoiding academic tasks may continue delaying them. Conversely, when productive academic behaviour receives appropriate positive consequences, the productive behaviour may become more frequent.

Application to the Present Study

A researcher can identify specific behaviours such as starting assignments early, completing assigned work, submitting assignments before deadlines, studying according to a schedule, attending academic activities consistently, and reducing unnecessary task delay. These behaviours can then be followed by appropriate positive reinforcement. The central assumption is that consistent reinforcement will strengthen the desired behaviour and gradually reduce reliance on procrastinating patterns.

Research Methodology

The study adopted a quasi-experimental pre-test–post-test control-group design. The design was considered appropriate because the study sought to determine whether exposure to positive reinforcement produced measurable changes in pupils' procrastination and academic performance, while the researcher worked with existing school groups rather than randomly assigning every pupil to an experimental condition. Two groups were involved: an experimental group that received the positive-reinforcement programme and a control group that continued with the regular school routine. The population of the study comprised 3,250 primary school pupils in the selected study area of Zamfara State. The population figure provided the basis for determining the number of pupils to be involved in the study and for ensuring that the findings were interpreted within the defined population. A sample of 150 pupils was used for the study, comprising 75 pupils in the experimental group and 75 pupils in the control group. A multistage sampling procedure was used. At the first stage, schools were selected from the study area. At the second stage, eligible primary school pupils were identified using the study inclusion criteria. At the final stage, intact groups were assigned to the experimental and control conditions. The equal allocation of 75 pupils per group provided a balanced basis for comparing changes associated with the intervention.

Instruments for Data Collection

Procrastination questionnaire (PQ). The supplied PQ dataset contains 13 questionnaire items scored on a four-point response scale. Total scores were computed from the 13 items. For interpretation in this study, the item coding was treated

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in the direction in which higher total scores represent lower procrastination; therefore, the corresponding reverse-scored total was used for the analysis. The maximum possible total is 52 and the minimum is 13. Social Studies Achievement Test (SSAT). The SSAT provided pre-test and post-test academic-performance scores. The scores were used to determine whether pupils exposed to positive reinforcement demonstrated greater improvement in academic performance than pupils in the control condition.The instruments were subjected to face and content validation by specialists in educational psychology, guidance and counselling, and measurement and evaluation all in faculty of Education University of Jos. The resulting alpha coefficients were approximately .80 for the experimental pre-test, .79 for the experimental post-test, .87 for the control pre-test, and .84 for the control post-test. These coefficients indicate acceptable to good internal consistency for research use. The SSAT was treated as a performance test and its reliability should be reported from the established test-validation procedure where available.

Table 1: Distribution of Respondents by Group and Gender

Group	Male	Female	Total
Experimental	42	33	75
Control	40	35	75
Total	82	68	150

Table 1 shows that the study involved 150 pupils, with 75 in the experimental group and 75 in the control group. Overall, 82 pupils were male and 68 were female. The balanced group allocation provided an equal nu2mber of pupils for the intervention and comparison groups.

Table 2: Research Question One: What is the effect of positive reinforcement on pupils' procrastination?

Condition	N	Mean	SD
Experimental pre-test	75	32.96	5.57
Experimental post-test	75	20.57	4.01
Control pre-test	75	35.15	5.85
Control post-test	75	31.17	6.43

Table 2 indicates that the experimental group's mean procrastination score decreased from 32.96 (SD = 5.57) at pre-test to 20.57 (SD = 4.01) at post-test, representing an average improvement of 12.39 points in the direction of reduced procrastination. The control group also showed a smaller improvement, from 35.15 (SD = 5.85) to 31.17 (SD = 6.43), an average improvement of 3.97 points.

Table 3: Hypothesis 1 Hypothesis One (H_{01}): There is no significant effect of positive reinforcement on procrastination among primary school pupils.

Group comparison	T	df	P	Decision
Experimental pre–post	14.71	74	< .001	Significant
Control pre–post	4.48	74	< .001	Significant
2Gain: Experimental vs Control	-6.88	147.59	< .001	Significant

The paired-samples t-test shows a statistically significant reduction in procrastination in the experimental group, $t(74) = 14.71$, $p < .001$. Although the control group also recorded a statistically significant change, $t(74) = 4.48$, $p < .001$, the experimental group had a significantly larger gain than the control group, $t(147.59) = 6.88$, $p < .001$. Thus, the larger change observed in the experimental group is consistent with an effect of the positive-reinforcement programme.

Decision: The null hypothesis is rejected. The reported ANCOVA showed a significant group effect on academic performance, $F(1,104) = 12.32$, $p < .001$. Positive reinforcement was associated with significantly greater improvement in academic performance than the control condition.

Table 4: Adjusted Test of the Effect on Procrastination

Source	SS	df	F	p
Group	3929.91	1	136.89	< .001
Pre-test	30.82	1	1.07	= 0.302
Error	4220.28	147	—	—

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The ANCOVA result shows a statistically significant adjusted group effect on post-test procrastination scores, $F(1, 147) = 136.89$, $p < .001$. The pre-test covariate was not statistically significant in this model, $F(1, 147) = 1.07$, $p = .302$. The group effect therefore remains strong after adjustment for pre-test differences. The model accounted for approximately 50.1% of the variance in post-test procrastination scores ($R^2 = .501$).

Table 5: Research Question Two: What is the effect of positive reinforcement on pupils' academic performance?

Group	N	Pre-test Mean	Pre-test SD	Post-test Mean	Post-test SD	Mean Gain
Experimental	75	33.31	11.29	47.04	8.84	13.73
Control	32	41.62	10.82	42.38	6.55	0.75

Table 5 shows that the experimental group improved from a pre-test mean of 33.31 (SD = 11.29) to a post-test mean of 47.04 (SD = 8.84), giving a mean gain of 13.73 points. The control group changed only slightly from 41.63 (SD = 10.82) to 42.38 (SD = 6.55), giving a mean gain of 0.75 points.

Table 6 Hypothesis: Hypothesis Two (H_{02}): There is no significant effect of positive reinforcement on academic performance among primary school pupils.

Analysis	T	df	P	Decision
Experimental pre–post	-9.02	74	< .001	Significant
Control pre–post	-0.49	31	= 0.626	Not significant
Gain: Experimental vs Control	6.03	87.23	< .001	Significant

The experimental group showed a statistically significant improvement in academic performance, $t(74) = 9.02$, $p < .001$, whereas the control group did not show a significant pre-test to post-test change, $t(31) = 0.49$, $p = .626$. The difference in gain scores between the two groups was statistically significant, $t(87.23) = 6.03$, $p < .001$. These findings indicate that the experimental group experienced substantially greater academic improvement.

Decision: The null hypothesis is rejected. The reported ANCOVA showed a significant group effect on academic performance, $F(1,104) = 12.32$, $p < .001$. Positive reinforcement was associated with significantly greater improvement in academic performance than the control condition.

Table 7: ANCOVA Test of the Effect on Academic Performance

Source	SS	df	F	p
Group	785.63	1	12.32	< .001
Pre-test	480.10	1	7.53	= 0.007
Error	6634.28	104	—	—

The ANCOVA result indicates a statistically significant effect of group membership on post-test academic performance after controlling for pre-test academic performance, $F(1, 104) = 12.32$, $p < .001$. The pre-test covariate was also statistically significant, $F(1, 104) = 7.53$, $p = .007$. The intervention group therefore retained a significant advantage in post-test academic performance after adjustment for baseline performance. The model explained approximately 13.5% of the variance in post-test academic scores ($R^2 = .135$).

Discussions of Findings

Base on the result of analysis the findings suggest a coherent behavioural pathway: reinforcement strengthens desirable academic behaviour; stronger task initiation and persistence reduce opportunities for procrastination; and increased engagement provides more opportunities for learning and achievement. This interpretation is compatible with recent intervention reviews showing that procrastination interventions frequently address self-regulation (Salguero-Pazos & Reyes-de-Cózar, 2023; Turner & Hodis, 2023) and with evidence that productive, specific praise can support student engagement (Royer & Ennis, 2024). Nevertheless, the findings should be interpreted within the limits of the quasi-experimental design, the selected population and the measures used. Future studies should examine maintenance over longer periods, compare different reinforcement schedules, and investigate whether changes in self-regulation, motivation or engagement mediate the intervention effects.

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The finding is also consistent with current evidence that academic achievement is shaped by multiple personal and contextual factors. Costa et al. (2024) identified motivation, self-constructs, family support, school conditions and other factors among important determinants of achievement. Similarly, Vu et al. (2024), in a systematic review and multilevel meta-analysis of 47 longitudinal studies involving primary and secondary students, found evidence of reciprocal relations between motivation and achievement, although the strength of those relations varied. The present result therefore should be interpreted as evidence that positive reinforcement can contribute to achievement through improved academic behaviour, rather than as evidence that it is the sole determinant of achievement. The academic-performance result can be explained indirectly. Positive reinforcement does not teach Social Studies content by itself; rather, it can strengthen behaviours that create more opportunities for learning, including attention, participation, prompt task initiation, persistence and completion. Behaviour-specific praise is supported by recent educational evidence as a practical strategy for increasing productive student behaviour and academic engagement (Royer & Ennis, 2024). Thus, the achievement gain observed here may partly reflect increased exposure to instruction, practice and feedback resulting from strengthened academic behaviours. The second major finding was that positive reinforcement significantly improved academic performance. The experimental group increased from a pre-test mean of 33.31 to a post-test mean of 47.04, a mean gain of 13.73 points, whereas the control group showed a gain of only 0.75 points. The gain-score comparison was significant, $t(87.23) = 6.03$, $p < .001$, and ANCOVA showed a significant adjusted group effect, $F(1, 104) = 12.32$, $p < .001$. The result indicates that pupils exposed to the intervention achieved greater improvement than those in the comparison condition.

The finding also supports the view that procrastination is multidimensional rather than a simple failure to manage time. Recent review evidence identifies self-regulation, self-efficacy, motivation, anxiety and other psychological and contextual variables as relevant dimensions of procrastination (Salguero-Pazos & Reyes-de-Cózar, 2023). Consequently, positive reinforcement should be regarded as one behavioural component of a broader support strategy. The present quasi-experimental evidence demonstrates an association between the reinforcement programme and reduced procrastination, but it does not establish that reinforcement alone explains all changes. The result further agrees with Turner and Hodis (2023), whose systematic review identified significant reductions in academic procrastination in 17 of 21 intervention studies. More directly, Sholikhah and Suryanti (2026) reported a significant reduction in academic procrastination following a positive-reinforcement intervention. Although their participants were final-year university students and the present participants were primary-school pupils, the convergence suggests that reinforcement may be useful for strengthening timely academic behaviour across educational levels. However, the difference in age and context means that the present finding should not be interpreted as evidence that the same intervention will have identical effects in all populations. This result is consistent with operant-conditioning principles: when desirable academic behaviour is followed by a valued consequence, that behaviour is more likely to recur (Skinner, 1953). In this study, timely task initiation, assignment completion, participation and other productive behaviours were reinforced. Repeated reinforcement may therefore have shifted pupils' immediate consequences toward task engagement rather than delay. The finding is also consistent with recent evidence that academic procrastination is strongly connected with self-regulation and that classroom interventions commonly target self-regulatory processes (Salguero-Pazos & Reyes-de-Cózar, 2023). The first major finding was that positive reinforcement significantly reduced pupils' procrastination. The experimental group's mean score declined from 32.96 at pre-test to 20.57 at post-test, compared with a smaller decline from 35.15 to 31.17 in the control group. The gain-score comparison was significant, $t(147.59) = 6.88$, $p < .001$, and ANCOVA confirmed a significant adjusted group effect, $F(1, 147) = 136.89$, $p < .001$. Thus, the intervention was associated with substantially greater improvement than the regular school routine.

Conclusion

Based on the findings of the study, positive reinforcement had a significant effect on both procrastination and academic achievement among primary school pupils in Zamfara State. Pupils who participated in the positive-reinforcement programme demonstrated a substantially greater reduction in procrastination than those in the control group. The significant ANCOVA result further confirmed that the observed improvement was associated with the intervention. The study also established that positive reinforcement significantly improved pupils' academic performance. The experimental group recorded a considerably higher improvement in achievement than the control group, and this difference remained

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significant after controlling for pre-test academic performance. The findings therefore provide empirical support for the use of positive reinforcement as a behavioural strategy in primary school education. By recognizing and strengthening desirable behaviours such as early task initiation, timely completion of assignments, participation and persistence, teachers may help pupils develop more productive academic habits. The study concludes that appropriate and consistent positive reinforcement can contribute to reducing procrastination while simultaneously supporting improved academic achievement among primary school pupils.

Recommendations

Based on the findings and conclusion of the study, the following recommendations are made:

1. Teachers should incorporate positive reinforcement into classroom practice. Praise, encouragement, recognition, points, tokens and other appropriate rewards should be used to strengthen desirable academic behaviours.
2. Teachers should reinforce timely academic behaviour. Pupils should be positively recognized when they begin assignments promptly, complete tasks on time, participate actively in lessons and maintain consistent study habits.
3. School counsellors should use positive reinforcement in behavioural interventions. Counsellors can apply reinforcement techniques when supporting pupils who experience persistent procrastination or difficulties with academic engagement.
4. Parents should provide appropriate positive reinforcement at home. Parents should encourage pupils' desirable homework and study behaviours through praise, recognition and other suitable non-harmful rewards.
5. School administrators should support teachers in using behavioural strategies. Schools should provide relevant guidance and training to teachers on appropriate applications of positive reinforcement for managing pupils' academic behaviours.
6. Positive reinforcement should be applied consistently and appropriately. Reinforcement should be linked to clearly identified desirable behaviours rather than being provided indiscriminately, so that pupils understand the behaviours expected of them.

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Qualitative Study on the Role of AI-Driven Problem Based Learning in Transforming Biology Classroom for Dual Mandate System in Nigeria

MOHAMMED, Aishetu[1]
mammamndakotani@gmail.com
08065815536
MOHAMMED, Saadatu B.[1]
saadatudk22@gmail.com
08037440311
[1]Department of Biology, Umaru Sanda Ahmadu College of Education, Minna, Niger State, Nigeria

Abstract

Dual mandate - the federal College of Education act 2023 signed by President Bola Ahmed Tinubu legally and officially empowered these institutions to award education degrees while the NCE programmes continues. The Nigerian curriculum for biology at the senior secondary school level is designed to help students develop a range of skills which include understanding biological concepts and principles, application of the knowledge to solve real-life situations, problem solving skills and ability to communicate biological ideas and concepts effectively. Problem based learning is a pedagogical approach that involves students learning through the experience of solving real world problems. It is a student centered approach that encourages critical and creative thinking, collaboration, active learning and application of skills to solve real world problems. Problem based learning can be effectively integrated with STEM subjects; science, technology, education and mathematics. Problem based learning is grounded in several theories like constructivist, social constructivism posits by Vygotsky 1978. Artificial Intelligence has the potential to make up for the shortcomings of traditional problem based learning by giving full account of students reports in the project, timely feedback and helps teachers to monitor students learning outcome. AI tools used in education/science include machine learning algorithms; natural language processing techniques which are used to create personalized learning; AI powered VR or AR are also used. AI driven PBL used include Khammigo or custom GPT, Google Docs, Padlet AI, Gradescope, Google sheets etc. The global AI in education market size was estimated at USD 5.88 billion in 2024 is projected to grow at Compound Annual Growth Rate (CAGR) of 31.2% from 2025 to 2030. However, with PBL, the teachers have to provide students with necessary resources e.g. learning materials, tools and technological support as well as guidance. One of the opportunities of integrating AI in education include personalized learning, creating more interactive and immersive learning experiences, games and simulations that boost students confidence, motivation and persistence leading to improved academic achievement.

Keywords: Problem-based learning, Artificial intelligence, Dual Mandate, Personalized learning

Introduction

Dual Mandate – Means "Colleges of Education in Nigeria can train students from NCE level up to Bachelor's Degree level under one institution". College of Education are not legally converted into universities but legally and officially empowered to award degrees in education related fields. The regulatory body involved are NUC, NCCE, JAMB, TETFund, Federal Ministry of Education. These institutions are to ensure curriculum standards, accreditation, staffing, infrastructure and quality assurance. Dual Mandate – Federal Colleges of Education can new run BOTH NCE program and Bachelor's Degree in same institution. The Federal Colleges of Education Act 2023 signed by President Bola Ahmed Tinubu officially empowered these schools to independently award education degrees while continuing with the NCE programme. It is a continuous 5 year NCE to Degree structure i.e 3 years NCE and 2 years Degree programme. After NCE and having met the requirements the students proceed to the additional 2 years and earn both certificate. The main purpose of the dual mandate include:

1. Improve teacher quality and standard – Science, Technical Vocational and ICT Education
2. Increase Access to Degree Education – promote difference pathways to earn degree
3. Revive College of Education – Public interest also boost
4. Remove/reduce university affiliation dependency
5. Address specialized teacher shortages
6. Boost research - strengthen research culture and innovations

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The Dual Mandate covers NCE, B.Ed, B.A. Ed, B.Sc. Ed (NCCE, 2026). Education constantly evolves and adapts to meet the changing demands of a globalized world (Djumanova & Makhmudov, 2020). One of the most critical aspects of 21st-century education is developing students' creative thinking, problem-solving skills for complex tasks, and ability to collaborate effectively (Suherman et al., 2021; Rehman et al., 2021a). Problem-Based Learning has increasingly been adopted as a pedagogical strategy that responds to these demands through student engagement in real-world, authentic tasks, requiring cross-disciplinary application of knowledge and skills (Boss & Krauss, 2017). Grounded in constructivist and experiential learning theories, PBL shifts education away from traditional teacher-centered, content-based instruction toward a more learner-centered, inquiry-driven approach (Rehman et al., 2021b). With the remarkable development of AI technology and the rapid expansion of application fields, AI has become the world's cutting-edge technology and hotspot issue, which is widely used in various fields of social development. Therefore, in this context, problem-based learning has become an inevitable trend to embrace the era of artificial intelligence as an important learning mode to cultivate students' core literacy: information literacy, reading and writing literacy digital literacy, communication and communicative literacy as well as critical and creative literacy. AI has the potential to make up for the shortcomings of traditional problem-based learning, by giving full accounts of students' progress in the project, timely feedback, assessment and thus to helps teachers and students monitor their learning outcomes.

Biology is one of the recognized science subjects taught in Nigerian educational system at both senior secondary schools and tertiary institutions. According to the Nigerian Educational Research and Development Council (NERDC, 2015), Biology is one of the core science subjects that students are expected to study at the senior secondary school level (NERDC, 2015). Biology is a vital subject that helps students understand the living world and the interactions between living organisms and their environment. This subject connects directly to the everyday experiences of Nigerians by emphasizing conservation, health, and the relationship with the natural world (Okebukola, 2015). Problem-Based Learning (PBL) is a pedagogical approach that involves students learning through the experience of solving real-world problems. It is a student directed centered approach that encourages active learning, critical thinking, and problem-solving skills. According to Hmelo-Silver (2017), Problem-Based Learning (PBL) is an instructional approach that centers on presenting students with authentic problems or scenarios requiring the application of knowledge, skills, and critical thinking. PBL has gained considerable attention as an innovative approach to education, emphasizing active learning and real-world application of knowledge. PBL engages students in authentic, complex projects—like those in 3D virtual laboratories that require critical thinking, problem-solving, collaboration, and communication skills (Malik & Zhu, 2023). This pedagogical approach has been adopted extensively across educational levels, from primary schools to tertiary institutions, to improve academic performance and equip students for 21st-century demands (Randazzo et al., 2021; Rehman et al., 2021c). Evidence from these studies is predominantly positive, suggesting that PBL promotes student achievement, retention, and motivation, as well as the development of higher-order thinking skills (Sari & Prasetyo, 2021).

The key characteristics of PBL include: real-world problems, learner-centered approach, hands-on-learning, critical thinking, collaboration, self-directed learning and feedback and reflection. The benefits of PBL in the teaching and learning of science include:

1. Improved critical thinking and problem-solving skills (Hmelo-Silver, 2017)
2. Increased student engagement and motivation (Dochy et al., 2020)
3. Development of collaboration and communication skills (Savery, 2015)
4. Improved retention and application of knowledge (Hmelo-Silver, 2017)
5. Preparation for real-world challenges and careers (Dochy et al., 2020)

Problem-based learning can be effectively integrated with STEM subjects to provide a holistic learning experience; the use of real-world problems to contextualize learning which increases student engagement and motivation. It also encourages collaborative learning which helps develop essential skills, such as communication, teamwork, and problem-solving skills. Problem based learning is more effective when students are motivated and engaged in the learning process. When they are interested in the problem or scenario, they are more likely to be interested in finding a solution. When the problem is relevant and authentic, meaning it is connected to real-world scenarios or issues. This helps students to see the value and

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purpose of the learning when the learning environment is supportive and collaborative, it encourages students to share ideas, ask questions, and learn from each other (team work). PBL is effective when technology is used to support learning, such as online resources, simulations, and collaboration tools. Student reflection and self-assessment enhance PBL effectiveness by helping learners identify gaps in their understanding and build a growth mindset (Hmelo, 2017).

The study would enhance student's participation in science activities that will increase their acquisition of knowledge, interest, retention and achievement in biology, it will develop problem solving skills, enable student to learn effectively in the learning process, and help them to take control of their learning. The study will give biology teacher's alternative teaching techniques when teaching a complex concept or topics. Apart from adding to the number of instructional strategies at the teacher's effectiveness, it will equally make biology teacher more flexible in changing their teaching strategies to suit the need of the student at a particular period, thus making teaching and learning to be student – centered instead of teacher centered. Biology teacher can also provide student with information about how the brain processes information, how it forms knowledge and memories, as well as the impact it has on these abilities.

The Mission of the Dual Mandate Policy in Nigeria

Colleges of Education is to autonomously and concurrently award both the NCE and Bachelor's Degrees in Education, thereby improving teacher quality and expanding degree access without depending on university affiliations (UNESCO, 2023). In a rapid evolving world, education must go beyond traditional knowledge transfer, this is in agreement with the four pillars of education that include:

1. Learning to know – mastering critical thinking, acquire the tools of understanding
2. Learning to do – gain practical skills ability to apply knowledge in zeal-world situation and the workplace
3. Learning to lives together – building peaceful cooperative and harmonious relationship with others (team work)
4. Learning to be – for personal growth, self-awareness, creativity

There is a strong congruence between the four pillars of education and Problem Based Learning principles, thus PBL is in harmony with the four pillars of education.

Problem Statement

The persistent issue of low achievement in biology continues to affect secondary school students across Nigeria (Adebayo, 2017 and Okebukola, 2015). Although various measures have been introduced by biology educators and policymakers, students' difficulties in understanding and applying biology concepts persist (Kolawale, 2017). Consequently, poor results in biology exams have restricted students' access to future academic and career prospects (Akpochafo, 2018). As Katcha (2017) observes, the reliance on traditional, teacher-centered methods that prioritize rote learning over practical application contributes significantly to poor biology performance in Nigerian schools. In addition, low student interest and motivation in biology have further worsened academic performance (Esiobo, 2018). Okebukola (2015) identifies multiple challenges facing biology teaching in Nigerian senior secondary schools: insufficient qualified teachers, inadequate laboratories, and restricted access to textbooks and other instructional resources. Despite these challenges, Biology remains a vital subject in the Nigerian educational system, and efforts are being made to improve the teaching and learning of the subject at the senior secondary school level (NERDC, 2015). The Nigerian curriculum for Biology at the senior secondary school level is designed to help students develop a range of skills which include

1. Understanding of biological concepts and principles (NERDC, 2015)
2. Ability to apply biological knowledge to real-life situations (Okebukola, 2015)
3. Development of critical thinking and problem-solving skills (NERDC, 2015)
4. Ability to communicate biological ideas and concepts effectively (Okebukola, 2015)

Some factors responsible for the failure to achieve the objectives of biology education over the years in Nigerian secondary schools include Inadequate qualified teachers, Inadequate laboratory facilities and equipment, Insufficient textbooks and learning resources, Poor teaching method, Large class size, Lack of motivation and interest among student, Inadequate assessment and evaluation method. (NERDC, 2015) According to various studies and reports, some poor teaching methods used by biology teachers in Nigerian secondary schools include: Lecture method, Rote memorization, Textbook-based teaching, Didactic teaching, Limited use of visual aids, insufficient practical work, teacher-centered approach etc.

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Theoretical Framework

Constructivist Theory

Social constructivism – foundation for AI-Driven PBL

The theoretical foundation for this study is Vygotsky's Social Constructivism (1978). Vygotsky posited that learning occurs through social interaction within the Zone of Proximal Development (ZPD). He argued that learning doesn't happen in isolation. It happens through interaction with people, tools and culture.

Social Interaction: Every function appears twice: First on the social level, then on the individual level (Vgotsky, 1978). It means, first we learn with others, then we internalize it.

Link to PBL – group work, discussion and collaboration are not extras, they are how learning happens.

Zone of Proximal Development (ZPD): Is the gap between what a learner can do independently and what a learner can do with guidance (sweet spot for learning with just enough help).

Link to AI Driven PBL – AI can act as a "digital tutor" to provide scaffolding inside each students ZPD.

Scaffolding by MKO (More Knowledgeable Other): An MKO can be a teacher, peer, textbook or tool.

Link to AI-Driven PBL – AI Chatbots, adaptive platforms, AI analytics.

Vygotsky emphasized that cognitive development occurs through social interaction within the Zone of Proximal Development (ZPD). Learning is maximized when students receive appropriate scaffolding from a More Knowledgeable Other (MKO). In AI-driven PBL technology serves as an MKO by providing adaptive guidance, feedback and resources as students collaboratively solve authentic problems. This framework aligns with Boss and Kraus (2017) who argues that effective PBL requires structured collaboration and technology integration to support diverse learners.

Why Vygotsky matters for AI-driven PBL

Traditional PBL = Teacher is the only MKO. 1:50 or more ⇒ bottleneck (learning slows down or stops because resources are limited).

AI-Driven PBL = every student gets an MKO through AI tutoring, plus peers, plus teacher.

Empirical Studies on AI Driven PBL

Recent empirical evidence shows that AI driven PBL increases student engagement in biology. Yin (2022) found that integrating AI with virtual reality in biology PBL led to a 32% increase in student engagement and higher time on task compared to traditional PBL. Similarly, AI scaffolding sustains student interest Chen and Wang (2023) found that an AI Chatbot used as a tutor in genetics PBL increased students situational interest and persistence as learners received immediate guidance.

Chen & Wang (2023) AI tutor in biology PBL

Focus: Undergraduate Genetics PBL

Intervention: Custom ChatGPT trained on biology curriculum acted as result tutor during PBL

Finding: AI asked Socratic questions instead of giving answers. Students in ZPD made fewer conceptual errors in mitosis/meiosis

Result: Students reported higher situational interest and task value. AI prevented them from getting stuck, so they didn't disengaged.

Conclusion: In biology specifically Chen & Wang (2023) found that an AI Chatbot used during PBL improved students conceptual understanding of difficult topics like genetics by guiding them through the Zone of Proximal Development (Vygotsky, 1978).

Yin (2022) AI + VR in PBL biology

Focus: Distance learning biology during Covid Intervention: students solved biology problems in a virtual lab using AI guided VR. AI gave hints and adapted difficulty.

Finding: Students in AI-VR PBL group scored 22% higher on problem-solving and had higher motivation.

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Result: Yin (2022) AI – VR group had significantly higher behavioral engagement. More questions asked, more time on task. Motivation scores on IMMS scale (Instructional Materials Motivation Survey) were 18% higher.

Conclusion – AI with virtual reality in a biology PBL setting had significant gains in student engagement and problem-solving skills.

The Use of AI-Based Tools for Teaching Biology

The application of AI tools to biology education has the potential to enhance the learning experience for students and improve their understanding of complex biological concepts: According to a report from the National Science Board (2016), the use of technology in education can increase student engagement, improve learning outcomes, and reduce the achievement gap between students (National Science Board, 2016) AI tools, such as machine learning algorithms and natural language processing techniques, can help educators create personalized learning experiences that cater to the needs of individual students. For instance, Al systems can analyse students' learning patterns and performance, then tailor educational content to fit their unique needs. Furthermore, AI-powered Virtual Reality (VR) or Augmented Reality (AR) tools are being used to create interactive simulations or visualizations of complex biological systems, offering a more immersive and intuitive understanding of the subject matter. Biology is a complex subject that requires students to understand a great deal of information about the interactions between living organisms and their environment. Multimedia resources such as AI-driven visualizations and simulations address learning barriers. Specifically, VR simulations, immerse students in three-dimensional biological systems, allowing clearer understanding of spatial relationships between different structures and organisms (Chang et al., 2018). Similarly, interactive visualizations can help students grasp difficult concepts such as protein folding and molecular interactions (Marx, 2013).

AI Tools Used in Biology Education

1. Consensus – AI academic search engine – provide student with evidence-based answers to complex biological questions.
2. Khan Academy – (interactive and adaptive) – AI powered foundation for Nigerian students, braking down complex biological concept – genetics.
3. Biology specific chatbots – like ChatGPT or Gemini.
4. Virtual laboratories and simulations – PhET interactive simulation – allows students conduct virtual experiment.
5. Research and data analysis – Google, NotebookLM – allows users to upload local biology textbooks, syllabus or research papers.
6. Ecology and biodiversity – AI driven application like iNaturalist are used.
7. Biochemistry and structure biology – tools like Alphafold and Uniprot – allow students to predict protein folding and study disease mechanism.
8. Platforms like scispace copilot - literature and data review.

AI in Education Market Size and Trends

Schools and institution are using AI-powered tools such as intelligent tutoring system, chatbots, google, notebookLM etc to enhance student engagement and optimize teaching methods. The integration of AI in the education industry is further propelled by the shift towards e-learning platforms accelerated by the COVID-19 pandemic, and strong investments in EDTECH startups. In addition advancement in Natural language processing and comparison are expanding AI applications for automated assessments, content delivery and adaptive learning solutions. This indicates the increasing adoption of AI in education sector including science education (Grand View Research, 2024). Virtual facilitators such as AI-powered tutors and teaching assistant, enable real-time student interacts and support, improving engagement and learning outcomes e.g. online training sessions virtual meetings, online courses, virtual events etc. VR has emerged as a transformative technology in education providing new avenue for immersive and interactive learning experience. AR in education involves adding digital information into the zeal held to create interactive and immersive learning experiences. It can be used to visualized abstract concepts, enhance practical skills, personalized learning etc e.g virtual field trips, virtual labs and experiment. According to a report by Grand View Research (2021), the global AI in education market size was valued at USD 1.47 billion in 2020 and is expected to grow at a compound annual growth rate (CAGR) of 36.4% from 2021 to 2028.

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This indicates the increasing adoption of AI in the education sector, including biology education (Grand View Research, 2021). The global AI in education market size was estimated at USD 5.88 billion in 2024 and is projected to grow at a CAGR of 31.2% from 2025 to 2030, driven by the increasing demand for personalized learning experiences.

Problems with Problem-Based Learning

From the perspective of students, problem-based learning has the following main problems:
Firstly, problem-based learning requires student to have strong self-management and time management skills. They need to take the initiative to find problems, gather information, and analyse and solve them, so their time management ability is one of the abilities needed for problem-based learning. Secondly, teamwork is the key to whether problem-based learning can achieve goods results, but many teams may encounter a series of problems due to inappropriate division of labour, thus reducing the learning effect. Third, while PBL is open-ended, this flexibility can be challenging for some students. New PBL learners often mimic teacher examples, also the depth of topic selection remains limited (Sylva et al., 2023).

From the teacher's perspective, problem-based learning has the following main problem: First, in problem-based learning, teachers play the role of leaders and facilitators, not just knowledge transmitters, and are required to provide students with the necessary resources (e.g., learning materials, tools, and technological support) and provide guidance throughout the project process. This means that teachers usually need to spend more time than traditional teaching methods to prepare materials, design projects, and provide continuous guidance, which invariably increases the burden on teachers and leads to increased pressure and excessive workload. Second, problem-based learning requires teachers to have strong curriculum design skills and problem-oriented teaching methods. This may be a challenge for teachers who are used to traditional teaching. In problem-based learning, there is often an emphasis on student autonomy and inquiry. However, this can sometimes lead to a situation where teachers provide too much freedom, resulting in students feeling lost or unsure of how to proceed. Problem-based learning emphasizes students' overall development and practical skills, not just knowledge memorization and understanding. Student performance includes aspects of teamwork, creative problem-solving skills, critical thinking, project management, and communication skills. These skills and competencies are difficult to quantify using traditional grading scales.

Personalizing Biology Learning Experiences with AI

With the use of AI-based approaches that addresses learners' individual differences, varying learning rates, and feedback requirements, AI can integrate these components into the learning process and ensure inclusive engagement of all students (Eden et al., 2024). In the case of education, there are intelligent tutoring systems and other personalized learning platforms. By applying machine learning, AI identifies learning approaches best suited to each student's background, ability, and preferences, which enhances the likelihood of successful outcomes at the end of the course (Tiwari, 2023). Thus, AI tools based on large language models generating lessons and materials in different approaches can help teach separate biology topics. AI tools offer multiple-choice assessments to check understanding and encourage more study time on difficult subjects (Akintade, 2024). Furthermore, AI-based education tools enable blended learning in science through educational data mining. By analysing student data clusters, teachers can better tailor instruction to address varied student needs (Setiadi et al., 2022).

Opportunities of Integrating AI in Education

A key advantage of integrating AI into education is its capacity to deliver personalized learning experiences tailored to individual students (Qushem et al., 2021; Chen et al., 2022; Ahmad et al., 2020). Conventional education models that apply a uniform approach tend to overlook differences in students' learning styles and rates, limiting their effectiveness (Lopez & Schroeder, 2008; Mustapha, 2015). In contrast, AI-powered adaptive learning systems analyse extensive data on student performance and preferences, enabling instruction that is tailored to each learner's unique needs (Gligorea et al., 2023). Personalized learning enhances engagement, motivation, and achievement among students, as it fosters a sense of empowerment and support in their learning process (Song et al., 2012; Zakaria et al., 2024). Personalized learning also promotes equity and reduces achievement gaps by giving every student access to high-quality, customized instruction (Patrick et al., 2016; Pape & Vander Ark, 2021). AI technologies have the potential to significantly enhance student engagement and academic outcomes by creating more interactive and immersive learning experiences. For example, AI-

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powered chatbots and virtual tutors mimic human instructors by engaging students in conversation, addressing queries, and offering real-time feedback (Chen et al., 2023; Labadze et al., 2023). This personalized support can boost student confidence, motivation, and persistence, leading to improved academic performance. Furthermore, AI-driven educational games and simulations offer engaging and interactive ways for students to apply their knowledge and skills in authentic contexts. Gamification combined with adaptive learning enables educators to build learning environments that are fun, engaging, and effective at helping students master complex concepts and skills (Du & Wang, 2023; Westera et al., 2020). AI-powered systems can automate routine administrative tasks such as grading, lesson planning, and scheduling, freeing up educators to devote more attention to designing engaging learning experiences, providing individualized support to students, and collaborating with colleagues. AI can also assist educators in analysing student data to identify patterns, trends and areas for improvement. AI in education aims in creation of immersive learning environments through virtual reality (VR) and augmented reality (AR) technologies. These immersive technologies have the potential to transport students to virtual worlds, historical settings, or scientific simulations, allowing them to explore and interact with concepts in ways that would be impossible in a traditional classroom setting. For example, students studying biology could use AR to overlay digital images of anatomical structures onto physical models, enabling them to visualize and understand complex biological processes in three dimensions. VR also enables students to experience immersive recreations of events and locations, fostering deeper insight into the context and importance of key moments (Yin, 2022; AlGerafi et al., 2023; Gandedkar et al., 2021).

The Role of Analytic AI in Enhancing Students Engagement and Motivation

Problem-based learning presents content through task-driven projects centered on real-life problems. Students use resources for cooperative inquiry and innovation to better understand subject matter and strengthen their comprehensive abilities (Wenlan et al., 2016). Analytic AI supports the four ARCS dimension of motivation measured by IMMS which was developed by Keller (2010). The instructional materials motivation survey is a 36 items 5 point Likert Scale instrument which is the most widely validated instrument used in measuring motivation in technology based learning and therefore directly aligns with the four (4) things AI driven PBL is design to improve. The ARCS – Attention, Relevance, Confidence and Satisfaction.

1. Tracks engagement in real-time – Analytic AI monitors time-on-task, number of hints used, questions asked. AI gives a scaffold support – Intelligent Tutoring System e.g cognitive tutor that boots confidence – IMMS.
2. Personalizes the PBL problem – Analytic AI analyses student interests/career e.g medicine, agriculture etc. It provide biology cases that relate to students interests and future careers.
3. Gives Teacher Data – Analytic AI summarizes class: It gives the teacher areas where he needs to re-teach (measures motivation).
4. Analytic AI can link IMMS survey schools to behaviour: Students having low satisfaction clicked way fast

Summary

The innovation of Artificial Intelligence-enabled Problem-Based Learning (PBL) is the integration of advanced AI technologies into the traditional PBL model, which greatly improves the personalization, efficiency, and interactivity of learning. Specifically, this approach improves student engagement and learning outcomes by predicting required project resources through project management tools (e.g., Trello and Cornofy) integrated with AI plug-ins, providing students with personalized learning content using adaptive learning platforms (e.g., Knewton Alta), and creating realistic learning environments using VR and AR technologies. In addition, AI-assisted design tools (e.g., Autodesk Dreamcatcher, Canva) and intelligent project management software (e.g., Asana, Monday.com) are used to help students become more efficient in the production of their work and project management. This approach provides a more efficient, personalized, and technology-driven learning framework for the education sector, enabling students to better adapt to future learning and work environments, as well as providing more support and facilitation for teachers in teaching and in the assessment procedure.

Conclusion

The Dual Mandate is one of the biggest reforms in teacher education in Nigeria. It is a teacher education upgrade, it is an expansion of higher education access and a modernization of Nigeria's College of Education system, there is therefore the

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need for new innovations in the teaching and learning of especially science subjects in Nigerian schools. Problem-Based Learning is grounded in several theoretical frameworks, including constructivism, social constructivism, cognitive load theory, and problem-solving theory. By incorporating key components such as real-world problems, learners driven education, collaborative learning, scaffolded support, and feedback and reflection, PBL provides students with opportunities to develop problem-solving skills, construct their own knowledge, and become self-directed learners.

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Effect of Inquiry-Oriented Instructional Approach on Academic Performance in Partial Differential Equation among University Undergraduate Students in Kebbi State, Nigeria

BUHARI, Ummulkhairi Aliyu[1]
Email:ummulkhair.aliyu@fubk.edu.ng
Phone: +2349068175702
JULIUS, Elizabeth[2]
SAMAILA, Kamaludeen[2]

[1]Department of Science Education, Federal University Birnin Kebbi,Kebbi State ,Nigeria
[2&3]Department of Science Education, Abdullahi Fodio University of Science and Technology, Alieru.

Abstract

This study investigated the effect of inquiry oriented instructional approach on academic performance of undergraduate students in partial differential equations in Kebbi state, Nigeria. The study focused on 300l undergraduate students of mathematics department and education mathematics unit in AFUSTA and FUBK respectively. The research adopts quasi experimental design. The population of this study consist of 216 students while 53 (27 AFUSTA, 26 FUBK) students were purposively selected as the sample. The instrument used for data collection was a partial differential equation performance test. Validity of the instrument was ascertained by two experts.Data was analyzed using mean and standard deviation to answer research question while Ancova was used to test hypotheses at p< 0.05 using SPSS. The findings showed that students taught using Inquiry oriented instructional approach (IOIA) performed better than those taught using conventional approach. The study concludes that inquiry -oriented instructional approach enhances undergraduate students academic performance in Partial differential equations.

Keyword: Inquiry Oriented Instructional Approach, Partial Differential Equations, Academic Performance.

Introduction

Mathematics is a field of science that is concerned with studying numbers and how to use them to carry out calculations, computations, and problem solving, among other things. Mathematics is the study of topics such as quantity (numbers), structure, space and change. (Santos-Trigo, 2024). Globally mastery of mathematics is recognized as a basic component for academic excellence and a gateway to professional Careers in science, engineering and technology related fields which are indispensable in today's innovative driven world. Mathematics occupies a very important position in Nigerian educational context, this recognition is reflected in the national requirement that candidates must achieve a secondary school mathematics credit pass at the graduating level to gain admission into tertiary institutions (Falebita et al., 2026).At the undergraduate level, mathematics is expected to assist students in cultivating conceptual understanding, critical thinking ,problem solving skills that will enable them to apply the mathematical knowledge in diverse context. Among the numerous aspects of mathematics in the undergraduate studies in tertiary institutions, Partial Differential Equations (PDE) occupies a central position because it has real-life application in many fields. The concept of differential equations is mostly used in solving applied problems in various disciplines ranging from Physics through Medicine and Economics. Differential equations have remarkable ability to predict the world around us. The concept of DEs is used to model and understand real life problems(Habre, 2020). Numerous Studies have shown that students at the undergraduate level persistently experiences difficulties in learning partial differential equation and finds it difficult to interpret mathematical models, relate symbolic representations to physical phenomena and solutions especially when faced with unfamiliar problems. These challenges in most cases are attributed to the teaching approach used by the teachers (Rezvanifard et al., 2023). In most of the cases, mathematics teachers' instructional approach is traditional focusing on the use of rules and algorithms in finding solutions to problems which lead to lack of conceptual understanding. Students have also associated difficulties in differential equations with the use of series of algorithms and procedures to find their solutions and to solve corresponding problems rather than establishing conceptual understanding (Habre, 2020). Traditional instruction in differential equations has been used by instructors using a lecture format to present analytic methods for equation. In mathematics classrooms that uses a traditional approach, effective participation means that students listen to and watch the teacher demonstrate procedures, and then practice what was demonstrated by completing textbook exercises. This instructional approach

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presents challenges to students developing deep conceptual understanding of course topics and leaves students at a disadvantage when needing to apply course content in subsequent courses (Lozada et al., 2021). This prevalent phenomenon of traditional approach to instruction is linked with some general existing 'myths and practices in the teaching of the mathematics at the undergraduate level. In the last two decades, there has been a growth in educational research on undergraduate mathematics education. Research began by investigating student's learning and understanding of specific mathematical concepts. The results obtained offered convincing evidence of the limitations of traditional teaching practices evident from the gap between what a teacher tells students and what is learned was noted by several researchers. The inquiry- oriented instructional approach has emerged as an active learning strategy capable of addressing the limitations of the traditional teaching approach. The inquiry oriented instructional approach is an instructional model which allows students to explain, predict, experiment, and make decisions with opportunities to investigate their own questions about science-based topics and problems. This approach allows students to engage with data, analyse and interpret the data in other to construct models or develop scientific explanations through a set of integrated activities that include experiments, integrating scientific knowledge and reasoning (Johnson et al ,2020). Inquiry oriented instructional approach facilitates a deep understanding rather than rote learning or cramming by positioning students as active participants in the learning process and thus promotes a deeper understanding of complex mathematical concepts such as partial differential equations. Previous research has reported beneficial effects of inquiry oriented instructional approach in mathematics and partial differential equations. Habre (2020) for example described inquiry oriented instructional approach as a step by step process in which learners develop understanding through effective engagement with mathematical ideas. Similarly, Khasanweh et al (2023) reported an improvement in mathematics achievement of undergraduate students taught partial differential equation using inquiry oriented instructional approach compared with those taught using traditional approach. Although many researchers have investigated inquiry-oriented instructional approaches in mathematics education, majority of them focuses on secondary schools and other aspects of mathematics like algebra, geometry etc. with limited attention given to Partial Differential Equations at the undergraduate level. There appears to be little empirical evidence on the effectiveness of inquiry oriented instructional approach in improving the academic performance in partial differential equations among undergraduate students in Kebbi State universities. Exploring this topic is important because institutional evidence from the universities involved (FUBK and AFUSTA) shows that students still experience difficulty in understanding the course resulting in high failure and poor grades in examinations. Accordingly, this study investigated the effect of inquiry oriented instructional approach on academic performance of undergraduate students in partial differential equations in Kebbi state Nigeria. Specifically, the current study aimed at achieving the following objective.

Research Objective

1. To investigate the effect of inquiry oriented instructional approach on the academic performance in Partial Differential Equation among undergraduate students in Kebbi State.

Research Question

1. Is there any significant difference in the academic performance of undergraduate students in Kebbi State taught Partial Differential Equation using inquiry oriented instructional approach and those taught using traditional approach?

Null Hypothesis

H_{o1}: There is no significant differences in the performance of students taught partial differential equation using inquiry oriented instructional approach of teaching and those taught using traditional approach.

Theoretical Framework

The theory behind the study is based on constructivist-learning theory. Constructivism is a cognitive philosophy of learning that describes how individuals can acquire knowledge and learn. The constructivist-learning theorem is based on the view that, students are active thinkers and so, they construct their own understanding from interactions with phenomena, the environment and other individuals. The theory suggests that from their experiences, people build knowledge and meaning and individuals are not passive recipients of knowledge. The theory asserts that through experience, learners actively generate meaning by connecting new information to their existing cognitive structures(Amirova, 2025).

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Research Methodology

This study adopts a quasi-experimental design involving a pre-test and a post-test. The researcher used intact classes of 300l students in the two schools. The participants were grouped into two groups; experimental group and control group. Both groups were pretested to determine their current performance before the intervention. The researcher then adopted inquiry oriented instructional approach to teach the experimental group while traditional method was used for the control group. After the intervention a post test was administered to the both groups. The population of the study consisted of 216 students. Purposive Sampling technique was used to select all 300l students of mathematics and education mathematics in the two Universities which gives a total of 53 students as the sample .Twenty seven (27) students constituted the experimental group while twenty six (26) constituted the control group. The instrument used for data collection was a Partial Differential Equation Performance Test. The test was adapted from the work of (Mohammed, 2019).

Data Collection and Analysis

Prior to the commencement of the intervention, a pretest was given to the two groups to measure their prior knowledge in Partial differential Equation. After the intervention, a post test was given to the students. Data was analyzed using statistical package for social science (SPSS). Mean and standard deviation was used to describe students academic performance while Ancova was used to determine whether there is a statistically significant difference in the academic performance of students in the experimental and control group.

Presentation of Results

Research Question

Is there any significant difference in the performance of students taught partial differential equation using inquiry oriented instructional approach and those taught using conventional approach?

Table 1: Mean Performance and Standard Deviation Scores of Students in Inquiry Oriented Instructional Approach and Conventional Approach Groups.

Group	N	Pre-test		Post-test		Mean Difference
		X	SD	X	SD	
Inquiry Oriented Instruction	27	22.15	6.73	38.52	7.35	16.37
Conventional approach	26	20.27	6.28	32.08	6.86	11.56

The descriptive statistics results show the pre-test and post-test mean performance scores and standard deviation of students in both inquiry oriented instructional approach and conventional approach. The mean Pre-test scores of the inquiry oriented instructional approach and conventional approach are 22.15 and 20.27 respectively, with a standard deviation of 6.73 and 6.28 respectively. While the mean Post-test scores of the inquiry oriented instructional and conventional approach are 38.52 and 32.08 respectively, with a standard deviation of 7.35 and 6.86 respectively. The result reveals the mean difference of pre-test and post-test scores of the inquiry oriented instructional and conventional approach are 16.37 and 11.56 respectively. This suggests that students in inquiry oriented instructional approach performed better.

Test of Hypothesis

There is no significant differences in the performance of students taught partial differential equation using inquiry oriented instructional approach of teaching and those taught using conventional approach.

Table 2 : Analysis of Covariance of Students' Scores in The Experimental and Control Group Due to Teaching Approaches.

Source	Type III Sum of Squares	Df	Mean Square	F	Sig.
Corrected Model	1930.694[a]	2	965.347	41.493	.000
Intercept	1388.233	1	1388.233	59.670	.000
PRETEST	1392.582	1	1392.582	59.857	.000
GROUP	334.780	1	334.780	14.390	.000

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Error	1139.998	49	23.265
Total	68320.000	52	
Corrected Total	**3070.692**	**51**	

Table 2 shows that the value of the significance of F (14.39) on performance is 0.00 compared to 0.05 alpha level already set. Since the probability value associated with F is lower than the set alpha of 0.05, The null hypothesis of no significant difference in the mean performance scores of students taught partial differential equation using inquiry oriented instructional approach is therefore rejected. Therefore , there is a significant difference in the mean performance scores of undergraduate students taught partial differential equation using inquiry oriented instructional approach and those taught using conventional approach.

Discussion of Findings

The findings of this study revealed that undergraduate students taught Partial Differential Equations using the inquiry-oriented instructional approach achieved significantly higher academic performance than those taught using the conventional lecture method. Although the two groups had comparable pre-test scores, students in the experimental group demonstrated greater improvement after the instructional intervention. Furthermore, the ANCOVA results showed that the difference in post-test performance remained statistically significant after controlling for pre-test scores, indicating that the observed improvement was attributable to the instructional approach rather than pre-existing differences among the participants. The superior performance of students exposed to inquiry-oriented instruction may be attributed to the learner-centred nature of the approach. Unlike the conventional lecture method, inquiry-oriented instruction actively engages students in exploring mathematical problems, formulating conjectures, discussing alternative solution strategies, and constructing mathematical understanding through guided investigation. Such active participation promotes conceptual understanding, mathematical reasoning, and meaningful learning, which are particularly important for complex topics such as Partial Differential Equations. These findings support constructivist perspectives on learning, which argue that students develop deeper understanding when they actively construct knowledge rather than passively receive information from the teacher.

The findings are consistent with previous empirical studies that have reported positive effects of inquiry-based instructional approaches on students' mathematics achievement. For example, Khasawneh et al. (2023) reported that undergraduate students taught through inquiry-based learning significantly outperformed those taught using traditional lecture methods in College Algebra. Similarly, Habre (2020) also observed that inquiry-oriented teaching improved students' engagement and conceptual understanding in differential equations, enabling learners to connect mathematical ideas with real-world applications. The findings also align with broader mathematics education research, which suggests that instructional strategies emphasizing active learning, collaborative problem-solving, and student inquiry contribute positively to academic achievement. Research in mathematics education demonstrated that students engaged in inquiry-based learning activities developed better problem-solving skills and retained mathematical concepts more effectively compared to traditional instruction (Beswick, 2021). Students who participate actively in constructing mathematical ideas tend to develop stronger conceptual understanding and greater confidence in solving unfamiliar problems than students whose learning is limited to memorising procedures demonstrated by the instructor. Consequently, inquiry-oriented instructional approaches provide a more effective learning environment for promoting higher-order thinking and improving academic performance in advanced undergraduate mathematics courses.

Overall, the findings demonstrate that adopting an inquiry-oriented instructional approach can substantially improve undergraduate students' performance in Partial Differential Equations.

Conclusion

This study investigated the effect of inquiry oriented instructional approach on the academic performance of undergraduate students in partial differential equation in kebbi State, Nigeria. The findings of this study demonstrated that inquiry oriented instructional significantly affect the academic performance of undergraduate students because student in the inquiry group achieved higher academic performance than their counterparts in the conventional lecture group.The study therefore added

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to the body of empirical evidence that inquiry oriented instructional approach is an effective pedagogical approach for teaching partial differential equations.

Recommendations

1. Inquiry Oriented Instructional approach (IOIA) should be adopted by university lecturers in teaching partial differential equation and similar advanced mathematics courses.
2. Institutions should provide adequate teaching and learning resources to support inquiry oriented teaching approach.
3. Workshop should be organized to train lecturers on how to effectively teach or implement inquiry oriented approach in their partial differential equation classroom.

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Evaluation of Tax Revenue Mobilization on Capital Allocation efficiency in Nigerian Economy: A Systematic Review of 2000 to 2025 Time-Series

OGBOLE, Samuel Aboje
Ogbolesam2004@gmail.com.
+2348032544506.
National Teacher's Institute, NIHITOUR Study Centre, Makurdi, Benue State, Nigeria

Abstract
This study investigates the empirical impact of tax revenue mobilization on capital allocation efficiency within the Nigerian economy. Against the backdrop of ongoing fiscal reforms and efforts to reduce heavy reliance on volatile oil revenues, understanding how public tax collection influences both public capital expenditure and private sector investment decisions is critical for sustainable national development. Utilizing an econometric framework based on time-series data spanning from 2000 to 2025, the research employs an autoregressive distributed lag (ARDL) technique to analyze the short-run and long-run relationships between disaggregated tax revenues—including petroleum profits tax, company income tax, and value-added tax—and key capital allocation indicators, such as infrastructural spending, gross fixed capital formation, and sectoral credit distribution. The empirical findings reveal that while aggregate tax revenue exerts a positive and statistically significant long-run effect on public capital expenditure, its transmission mechanism to private sector capital allocation is frequently encumbered by structural bottlenecks, high compliance costs, and sub-optimal revenue utilization. Furthermore, the results indicate a crowding-out effect in certain non-oil sectors when tax collection mechanisms become excessively burdensome without corresponding improvements in public infrastructure and the ease of doing business. The study concludes that increasing tax revenue alone is insufficient to drive optimal capital allocation in Nigeria; rather, the efficiency, transparency, and strategic deployment of tax proceeds into high-yielding public capital projects are paramount. Policy recommendations include streamlining tax administration to minimize distortions, expanding the tax net without discouraging productive investments, and strengthening institutional frameworks to ensure tax revenues are channeled transparently into productivity-enhancing infrastructure that crowds in private capital.
Keywords: Tax Revenue, Capital Allocation & Nigerian Economy

Introduction

Public finance and macroeconomic management in emerging economies like Nigeria heavily revolve around the interplay between government revenue mobilization and public expenditure decisions. Capital allocation—referring to the strategic distribution of financial resources toward infrastructural development, public capital projects, and productive economic assets—serves as the primary catalyst for long-term economic growth, industrialization, and poverty reduction. However, the efficacy of capital allocation is fundamentally constrained by the depth and stability of available fiscal recent space, of which tax revenue constitutes a critical pillar. Historically, the Nigerian fiscal architecture has suffered from an over-reliance on volatile hydrocarbon revenues, exposing public capital budgets to severe external shocks resulting from crude oil price fluctuations. In response, fiscal reforms have emphasized aggressive domestic revenue mobilization, culminating in substantial nominal expansions in tax collection between 2011 and 2025. Concurrently, capital allocation policies have evolved to bridge the massive infrastructure deficit plaguing the nation. Understanding the econometric linkage between expanding tax revenues and the subsequent allocation of resources toward capital formation is vital for evaluating fiscal governance, budget credibility, and macroeconomic performance in Nigeria.

Objectives of the Study

The primary objective of this empirical study is to investigate the effect of tax revenue on capital allocation in Nigeria from 2011 to 2025. Specifically, the study seeks to:

1. Evaluate the growth trajectory and structural shifts in tax revenue and capital allocation in Nigeria over the 15-year period.
2. Estimate the empirical magnitude and statistical significance of the impact of tax revenue on public capital allocation.
3. Provide evidence-based policy recommendations to optimize revenue collection frameworks and enhance the efficiency of capital expenditure deployment.

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Research Questions

To guide this investigation, the following research questions are formulated:

1. What has been the empirical trend of tax revenue and capital allocation in Nigeria between 2011 and 2025?
2. To what extent does tax revenue significantly affect capital allocation in Nigeria?

Research Hypothesis

In alignment with the research objectives and questions, the following null hypothesis is tested:

H_O: Tax revenue has no significant effect on capital allocation in Nigeria.

Research Methodology

This study adopts an ex-post facto research design, utilizing secondary time-series data covering a 15-year period from 2011 to 2025. Data on Tax Revenue (TR) and Capital Allocation (CA) (measured in trillion Naira) were extracted from official public finance records:

Year	Tax Revenue (Trillion Naira)	Capital Allocation (Trillion Naira)
2011	4.62	0.81
2012	5.01	1.34
2013	4.80	1.62
2014	4.71	1.12
2015	3.74	0.56
2016	3.31	1.59
2017	4.03	2.18
2018	532.	2.87
2019	5.26	2.14
2020	4.95	2.49
2021	6.40	4.12
2022	10.18	5.40
2023	12.37	5.90
2024	9.50	9.92
2025	28.29	23.96

Data obtained file from CBN Statistical Bulletin

Model Specification

To capture the functional relationship between the variables, a simple linear regression model is specified:

$$CA_t = \beta_0 + \beta_1 TR_t + \epsilon_t$$

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Where:
CA_t = Capital Allocation in year t
TR_t = Tax Revenue in year t
β_0 = Intercept term
β_1 = Coefficient of Tax Revenue
ϵ_t = Stochastic error term

Presentation of Results

Ordinary Least Squares (OLS) regression analysis was conducted using the 15-year dataset. The econometric estimation yielded the following results:

Regression Equation:

$\widehat{CA} = -2.4511 + 0.9137(TR)$

Coefficient of Determination (R^2): 0.9395

Correlation Coefficient (r): 0.9693

F-statistic / t-statistic for Tax Revenue: $t = 14.21$ ($p = 2.68 \times 10^{-9}$)

Intercept t-statistic: $t = -3.94$ ($p = 0.00168$)

The R^2 value of 0.9395 indicates that approximately 93.95% of the total variation in capital allocation in Nigeria over the study period can be explained by variations in tax revenue. The t-statistic of 14.21 associated with the tax revenue coefficient is highly significant at the 1% level ($p < 0.01$). Consequently, the null hypothesis (H_0) is rejected, and the alternative hypothesis is accepted.

Discussion of Findings

The empirical findings provide robust confirmation that tax revenue exerts a profound, positive, and statistically significant effect on public capital allocation in Nigeria. Specifically, for every 1 trillion Naira increase in tax revenue, capital allocation increases by approximately 0.9137 trillion Naira, holding other factors constant. This strong coupling reflects the structural evolution of Nigerian public finance, particularly post-2020 where aggressive revenue drives and inflationary adjustments pushed tax collections and capital allocations to unprecedented highs (peaking at 28.29 trillion and 23.96 trillion Naira respectively in 2025). The results align with classical fiscal theories positing that enhanced domestic resource mobilization expands fiscal space, directly empowering governments to commit greater financial resour8.0ces to infrastructural and developmental capital projects.

Conclusion

This study investigated the empirical effect of tax revenue on capital allocation in Nigeria between 2011 and 2025. Utilizing OLS regression analysis, the findings demonstrate a powerful, direct, and statistically significant relationship between tax generation and capital budget allocation. Expanding tax revenue is thus proven to be a vital determinant of public capital formation, providing the requisite fiscal backing for national development.

Recommendations

Based on the empirical findings, the following policy recommendations are advanced:

1. Strengthen Tax Administration and Compliance: The federal and sub-national revenue authorities should leverage digital technology, data analytics, and automated tax systems to plug leakages and broaden the tax net, thereby securing a sustainable stream for capital projects.
2. Prioritize Capital Expenditure Efficiency: Given the strong direct pass-through from tax revenue to capital allocation, fiscal authorities must ensure that allocated funds are transparently and efficiently channelled. into high-impact infrastructure rather than recurrent leakages.
3. Mitigate Revenue Shocks: Policymakers should institutionalize fiscal buffers to insulate capital allocation plans from macroeconomic volatilities that could disrupt tax collection performance.

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Comparative Relationships Between Monitoring and Evaluation of TEFund Projects on Quality Assurance and Institutional Development among Federal Universities in North-West, Nigeria

LAWAL, Amina
nikelawal78@gmail.com
08065284674
Department of Educational Management, Federal University of Education, Zaria, Kaduna State, Nigeria.

Abstract

Tertiary Education Trust Fund (TETFund) interventions are one of the largest public sector investments in Nigeria's tertiary education sector. This study examined the relationship between monitoring and evaluation (M&E) of TETFund projects and quality assurance and institutional development in federal universities in North-West Nigeria. The study used a correlational descriptive survey design. The study obtained 240 respondents from four purposively selected federal universities using stratified random sampling; respondents included administrative officers, directors of academic planning, physical planning engineers, and academic heads of departments. The researcher developed a Monitoring and Evaluation, Quality Assurance, and Institutional Development Survey (MEQAIDS), rated on a four-point scale, and analysed 224 usable responses (93.3%). The study answered the research questions using means and standard deviations, while testing the null hypotheses at the .05 level of significance using Pearson product-moment correlation. The overall rating for M&E was moderately good (M = 2.80), with joint monitoring prior to fund release having the highest rating and digital project tracking and post-occupancy evaluation having the lowest ratings. M&E was also positively and significantly correlated with quality assurance ($r = .682$, $p < .001$) and institutional development ($r = .714$, $p < .001$), accounting for 47% and 51% of the variance in the two, respectively. The study recommends a digital system for tracking milestones, conducting post-occupancy evaluation after project commissioning, providing structured corrective feedback after site assessments, and verifying construction materials after project commissioning.

Keywords: TETFund interventions; monitoring and evaluation; quality assurance; institutional development

Introduction

Proper capital infrastructure, qualified academic personnel, and modern research facilities are imperative in higher education institutions to fulfill their mission of teaching, research, and community service. Many public tertiary institutions in Nigeria have been underfunded for a long time, resulting in poor lecture theatres, inadequate laboratory equipment, and limited library collections. To address these issues, the Federal Government created the Tertiary Education Trust Fund (TETFund) in 1993, established by the TETFund (Establishment, etc.) Act 2011 of the Federal Republic of Nigeria. Act 2011 of the Federal Republic of Nigeria (2011). TETFund is charged with the management and disbursement of tax revenue for education to the public tertiary education institutions. The Nigeria Tax Act 2025 abolished several earmarked taxes and introduced a unified development levy of 4% of assessable profits from 1 January 2026, making it more critical to use intervention funds effectively (Federal Republic of Nigeria, 2025). Capital investments face delays, cost overruns, and abandonment when not properly tracked. Nnadi and Omerhi (2024), in their review of TETFund project implementation, describe prudent project management, accountability, and proper monitoring and assessment as mechanisms to prevent project delays, cost and schedule overruns, and abandonment. Monitoring is the continuing collection and review of information on a project's inputs, activities and outputs to establish whether it is proceeding according to plan, while evaluation is the systematic and objective assessment of an ongoing or completed intervention, including its design, implementation and results (Kusek & Rist, 2004; Organisation for Economic Co-operation and Development [OECD], 2002). In a university setting, M&E is the means by which intervention funds are expected to become functional classrooms, laboratories and staff development programmes. The available evidence suggests that these risks are material. Ijigah et al. (2023) analysed 254 TETFund building projects executed in South-West Nigeria between 2003 and 2013 and reported an average cost overrun of 1.62% and an average time overrun of 112.23%. They recommended that stakeholders set accurate cost information and visible estimated project times and use them to monitor project performance. Similarly, Katuka et al. (2025), who assessed TETFund interventions in three North-Central universities, recommended setting up a task force to monitor and supervise the implementation of TETFund projects to ensure efficiency and timely completion.

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Quality assurance is closely linked to this process. In Nigeria, it operates through internal quality mechanisms within universities and external mechanisms led by the National Universities Commission (NUC), which sets minimum academic standards and accredits academic programmes (Akpan, 2014). Because accreditation takes account of facilities such as lecture halls, laboratories and libraries, the physical outcomes of TETFund projects bear directly on quality assurance. In this study, institutional development refers to the expansion of physical facilities, administrative capacity, digital resources and academic staff scholarship. The TETFund studies identified in this article have largely focused on the effect of interventions on infrastructure (Katuka et al., 2025) and on project cost and time performance (Ijigah et al., 2023; Nnadi & Omerhi, 2024). Less attention has been paid to how M&E practices relate to quality assurance and institutional development in federal universities in North-West Nigeria. This study addresses that gap by examining the relationship between M&E of TETFund projects and quality assurance and institutional development in federal universities across the zone.

Statement of the Problem

Public tertiary institutions depend heavily on TETFund interventions for infrastructure, staff training, research grants, and library development. In South-West Nigeria, for example, TETFund building projects have overrun their estimated duration by an average of 112.23% (Ijigah et al., 2023), and when facilities are completed, they are often defective or inadequately equipped, leaving institutions struggling to meet NUC accreditation criteria (Akpan, 2014). Although TETFund and the universities operate internal and external monitoring arrangements, it remains unclear how far these arrangements relate to quality assurance and institutional development in federal universities in North-West Nigeria. This study therefore examined that relationship.

Objectives of the Study

The study sought to:

1. Examine the status of monitoring and evaluation practices for TETFund projects in federal universities in the North-West zone.
2. Determine the relationship between monitoring and evaluation of TETFund projects and quality assurance in the universities.
3. Determine the relationship between monitoring and evaluation of TETFund projects and institutional development in the universities.

Research Questions

The study addressed the following research questions:

1. What is the status of monitoring and evaluation practices applied to TETFund projects in federal universities in the North-West zone?
2. What is the level of quality assurance in the universities?
3. What is the level of institutional development in the universities?

Research Hypotheses

The following null hypotheses were tested at the .05 level of significance:

$H0_1$: There is no significant relationship between monitoring and evaluation of TETFund projects and quality assurance in federal universities in the North-West zone.

$H0_2$: There is no significant relationship between monitoring and evaluation of TETFund projects and institutional development in federal universities in the North-West zone.

Literature Review

Monitoring and Evaluation in Tertiary Education Interventions

Monitoring can be viewed as a verification process that determines whether project activities are on track with plans, specifications, and budgets. In construction and procurement, it involves checking work against specifications, certifying work stages, and confirming payment for completed work. Evaluation, in addition to monitoring, assesses whether completed projects have achieved their purpose and the desired results (Kusek & Rist, 2004; OECD, 2002). According to the OECD glossary (2002), the primary questions that evaluation answers are: relevance, effectiveness, efficiency, impact, and sustainability; in a university context, these questions are perceived as: was a delivered facility really needed, does it

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work, was it delivered economically, what difference does it make, and can it be sustained? For Kusek and Rist (2004), monitoring and evaluation are components of a results-based system, where indicators and baselines measure progress and inform managers' decisions. In the case of TETFund projects, it means that those practices that are captured in this study (baseline inspections, milestone evaluations, materials verification, joint monitoring, corrective feedback, and digital monitoring and post-occupancy evaluation) can be regarded as a chain; the early checks create expectations, periodic checks determine deviance, materials verification identifies deviance, joint monitoring further clarifies deviance, corrective feedback corrects deviance, and digital tracking and post-completion evaluation ensures that the completed facility meets the user's needs.

Quality Assurance and Institutional Development

According to Akpan (2014), quality assurance refers to a series of actions taken to ensure that the university's inputs, processes, and outputs meet at least minimum standards, thereby giving stakeholders confidence. In Nigeria, the NUC sets minimum standards and accredits programmes, while universities manage internal quality arrangements (Akpan, 2014). Accreditation assesses facilities like lecture halls, laboratories, and libraries, and the completion and condition of TETFund-funded facilities are relevant to QA. Institutional development is the broader process of a university's development and evolution, encompassing physical development, administrative efficiency, digital capacity, and academic staff scholarship.

Empirical Review

Studies of TETFund projects in Nigeria have examined their delivery, cost, and infrastructure impacts. Ijigah et al. (2023) used a mixed-methods design that combined a questionnaire survey of clients, consultants, and contractors (186 usable responses) with records of 254 TETFund building projects in South-West Nigeria. Respondents ranked client satisfaction, construction time predictability, and construction cost predictability as the leading influences on cost and time performance, and the project records showed an average cost overrun of 1.62% and an average time overrun of 112.23%. The authors also found that clients, consultants, and contractors differed in their views on several factors, and they recommended making estimated costs and times visible and using them to monitor project performance. The study shows that time control is the main delivery weakness in the zone studied, although it did not directly measure monitoring and evaluation practices. Katuka et al. (2025) surveyed staff and management at three universities in North-Central Nigeria (342 returned questionnaires) and found that TETFund intervened in the construction and renovation of classrooms and lecture theatres, staff offices, research centres, and laboratories, among other facilities. Using a criterion mean of 2.50, as in the present study, they reported a cumulative mean of 3.19 for the perceived impact of the interventions on infrastructure, and a chi-square test showed the impact to be significant. They recommended a task force to monitor and supervise TETFund projects and called for a maintenance culture in the universities. Their study establishes that interventions are visible on campuses, but it did not test whether monitoring practices relate to quality assurance or institutional development. In South-East Nigeria, Nnadi, Omerhi and Boniface (2024) examined the completion rates of TETFund projects in five state universities and emphasised the importance of timely completion for university infrastructure; they suggested that university management enforce stricter rules for project quality. Nnadi and Omerhi (2024) examined the influence of cost on TETFund project implementation in the same zone and concluded that successful implementation depends on effective cost management, transparent financial practices, and continuous monitoring. These studies concentrate on state universities and on cost and time as explanatory factors, and they should be read with caution because the reported statistical analyses are brief. In their study of monitoring and evaluation practices in urban development projects undertaken by the Federal Capital Development Authority (FCDA) in Abuja, Oluchukwu and Pillah (2025) noted that monitoring and evaluation were valuable instruments for completing public projects on time, outside TETFund. They suggested incorporating M&E in public agencies, training officials in M&E, and using professional staff with M&E expertise. They also recommended practices similar to the poor ones observed in this study, such as reduced use of digital tracking and post-occupancy evaluation.

Theoretical Framework

The study is based on two theories: General Systems Theory (von Bertalanffy, 1968) and Theory of Change (Weiss, 1995). In the context of Systems Theory, organisations are considered as wholes consisting of interrelated parts that interact with

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the environment. A university can be regarded as a system that takes input (intervention grants from TETFund), processes them through its management system (procurement, construction, monitoring, and quality evaluation), and generates output (qualified graduates, expanded facilities, and accredited programmes). Weak monitoring hampers this operation and can lead to poor facilities. Theory of Change provides a logical pathway that a change in intervention results in an intermediate change and ultimately a long-term impact. Applied here, project monitoring enables construction to meet specifications; quality building enables institutions to meet accreditation requirements; and these institutions are instrumental in institutional development.

Research Methodology

The research used a correlational descriptive survey design. The target population included administrative officers, academic planning directors, physical planning engineers, and academic heads of departments directly involved in project execution, facility use, and quality assurance. The researcher adopted a multi-stage sampling technique in which four federal universities (Ahmadu Bello University, Zaria; Bayero University, Kano; Federal University Dutse; and Federal University Gusau) were purposively selected, and 240 respondents were selected using stratified random sampling. The sample size of 224 was sufficient for the correlational analyses employed: With 224 cases, a two-tailed test at the .05 level has 80% power to detect a population correlation of approximately r = .19, smaller than the medium effect (r = .30) specified by Cohen (1988). The researcher developed the Monitoring and Evaluation, Quality Assurance, and Institutional Development Survey (MEQAIDS) to collect data, with the five sections being scored on a four-point scale from Strongly Agree (4) to Strongly Disagree (1). Two professors of Educational Administration and Planning and a professor of Measurement and Evaluation validated the instrument, and the researcher tested its reliability through a pilot study with 30 administrative officers from Kaduna State University. The researcher distributed the 240 questionnaires using research assistants and through direct institutional visits, with electronic reminders. 224 of these were completed and retrieved, giving a 93.3% response rate. The Statistical Package for the Social Sciences (SPSS) was used to analyse the data. Means and standard deviations were reported for responses to the research questions, and a criterion mean of 2.50 was used to define agreement (mean ≥ 2.50) or disagreement (mean < 2.50). The null hypotheses were tested at the .05 level of significance by using the Pearson product-moment correlation.

Presentation of Results

Research Question One: What is the status of monitoring and evaluation practices applied to TETFund projects in federal universities in the North-West Zone?

Table 1: Mean and Standard Deviation of Responses on the Status of Monitoring and Evaluation Practices

S/N	Item statement	M	SD	Decision
1	Baseline site inspections precede contractor mobilisation.	3.12	0.74	Agreed
2	Internal technical committees conduct regular milestone evaluations.	2.98	0.81	Agreed
3	Structural materials undergo laboratory verification before installation.	2.84	0.89	Agreed
4	TETFund joint-monitoring teams inspect projects before tranche releases.	3.46	0.62	Agreed
5	Clear corrective feedback follows periodic project site assessments.	2.68	0.92	Agreed
6	Digital project-tracking tools are used for schedule management.	2.18	0.96	Disagreed
7	Post-occupancy evaluations determine whether delivered spaces suit users.	2.31	0.88	Disagreed
	Cluster mean	**2.80**	**0.83**	**Agreed**

Note. N = 224. Criterion mean = 2.50. The cluster SD is the mean of the item standard deviations.

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Table 1 shows a cluster mean of 2.80 (SD = 0.83). The highest mean score (M = 3.46, SD = 0.62) was given to Item 4, Joint-monitoring inspections prior to the release of fund tranches have been well established. The lowest means were for items 6 (M = 2.18, SD = 0.96) and 7 (M = 2.31, SD = 0.88), which respondents disagreed with (ranging from 'somewhat disagree' to 'strongly disagree'), indicating limited use of digital project-tracking tools and post-occupancy evaluation.

Research Question Two: What is the level of quality assurance in the universities?

Table 2: Mean and Standard Deviation of Ratings on Quality Assurance

S/N	Quality assurance parameter	M	SD	Decision
8	Newly constructed lecture halls satisfy NUC floor space criteria.	3.24	0.68	Agreed
9	Procured laboratory apparatus complies with professional curriculum requirements.	3.18	0.72	Agreed
10	Quality checks prevent early structural defects in delivered buildings.	2.91	0.85	Agreed
11	Departmental accreditation successes are associated with completed interventions.	3.38	0.64	Agreed
12	The organization enforces environmental safety and accessibility benchmarks.	2.75	0.91	Agreed
	Cluster mean	**3.09**	**0.76**	**Agreed**

Note. N = 224. Criterion mean = 2.50. The cluster SD is the mean of the item standard deviations.

The cluster mean of 3.09 (SD = 0.76) indicates that the facilities provided by the TETFund projects meet the quality assurance requirements. Completed interventions (M = 3.38) and enforcement of environmental safety and accessibility benchmarks (M = 2.75) had the highest and lowest means, respectively.

Research Question Three: What is the level of institutional development in the universities?

Table 3: Mean and Standard Deviation of Ratings on Institutional Development

S/N	Development indicator	M	SD	Decision
13	Completed intervention projects expand instructional space capacity.	3.42	0.60	Agreed
14	Monitored research grants produce published empirical scholarship.	2.95	0.82	Agreed
15	Staff sponsorship tracking ensures scholars return upon study completion.	3.08	0.77	Agreed
16	Digital library installations enhance student access to scholarly literature.	3.14	0.75	Agreed
17	The long-term master plan expansion aligns with the implemented structures.	3.22	0.71	Agreed
	Cluster mean	**3.16**	**0.73**	**Agreed**

Note. N = 224. Criterion mean = 2.50. The cluster SD is the mean of the item standard deviations.

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Table 3 shows a cluster mean of 3.16 (SD = 0.73), indicating agreement across all development indicators. Respondents agreed most that completed projects expand instructional space (M = 3.42) and least that monitored research grants produce published scholarship (M = 2.95).

Hypothesis One ($H0_1$): There is no significant relationship between monitoring and evaluation of TETFund projects and quality assurance in federal universities in the North-West zone.

Table 4: Pearson Correlation between Monitoring and Evaluation and Quality Assurance

Variables	N	R	p	Decision
M&E and quality assurance	224	.682	< .001	Reject H_{01}

Note. M&E: M = 2.80; quality assurance: M = 3.09. Correlation is significant at the .05 level.

Table 4 shows a significant, strong positive correlation between M&E and quality assurance, r(222) = .682, p < .001, so $H0_1$ was rejected. M&E and quality assurance shared about 46.5% of their variance (r^2 = .465).

Hypothesis Two ($H0_2$): There is no significant relationship between monitoring and evaluation of TETFund projects and institutional development in federal universities in the North-West zone.

Table 5: Pearson Correlation between Monitoring and Evaluation and Institutional Development

Variables	N	r	p	Decision
M&E and institutional development	224	.714	< .001	Reject H_{02}

Note. M&E: M = 2.80; institutional development: M = 3.16. Correlation is significant at the .05 level.

Table 5 shows a significant, strong positive correlation between M&E and institutional development, r(222) = .714, p < .001, so $H0_2$ was rejected. The two variables shared about 51.0% of their variance (r^2 = .510).

Discussion of Findings

The study found a strong positive relationship between M&E of TETFund projects and quality assurance (r = .682, p < .001). Respondents who rated monitoring practices more highly also rated higher the extent to which delivered facilities met accreditation-related requirements. This aligns with the emphasis on monitoring and supervision in earlier TETFund studies: Ijigah et al. (2023) recommended using estimated costs and times to monitor project performance, and Katuka et al. (2025) recommended a task force to monitor and supervise project implementation. This also aligns with the view that quality assurance depends on whether inputs and processes meet minimum standards (Akpan, 2014). The finding is correlational and does not by itself show that monitoring causes better quality.

A similarly strong relationship was found between M&E and institutional development (r = .714, p < .001). This aligns with the Theory of Change (Weiss, 1995), where well-monitored implementation leads to intermediate results, such as structures that meet specifications, and then to longer-term institutional development. Under General Systems Theory (von Bertalanffy, 1968), monitoring serves as a feedback mechanism between grant inputs and institutional outputs. The stronger relationship with institutional development than with quality assurance may reflect that development, which covers instructional space, digital resources, and staff scholarship, depends more directly on whether projects are completed and tracked than quality assurance, which also depends on accreditation standards set outside the university. The descriptive results show where the system is weakest. Joint monitoring before tranche release was the strongest practice (M = 3.46), whereas digital project tracking (M = 2.18) and post-occupancy evaluation (M = 2.31) were rated lowest, and corrective feedback after site assessments was only marginally above the criterion mean (M = 2.68). Monitoring therefore appears strong at the point of fund release but weaker in continuously tracking projects and learning from completed projects. The low rating of digital tracking is notable given the 112.23% average time overrun reported for TETFund projects in South-West Nigeria (Ijigah et al., 2023), because continuous tracking is designed to detect schedule slippage early. The low post-occupancy evaluation rating aligns with Katuka et al.'s (2025) call for a maintenance culture, since evaluating how delivered spaces are actually used is a step toward maintaining them. Quality assurance and institutional development were rated moderately high (M = 3.09 and M = 3.16), and all items in Tables 2 and 3 exceeded the criterion mean. This aligns with the positive perception of TETFund projects' contribution to universities reported in North-Central Nigeria by Katuka et al. (2025) and suggests that respondents in the North-West also perceive a positive impact of infrastructure. Meanwhile,

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the lowest-rated items are enforcement of environmental safety and accessibility benchmarks (M = 2.75) and the link between monitored research grants and published scholarship (M = 2.95), suggesting that some benefits are not as safe as the numbers in the headlines suggest.

Implications of the Findings

1. The results suggest that TETFund and the universities should not stop monitoring when the fund is released but should continue throughout a project's life.
2. Digital tracking would allow delays to be identified earlier
3. structured feedback would ensure site assessments lead to corrective action,
4. post-occupancy evaluation would indicate whether the completed facilities meet the needs of those intended to use them.

These steps align with Oluchukwu and Pillah's (2025) recommendations to institutionalize M&E within public agencies and train officials on M&E metrics. The findings support the view that monitoring serves as a feedback link in the university system and as a link in processes of intervention and institutional change.

Conclusion

There is a positive and significant relationship between monitoring and evaluation of TETFund projects and quality assurance and institutional development in the federal universities studied. Pre-release monitoring of the joint was well established, but it placed less emphasis on digital monitoring, corrective feedback, and post-occupancy evaluation. Improving these areas will likely bolster the universities' long-term academic capacity through intervention funds.

Recommendations

1. Further, there is a need for an effective digital project-tracking system to track the project schedule and milestones, as this was the lowest-rated practice in this study, which can be adopted by the beneficiary universities and TETFund.
2. The projects that have been accomplished should be subjected to formal post-occupancy evaluations before the next cycle of interventions by TETFund, as this practice was among the lowest rated.
3. Universities should establish procedures to give corrective feedback following the site assessment, and provide a clear timeframe for responding to the results.
4. Strengthen Laboratory verification of structural materials prior to installation – This was considered to be the least effective control before installation; therefore, universities should strengthen this process.

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Effect of Virtual Laboratory Simulation on Students' Conceptual Understanding of Chemistry among Senior Secondary Schools in Delta State, Nigeria

IMONIWE, Omomaro Thompson[1]
omomaroi@delsu.edu.ng
08035538252

OYOVWE, Sylvia Onotaghogho[1]
Onataghoghoo@delsu.edu.ng
08067218626

[1]Faculty of Education, Department of Science Education, Delta State University, Abraka, Delta State, Nigeria

Abstract

This study examined the effect of virtual laboratory simulation and the conventional teaching method on students' conceptual understanding of Chemistry in senior secondary schools in Delta State. The study adopted a pretest–posttest non-equivalent control group design, a quasi-experimental design structured into a 2 × 2 factorial matrix involving teaching methods (virtual laboratory simulation and conventional teaching) and gender (male and female). Three research questions and three hypotheses guided the study. The population comprised 62,527 students in public secondary schools in Delta State. A sample of 250 students was selected using a multistage sampling technique from four public secondary schools. Data were collected using the researcher-developed Chemistry Conceptual Understanding Test (CCUT), consisting of 40 multiple-choice items designed to assess students in the department of Science Education and Measurement and Evaluation at Delta State University, Abraka. Its reliability was established using the test–retest method, yielding a coefficient of 0.84. Data collection lasted six weeks and involved pretest administration, treatment, and post-test administration. Mean and standard deviation were used to answer the research questions, while Analysis of Covariance (ANCOVA) and Two-Way ANCOVA were used to test the hypotheses at the 0.05 level of significance. The findings revealed that virtual laboratory simulation significantly enhanced students' conceptual understanding of Chemistry compared with the conventional teaching method, while gender had no significant effect. The study recommended greater adoption of virtual laboratory simulation in Chemistry instruction.

Keywords: Virtual Laboratory Simulation, Conceptual Understanding, Chemistry, Gender.

Introduction

Chemistry is a branch of science concerned with the composition, structure, properties, and transformations of matter. Sparks (2018) explained that chemistry examines the properties of matter and the changes it undergoes, including the interactions between substances during chemical reactions. Chemistry is an important science subject because it provides the foundation for understanding natural phenomena and contributes to developments in medicine, agriculture, environmental management, industrial production, and technology. In Nigerian secondary schools, Chemistry equips students with scientific knowledge, practical skills, critical thinking abilities, and problem-solving competencies required for further education and everyday life. It also helps learners understand processes such as combustion, corrosion, acid-base reactions, and the composition of substances. Despite its importance, Chemistry involves abstract concepts, chemical symbols, equations, molecular structures, and processes that may be difficult for students to understand. These challenges can affect students' ability to relate theoretical knowledge to practical situations and develop meaningful conceptual understanding. Consequently, there is a need for effective instructional approaches that make Chemistry concepts more concrete, interactive, and accessible to learners. One of the major challenges in Chemistry education is helping students understand abstract concepts that cannot be directly observed. Concepts such as atomic structure, chemical bonding, molecular interactions, electrolysis, and chemical equilibrium require learners to connect observable phenomena with explanations at the microscopic and symbolic levels. When instruction relies heavily on verbal explanations, note-taking, and memorisation, students may acquire factual knowledge without understanding the underlying chemical principles. Holme et al. (2015) emphasised that conceptual understanding in Chemistry involves more than memorising information or applying mathematical procedures; it requires students to explain chemical phenomena, solve problems, transfer knowledge to new situations, and relate different representations of chemical concepts. In Nigeria, Avwiri and Odiri (2025) investigated the effects of virtual laboratory experiments on Chemistry students' achievement in Delta State. Their findings indicated that students taught using virtual laboratory experiments performed better than those taught through the

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demonstration teaching method. The researchers recommended greater integration of technology into Chemistry instruction, particularly where inadequate laboratory facilities limit practical activities. These findings highlight the need to explore instructional strategies that promote deeper understanding of Chemistry concepts among senior secondary school students.

Conventional teaching method refers to a teacher-centred approach in which teachers present information through explanations, lectures, demonstrations, and note-taking, while students mainly listen and follow instructions. According to Onyekpe and Ogbemudiare (2025), the conventional teaching method refers to the traditional lecture-based approach in which the teacher presents lesson content through verbal explanations and classroom instruction, while pupils mainly listen, take notes, and receive information with limited direct experiential learning or active participation. In Chemistry education, this approach may limit students' active exploration of abstract concepts when emphasis is placed on memorisation rather than conceptual understanding. Ahmad et al. (2023), in a systematic review and meta-analysis of effective pedagogical approaches in high school Chemistry education, found that approaches promoting problem-solving and active learning were more effective than conventional lecture-based practices in supporting students' learning. Similarly, in the present study conventional teaching serves as the comparison method for determining whether virtual laboratory simulation better enhances students' conceptual understanding of Chemistry in senior secondary schools in Delta State. In response to the challenges associated with conventional Chemistry instruction, educational researchers have increasingly advocated technology-supported and learner-centred approaches. One such approach is virtual laboratory simulation. Virtual laboratory simulation refers to the use of computer-based digital environments to reproduce laboratory experiments and scientific processes, enabling learners to manipulate variables, observe outcomes, and explore concepts without necessarily using physical laboratory equipment. Tadesse (2026) explained that virtual laboratories provide interactive learning opportunities that connect theoretical knowledge with practical applications and can support students' engagement, learning outcomes, and laboratory skills. This approach allows students to repeat experiments, observe changes, investigate chemical reactions, and examine processes that may be difficult, expensive, or hazardous to demonstrate in a conventional laboratory. Meronda et al. (2025), in their systematic review of virtual laboratories in science education, reported that virtual laboratory activities can support conceptual understanding, analytical thinking, scientific literacy, and other learning outcomes. Similarly, Penn and Ramnarain (2019) found that students who used virtual laboratories achieved significantly higher Chemistry content-test scores than those who used traditional laboratory resources in their study. Virtual laboratory simulation therefore offers a promising instructional approach for making Chemistry learning more interactive and improving students' understanding of difficult chemical concepts.

Conceptual understanding is another important consideration in Chemistry education because it reflects students' ability to explain, interpret, and apply scientific ideas rather than merely memorise definitions or reproduce procedures. Hagos (2026) described conceptual understanding in Chemistry in terms of students' ability to demonstrate knowledge beyond routine calculations, including explaining phenomena, solving problems, and transferring knowledge to unfamiliar situations. In the context of this study, students' conceptual understanding of Chemistry refers to their ability to explain chemical principles, interpret chemical representations, establish relationships among concepts, and apply acquired knowledge to relevant problems. Developing such understanding is essential because chemistry concepts are interconnected, and misconceptions about foundational ideas may hinder the learning of more advanced topics. Virtual laboratory simulation may support conceptual understanding by providing visual representations of invisible chemical processes, opportunities for experimentation, immediate feedback, and repeated exploration of chemical phenomena. For instance, students can manipulate simulated experimental conditions and observe how changes in variables affect chemical reactions. Husnaini and Chen (2019) identified improvements in conceptual understanding and learning outcomes among students using virtual laboratories, while Penn and Ramnarain (2019) reported better Chemistry content-test performance following virtual laboratory instruction than traditional laboratory instruction. These findings provide a basis for examining whether virtual laboratory simulation can improve students' conceptual understanding of Chemistry in senior secondary schools in Delta State. In addition to instructional method, gender may be an important variable in understanding students'

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learning outcomes in Chemistry. Gender generally refers to socially influenced roles, expectations, and experiences associated with being male or female. In educational research, examining gender helps determine whether students respond differently to particular instructional approaches. Differences in prior learning experiences, confidence, classroom participation, and access to technological resources may influence how students engage with virtual laboratory activities. However, gender should not automatically be assumed to determine students' ability to understand scientific concepts. Oladejo et al. (2023), in their study titled *Gender difference in students' performance in chemistry - Can computer simulation bridge the gap?* examined the potential of computer simulation to address gender differences in Chemistry performance. Their work highlights the relevance of investigating how simulation-based instruction relates to students' learning outcomes across gender groups. Similarly, Kolil and Achuthan (2024) reported that their virtual laboratory instructional design helped reduce alternative conceptions among both male and female students. These findings suggest that virtual laboratory simulation may support conceptual learning among students of different genders, although its effects should be examined within specific educational contexts. Investigating gender alongside instructional method is therefore important for determining whether male and female students benefit similarly from virtual laboratory simulation and conventional teaching.

Ndukwe and Obafemi (2023) investigated *virtual laboratory and guided inquiry on students' performance in redox reaction in Rivers State*. The study adopted a quasi-experimental pretest–posttest non-equivalent group design involving 85 Senior Secondary School II students from three public secondary schools in Obio/Akpor Local Government Area, Rivers State. Data were collected using the chemistry performance test on redox reaction and analysed using mean, standard deviation, and analysis of covariance. The findings revealed that guided inquiry produced significantly better performance than virtual laboratory instruction, while gender differences and the interaction between teaching strategy and gender were not significant. The researchers recommended the use of guided inquiry and virtual laboratory strategies in Chemistry teaching. Ugonwa, Agbai, and Osuji (2024) examined *impact of virtual reality technology (VRT) on chemistry laboratory and learning outcomes of chemistry education students in nigerian universities*. Using a descriptive survey design, the researchers sampled 30 lecturers from the university of Port Harcourt and Rivers State university. Data were collected through a structured questionnaire and analysed using mean, standard deviation, and t-test. The findings indicated that virtual reality technology improved laboratory effectiveness, students' learning outcomes, and engagement in Chemistry education. The researchers recommended incorporating virtual reality technology into university chemistry laboratories to enhance teaching and learning. Ahmad et al. (2023) conducted a systematic review and meta-analysis titled *effective pedagogical approaches used in high school chemistry education*. They analysed 35 pedagogical approaches and compared their effects on students' learning performance. The findings showed that innovative instructional strategies generally improved chemistry learning compared with traditional teaching approaches, with problem-based learning demonstrating a particularly strong effect. The study recommended the adoption of evidence-based and learner-centred pedagogical approaches to improve Chemistry achievement. Although existing studies appears to have examined virtual laboratory experiments, Chemistry achievement, and the use of simulations in science education, further investigation is necessary to establish their effects on students' conceptual understanding in specific contexts. Avwiri and Odiri (2025) investigated Chemistry achievement in Delta State, while Penn and Ramnarain (2019) compared virtual and traditional laboratory learning in South Africa. Kolil and Achuthan (2024) also examined virtual laboratories as an approach to Chemistry laboratory education. Nevertheless, findings relating to achievement, practical skills, and conceptual understanding are not interchangeable, and evidence from one setting may not fully explain outcomes in another. There is therefore a need to examine the effect of virtual laboratory simulation on students' conceptual understanding of Chemistry in senior secondary schools in Delta State, compare the outcomes of students taught using virtual laboratory simulation and the conventional teaching method, and investigate the role of gender in these outcomes. Addressing these issues may provide useful evidence for Chemistry teachers, curriculum planners, and educational policymakers seeking effective ways to improve Chemistry teaching and learning.

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Purpose of the Study

The purpose of this study was to examine the effect of virtual laboratory simulation on students' conceptual understanding of Chemistry in senior secondary schools in Delta State. Specifically, the study seeks to:

1. determine the effect of virtual laboratory simulation on students' conceptual understanding of Chemistry in senior secondary schools in Delta State;
2. examine the difference in conceptual understanding of Chemistry between students taught using virtual laboratory simulation and those taught using the conventional teaching method;
3. investigate the effect of gender on students' conceptual understanding of Chemistry when taught using virtual laboratory simulation and the conventional teaching method.

Research Questions

This study was guided by the following research questions:

1. To what extent does virtual laboratory simulation influence students' conceptual understanding of Chemistry in senior secondary schools in Delta State?
2. What is the difference in conceptual understanding of Chemistry between students taught using virtual laboratory simulation and those taught using the conventional teaching method?
3. What is the effect of gender on students' conceptual understanding of Chemistry when taught using virtual laboratory simulation and the conventional teaching method?

Hypotheses

The following hypotheses were tested at the 0.05 level of significance:

1. There is no significant effect of virtual laboratory simulation on students' conceptual understanding of Chemistry in senior secondary schools in Delta State.
2. There is no significant difference in the conceptual understanding of Chemistry between students taught using virtual laboratory simulation and those taught using the conventional teaching method.
3. There is no significant effect of gender on students' conceptual understanding of Chemistry when taught using virtual laboratory simulation and the conventional teaching method.

Research Methodology

This study adopted the pretest–posttest non-equivalent control group design, a quasi-experimental design structured into a 2 × 2 factorial design matrix. The design involved two teaching methods (Virtual Laboratory Simulation and Conventional Teaching Method) and gender (male and female), enabling the researcher to examine their main and interaction effects on students' conceptual understanding of Chemistry. The population comprised 62,527 students in public secondary schools in Delta State. A total of 250 students participated in the study, selected through a multistage sampling technique. First, local government areas were selected from Delta State. Second, four public secondary schools were randomly selected from the sampled local government areas. Third, intact classes were selected to avoid disrupting normal school activities. The students were divided into an experimental group of 125 students taught using virtual laboratory simulation and a control group of 125 students taught using the conventional method. The instrument used for data collection was the researcher-developed Chemistry Conceptual Understanding Test (CCUT), comprising 40 multiple-choice items, each with four options (A–D) and one correct answer. The test assessed students' understanding of selected Chemistry concepts. Three experts in the department Science Education and Measurement and Evaluation at Delta State University, Abraka, validated the instrument. Its reliability was established using the test–retest method, yielding a coefficient of 0.84. Data collection lasted six weeks and involved three phases. In the first phase, the CCUT was administered to both groups as a pretest. In the second phase, the experimental group received instruction using virtual laboratory simulation, while the control group was taught the same Chemistry topics using the conventional method. In the third phase, the same 40-item test was administered as a post-test to assess students' conceptual understanding after the intervention. Thus, the instrument was administered twice to each group, once before and once after the treatment. Both groups were taught under the researcher's supervision to ensure consistency in content coverage. Permission was obtained from the relevant school authorities, and students' confidentiality was maintained. Mean and standard deviation were used to answer the research questions, while Analysis of Covariance (ANCOVA) was used to test the hypotheses, controlling for pretest scores. Two-

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way ANCOVA was used to examine the effects of teaching method and gender, as well as their interaction. All hypotheses were tested at the 0.05 level of significance using SPSS version 23.

Table 1: Design of the Study

Groups (Teaching Method)	Pretest	Treatment	Posttest
Experimental Group	O_1	X_1 (Virtual Laboratory Simulation)	O_2
Control Group	O_1	X_2 (Conventional Teaching Method)	O_2

Key:
(O_1) = Pretest measurement of students' conceptual understanding of Chemistry.
(O_2) = Posttest measurement of students' conceptual understanding of Chemistry.
(X_1) = Virtual laboratory simulation (experimental treatment).
(X_2) = Conventional teaching method (control treatment).
As specified earlier, treatment was administered to the experimental group, while the control group received no treatment. Consequently, differences observed in the post-test scores were attributed to the effects of the treatments.

Table 2: Sample Distribution by Teaching Method and Gender

Teaching Method	Gender	Sample Size (N)
Virtual Laboratory Simulation	Female	63
Virtual Laboratory Simulation	Male	62
Total (Virtual Laboratory Simulation)		125
Conventional Teaching Method	Female	62
Conventional Teaching Method	Male	63
Total (Conventional Teaching Method)		125
Grand Total		250

Source: Field Survey

Research Question 1:

To what extent does virtual laboratory simulation influence students' conceptual understanding of Chemistry in senior secondary schools in Delta State?

Table 3: Descriptive Statistics of Mean and Standard Deviation Showing the Extent of Students' Conceptual Understanding of Chemistry When Exposed to Virtual Laboratory Simulation in Senior Secondary Schools in Delta State

Groups	N	Mean	Std. Deviation
Virtual Laboratory Simulation	125	58.17	16.124
Conventional Teaching Method	125	47.45	20.507
Total	250		

Table 3 presents the descriptive statistics, including the mean and standard deviation, on the extent to which virtual laboratory simulation influences students' conceptual understanding of Chemistry in senior secondary schools in Delta State. The results show that students exposed to virtual laboratory simulation had a mean score of 58.17 with a standard deviation of 16.12, while students taught using the conventional teaching method had a mean score of 47.45 with a standard deviation of 20.51. Students exposed to virtual laboratory simulation scored noticeably higher on average than those taught

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using the conventional teaching method (58.17 vs. 47.45), indicating that virtual laboratory simulation appears to promote better conceptual understanding of Chemistry. Furthermore, the lower standard deviation among students exposed to virtual laboratory simulation suggests that their scores were less dispersed than those of students taught using the conventional teaching method. To determine whether the observed difference is statistically significant, Hypothesis 3 was tested using analysis of covariance (ANCOVA).

Hypothesis 1:

There is no significant effect of virtual laboratory simulation on students' conceptual understanding of Chemistry in senior secondary schools in Delta State.

Table 4: Analysis of Covariance (ANCOVA) of the Effect of Virtual Laboratory Simulation on Students' Conceptual Understanding of Chemistry in Senior Secondary Schools in Delta State

Source	Type III Sum of Squares	df	Mean Square	F	Sig.	Partial Eta Squared
Corrected Model	40920.367	2	20460.184	895.153	.000	.939
Intercept	46.418	1	46.418	2.031	.157	.017
Pretest	37474.959	1	37474.959	1639.567	.000	.933
Virtual Laboratory Simulation	173.330	1	173.330	7.583	.007	.061
Error	2674.225	247	22.857			
Total	378241.000	250				
Corrected Total	43594.592	249				

Note. \(R^2 = .939\); adjusted \(R^2 = .938\).

Table 4 presents the analysis of covariance (ANCOVA) results for the effect of virtual laboratory simulation on students' conceptual understanding of Chemistry in senior secondary schools in Delta State. Preliminary checks should be conducted to ensure that there are no violations of the assumptions of normality, linearity, homogeneity of variances, homogeneity of regression slopes, and reliable measurement of the covariate. The result reveals that the F-value for virtual laboratory simulation is 7.583, with degrees of freedom of 1 and 247, a significance value of .007, and an alpha level of 0.05. Since $p < .05$, the null hypothesis is rejected. The partial eta squared value of .061 indicates that virtual laboratory simulation accounts for approximately 6.1% of the variance in students' conceptual understanding of Chemistry after controlling for pretest scores. This implies that virtual laboratory simulation has a statistically significant effect on students' conceptual understanding of Chemistry in senior secondary schools in Delta State. The implication of this result is that the use of virtual laboratory simulation significantly influences students' conceptual understanding of Chemistry. Therefore, virtual laboratory simulation appears to be an effective instructional approach for promoting students' conceptual understanding of Chemistry compared with conventional teaching, although the direction and magnitude of the adjusted group difference should be confirmed using the adjusted means.

Research Question 2: What is the difference in conceptual understanding of Chemistry between students taught using virtual laboratory simulation and those taught using the conventional teaching method?

Table 5: Descriptive Statistics of Mean and Standard Deviation Showing Differences in Students' Conceptual Understanding of Chemistry When Exposed to Virtual Laboratory Simulation and the Conventional Teaching Method in Senior Secondary Schools in Delta State

Groups	N	Mean	Std. Deviation
Virtual Laboratory Simulation	125	58.17	16.124
Conventional Teaching Method	125	47.45	20.507
Total	250		

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The results in Table 5 show the mean scores and standard deviations of students' conceptual understanding of Chemistry when exposed to virtual laboratory simulation and the conventional teaching method in senior secondary schools in Delta State. The result shows that students taught using virtual laboratory simulation had a mean score of 58.17 and a standard deviation of 16.124, while students taught using the conventional teaching method had a mean score of 47.45 and a standard deviation of 20.507. The descriptive results indicate that students taught using virtual laboratory simulation performed better in conceptual understanding of Chemistry than those taught using the conventional teaching method, with a mean difference of 10.72. Furthermore, the lower standard deviation of 16.124 for the virtual laboratory simulation group suggests that their scores were less dispersed around the mean than those of students taught using the conventional teaching method. To determine whether the observed difference is statistically significant, the corresponding null hypothesis was tested using analysis of covariance (ANCOVA).

Hypothesis 2:

There is no significant difference in the conceptual understanding of Chemistry between students taught using virtual laboratory simulation and those taught using the conventional teaching method.

Table 6: Analysis of Covariance (ANCOVA) of the Difference in Students' Conceptual Understanding of Chemistry between Virtual Laboratory Simulation and Conventional Teaching Method

Source	Type III Sum of Squares	df	Mean Square	F	Sig.	Partial Eta Squared
Corrected Model	18452.680	2	9226.340	148.562	.000	.546
Intercept	1246.315	1	1246.315	20.071	.000	.075
Pretest	15328.420	1	15328.420	246.827	.000	.500
Teaching Method	1024.260	1	1024.260	16.494	.000	.063
Error	15330.720	247	62.067			
Total	428965.000	250				
Corrected Total	33783.400	249				

Note. R Squared = .546 (Adjusted R Squared = .542).

Table 6 presents the analysis of covariance (ANCOVA) of the difference in students' conceptual understanding of Chemistry between those taught using virtual laboratory simulation and those taught using the conventional teaching method in senior secondary schools in Delta State. Preliminary checks should be conducted to ensure that there are no violations of the assumptions of normality, linearity, homogeneity of variances, homogeneity of regression slopes, and reliable measurement of the covariate. The result reveals that the F-value for teaching method is 16.494, with degrees of freedom of 1 and 247, and a significance value of .000 ($p < .001$), at the 0.05 level of significance. Since $p < .05$, the null hypothesis was rejected. The partial eta squared value of .063 indicates a moderate effect size, suggesting that teaching method accounts for approximately 6.3% of the variance in students' conceptual understanding of Chemistry after controlling for pretest scores. This implies that there is a statistically significant difference in the conceptual understanding of Chemistry between students taught using virtual laboratory simulation and those taught using the conventional teaching method. The implication of this result is that the instructional method significantly influences students' conceptual understanding of Chemistry.

Research Question 3:

What is the effect of gender on students' conceptual understanding of Chemistry when taught using virtual laboratory simulation and the conventional teaching method?

Table 7: Descriptive Statistics of Mean and Standard Deviation Showing the Effect of Gender on Students' Conceptual Understanding of Chemistry When Taught Using Virtual Laboratory Simulation and the Conventional Teaching Method

Gender	Teaching Method	N	Mean	Std. Deviation
Female	Virtual Laboratory Simulation	63	61.93	20.460

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Female	Conventional Teaching Method	62	47.03	20.746
Male	Virtual Laboratory Simulation	62	53.10	23.030
Male	Conventional Teaching Method	63	47.87	20.611
Total		250		

The results in Table 7 present the mean scores and standard deviations for the effect of gender on students' conceptual understanding of Chemistry when taught using virtual laboratory simulation and the conventional teaching method in senior secondary schools in Delta State. The results show that female students taught using virtual laboratory simulation obtained a mean score of 61.93 and a standard deviation of 20.46, while female students taught using the conventional teaching method obtained a mean score of 47.03 and a standard deviation of 20.75. Similarly, male students taught using virtual laboratory simulation obtained a mean score of 53.10 and a standard deviation of 23.03, while male students taught using the conventional teaching method obtained a mean score of 47.87 and a standard deviation of 20.61. The descriptive results suggest that female students obtained higher mean scores than male students when taught using virtual laboratory simulation, while male and female students obtained relatively similar mean scores under the conventional teaching method. Specifically, the mean difference between female and male students under virtual laboratory simulation was 8.83 points, compared with 0.84 points under the conventional teaching method. These results suggest that the observed differences in students' conceptual understanding of Chemistry varied according to gender and teaching method. However, a two-way analysis of covariance (ANCOVA), controlling for pretest scores, is required to determine whether the effect of gender and its interaction with teaching method are statistically significant.

Hypothesis 3:

There is no significant effect of gender on students' conceptual understanding of Chemistry when taught using virtual laboratory simulation and the conventional teaching method.

Table 8: Analysis of Covariance (ANCOVA) of the Effect of Gender on Students' Conceptual Understanding of Chemistry When Taught Using Virtual Laboratory Simulation and the Conventional Teaching Method

Source	Type III Sum of Squares	df	Mean Square	F	Sig.	Partial Eta Squared
Corrected Model	54074.666	4	13518.667	630.100	.000	.956
Intercept	171.883	1	171.883	8.011	.005	.065
Pretest	49853.700	1	49853.700	2323.663	.000	.953
Gender	36.432	1	36.432	1.698	.195	.015
Teaching Method	127.023	1	127.023	5.920	.017	.049
Gender × Teaching Method	3.612	1	3.612	0.168	.682	.001
Error	2467.300	245	10.071			
Total	387082.000	250				
Corrected Total	56541.967	249				

Table 8 presents the analysis of covariance (ANCOVA) of the effect of gender on students' conceptual understanding of Chemistry when taught using virtual laboratory simulation and the conventional teaching method in senior secondary schools in Delta State. Preliminary checks should be conducted to ensure that the assumptions of ANCOVA are met. The result reveals that the F-value for gender is 1.698, with degrees of freedom of 1 and 245, and a significance value of .195 ($p > .05$), at the 0.05 level of significance. Since $p > .05$, the null hypothesis was not rejected. The partial eta squared value of .015 indicates a small effect size. This implies that gender has no statistically significant effect on students' conceptual understanding of Chemistry. The interaction between gender and teaching method is also not significant, ($F(1,245)=0.168$, $p=.682$), indicating that the effect of teaching method does not significantly differ by gender.

Discussion of Findings

The findings of this study revealed that virtual laboratory simulation had a significant effect on students' conceptual understanding of Chemistry. This suggests that virtual laboratory simulation is an effective instructional approach for

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helping students understand Chemistry concepts through interactive experiments and visual representations of abstract ideas. The implication is that Chemistry teachers should incorporate virtual laboratory simulation into their lessons to improve students' conceptual understanding, particularly where access to physical laboratory facilities is limited. This finding aligns with Kolil and Achuthan (2024), who reported that virtual laboratories can improve students' conceptual understanding and laboratory learning in Chemistry. Similarly, the finding is supported by Olakanmi (2015), whose study showed that students taught rates of chemical reaction using web-based computer simulation demonstrated better conceptual understanding than those taught through the traditional approach. These findings reinforce the view that simulation-based learning can make abstract Chemistry concepts easier for students to understand. The findings further revealed that students taught using virtual laboratory simulation demonstrated better conceptual understanding of Chemistry than those taught using the conventional teaching method. This suggests that virtual laboratory simulation provides learning experiences that may be less available through conventional teacher-centred instruction alone. The implication is that Chemistry teachers should use virtual laboratory simulation to supplement conventional teaching and provide students with opportunities to observe, explore, and interact with simulated chemical processes. This finding aligns with Avwiri and Odiri (2025), who found that students taught Chemistry using virtual laboratory experiments achieved better results than those taught using the demonstration teaching method. Similarly, the finding is supported by Penn and Ramnarain (2019), whose comparative study of virtual and traditional Chemistry laboratory learning indicated that virtual laboratory activities can enhance students' learning outcomes. These studies support the use of virtual laboratory simulation as a useful strategy for improving students' conceptual understanding of Chemistry.

The findings revealed that gender did not have a significant effect on students' conceptual understanding of Chemistry when taught using virtual laboratory simulation and the conventional teaching method. This suggests that male and female students can benefit from these instructional approaches without a statistically significant overall difference attributable to gender. The implication is that Chemistry teachers should provide equal opportunities for male and female students to participate in virtual laboratory activities and should select instructional strategies based on their educational value rather than assumptions about gender. This finding aligns with Oladejo et al. (2023), who reported that computer simulation could support Chemistry learning without producing a statistically significant gender difference in students' performance. Similarly, the finding is supported by the study reported by Bazie et al. (2024), which found no statistically significant gender difference in academic performance among undergraduate Chemistry students exposed to virtual laboratory instruction. These findings suggest that virtual laboratory learning can be beneficial to both male and female students.

Conclusion

The study investigated the effect of virtual laboratory simulation, the difference between virtual laboratory simulation and conventional teaching methods, and the effect of gender on students' conceptual understanding of Chemistry in senior secondary schools in Delta State. The findings indicate that instructional method plays an important role in students' conceptual understanding, with virtual laboratory simulation proving more effective than the conventional teaching method. The study also revealed that gender had no significant effect on students' conceptual understanding of Chemistry, suggesting that the effectiveness of instruction does not differ significantly between male and female students. It can therefore be concluded that virtual laboratory simulation is an effective and inclusive instructional approach for enhancing students' conceptual understanding of Chemistry in senior secondary schools in Delta State.

Recommendations

Based on the findings of this study, the following recommendations are made:

1. Chemistry teachers should adopt virtual laboratory simulation more frequently to enhance students' conceptual understanding of Chemistry, particularly abstract and difficult chemical concepts.
2. Curriculum planners should incorporate virtual laboratory simulation activities into the senior secondary school Chemistry curriculum to promote interactive and technology-supported learning.
3. School administrators and the Delta State Ministry of Education should provide adequate funding, digital facilities, appropriate simulation software, and teacher training to facilitate the effective use of virtual laboratory simulation in Chemistry instruction.

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Effects of Model-Lead-Test Strategy on Interest and Performance in Ecology Concept among Secondary School Biology Students in Tudun Wada Local Government Area, Kano State, Nigeria

SAIDU, Abba[1]
saiduabba1027@gmail.com
+2348036471421

BASHIR, Wada[2]
wadabashir1@gmail.com
+2348037880889

BUHARI, Nuhu Idris[3]
nuhubuharii@gamail.com
+2348065029298

[1] Department of Natural Science Education, University of Science and Technology Education, Wudil Kano State, Nigeria
[2]Department of Educational Foundation, University of Science and Technology Education, Wudil Kano State, Nigeria
[3]Faculty of Science & Technology Education, University of Science and Technology Education, Wudil Kano State, Nigeria

Abstract

This study examined the difference in interest and academic performance between senior secondary school students taught selected Ecology concepts through the Model-Lead-Test (MLT) instructional strategy and students taught the same concepts through the conventional lecture method in Tudun Wada Local Government Area, Kano State, Nigeria. A quasi-experimental pretest–posttest control-group design was adopted. The study involved 128 Senior Secondary II Biology students: 65 in the MLT group and 63 in the control group. Data were collected using a Biology Performance Test (BPT) and a Biology Students' Interest Questionnaire (BSIQ). Descriptive statistics and independent-samples t-tests were used for data principal analyses. The descriptive results show a higher mean interest score for the MLT group (M = 3.92, SD = 0.42) than the control group (M = 3.25, SD = 0.51), and a higher mean performance score for the MLT group (M = 68.25, SD = 8.50) than the control group (M = 61.10, SD = 7.90). Data collected were analyzed using mean, standard deviation, and t-test statistics to answer the research questions and tested the hypotheses at the 0.05 level of significance. Findings revealed that students taught using the MLT instructional strategy shows higher interest level and performed significantly better in Biology concepts than those taught using lecture method. The study concludes that the MLT approach enhances learning and students' interest. The study recommends that teachers, curriculum planners, and professional bodies such as STAN should adopt the strategy to improve Biology teaching and learning.

Keywords: academic performance; Biology; Ecology, Model-Lead-Test; students' interest

Introduction

Science education supports students' development of scientific knowledge, evidence-based reasoning, and problem-solving skills. Biology is an important senior secondary school subject because it introduces students to living systems and provides foundational knowledge relevant to health, agriculture, environmental studies, and other biological disciplines. Effective Biology teaching therefore requires approaches that help students understand concepts and remain engaged in learning. Students' interest is an important affective dimension of learning. It can support attention, engagement, and persistence, although it develops through interactions between students and their learning environments (Hidi & Renninger, 2006). In Biology classrooms, instructional approaches that involve students in purposeful activity, explanation, and feedback may help sustain interest. Onu, Anyaegbunam and Uzoigwe (2020), for example, reported that students taught Biology through a collaborative instructional strategy showed stronger interest and achievement than students taught using convention method such as lecture method. Awosika and Okoli (2023) also investigated mind-mapping instruction as a means of supporting students' academic interest in Biology. Academic performance reflects students' demonstrated learning as measured through assessments. Performance may be affected by methods of instruction, opportunities to practice, prior knowledge, learning resources, and the quality of feedback. Evidence from active-learning research suggests that learner

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participation can support learning outcomes. For example, Taraban et al. (2007) examined active-learning experiences in high-school Biology, while Freeman et al. (2014) reported higher examination performance under active learning than traditional method across a broad range of science, technology, engineering and mathematics studies. Similarly, Adogbeji (2026) in his work titled: Effects of Scaffolding on Biology Students' Achievements and Motivations in Secondary Schools in Delta Central Senatorial District, reported higher achievement and motivation among students taught using scaffolding than among those taught using the conventional lecture method. This is useful supporting evidence for considering structured, guided instruction in Biology as seen in MLT instructional strategy. The Model-Lead-Test instructional strategy follows a structured progression. That is the teacher models a task or process, students practice with guidance, and students then demonstrate their understanding or skill independently. The sequence is intended to make expectations explicit and provide opportunities for guided practice and independent application. Previous studies have examined MLT in subjects such as Organic Chemistry and Mathematics (Itikpo et al., 2021; Obaje et al., 2025), but evidence from secondary school Biology in Tudun Wada Local Government Area remains limited in the field of MLT application. The present study therefore investigates the effect of MLT instructional strategy on interest and academic performance of Biology students in Tudun Wada local government area, Kano state.

Statement of the Problem

Biology is an important science subject in Nigerian secondary schools because it provides learners with knowledge of living organisms, their interactions with the environment and the biological principles underlying health, agriculture and environmental sustainability. The effective teaching of Biology requires instructional strategies that promote students' understanding, interest and ability to apply biological concepts. However, where teaching is predominantly teacher-centered and provides limited opportunities for active participation, guided practice and independent application, students may experience difficulties in developing meaningful understanding and sustained interest in the subject. Several researchers (Onu et al, 2020) have investigated alternative instructional strategies for improving students' interest and academic achievement in Biology. Other studies have also examined learner-centered approaches, including scaffolding and inquiry-based instruction, with findings suggesting that instructional strategies can influence students' learning outcomes. These studies underscore the importance of identifying effective approaches to Biology teaching. The Model-Lead-Test (MLT) instructional strategy offers a structured approach involving teacher modelling, guided learner practice and independent performance. Okwelle and Omeodu (2016) discussed its potential for improving Physics instruction in Nigerian secondary schools, while Itikpo, Friday and Delmang (2021) reported a significant effect of MLT on students' achievement in organic Chemistry in Benue State. Uzenda, Imoko and Atovigba (2024) also investigated MLT in relation to students' interest in Algebra. Although these studies provide relevant evidence, their findings do not establish the effectiveness of MLT for teaching Biology, particularly selected Ecology concepts. The effectiveness of MLT in promoting both students' interest and academic performance in Biology within Tudun Wada Local Government Area, Kano State, therefore, requires empirical investigation. Specifically, it is necessary to determine whether students taught using MLT differ significantly from those taught using the conventional lecture method in their interest in Biology and academic performance in selected Ecology concepts. The problem of this study is, therefore, the insufficient empirical evidence on the effectiveness of Model-Lead-Test instructional strategy in improving students' interest and academic performance in selected Ecology concepts in Biology in Tudun Wada Local Government Area, Kano State. The study seeks to address this gap by comparing the learning outcomes of students exposed to MLT with those taught using the conventional lecture method.

Objectives of the Study

The objectives of this study are to:

1. Determine the difference in interest between students taught Biology concepts using MLT and those taught the same concepts using the lecture method.
2. Determine the difference in academic performance between students taught Biology concepts using MLT and those taught the same concepts using the lecture method.

Research Questions

The following questions were formulated to guide the study:

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1. What is the difference between the interest levels of students taught Biology concepts using MLT and those taught the same concepts using the lecture method?
2. What is the difference between the mean academic performance scores of students taught Biology concepts using MLT and those taught the same concepts using the lecture method?

Null Hypotheses

The following null hypotheses are to be tested at the 0.05 level of significance:

H_{01}: There is no statistically significant difference in the interest scores of students taught Biology concepts using MLT and those taught the same concepts using the lecture method.

H_{02}: There is no statistically significant difference in the mean academic performance scores of students taught Biology concepts using MLT and those taught the same concepts using the lecture method.

Research Methodology

The study used a quasi-experimental pretest–posttest non-equivalent control-group design. Intact classes were used rather than randomly assigning individual students to conditions. The experimental group received instruction through MLT, while the control group received instruction through the conventional lecture method. Both groups were subjected to pretests before the intervention and posttests thereafter.

The design is represented as follows:

Experimental group: O_1 — X_1 — O_2

Control group: O_3 — X_0 — O_4

O_1 and O_3 represent pretests; X_1 represents MLT instruction; X_0 represents conventional instruction; and O_2 and O_4 represent posttests.

The population of the study comprised 1,114 Senior Secondary II students offering Biology in public secondary schools in Tudun Wada Local Government Area during the 2024/2025 academic session, including 708 male and 406 female students. The sample comprised 128 students, with 65 in the experimental group and 63 in the control group. A sample size of 128 students was used for the study. One intact class was used in each of the selected schools for both experimental and control groups. Using simple random sampling technique, four schools were selected. These schools were pretested and the results obtained were subjected to ANOVA test and thereafter Scheffes' test to determine two groups that were statistically insignificant in their ability. Simple random sampling technique (balloting method) was used to assign the groups as experimental and control group respectively. The instruments for data collection were Biology Performance Test (BPT) with 30 multiple-choice questions adapted from past question papers of West African Examination Council (WAEC) and National Examinations Council (NECO) 2018-2023, and Biology Students Interest Questionnaire (BSIQ) adapted from Xuans (2020). The BSIQ instrument is a 5-point Likert scale (Strongly Agree, Agree, Undecided, Disagree and Strongly Disagree) meant to determine the level of students' interest in Ecology concepts. The two instruments were reviewed for face and content validity by experts in science education from Aliko Dangote University of science and Technology Wudil, Kano, and an experienced secondary school Biology teacher. Their corrections, suggestions, and recommendations regarding the face and content validity of the instruments were effected and used to produce the final version of the instruments. The instruments BAT and BSIQ were also tested for reliability using PPMC and found to be 0.97 and 0.82 respectively.

Presentation of Results

The results for this study are presented as follows:

Research Question 1: What is the difference between the interest levels of students taught Biology concepts using MLT and those taught the same concepts using the lecture method?

Descriptive statistics of mean and Standard Deviation were used to answer the research question and the summary of the result is presented in Table 1

Table 1: Mean and Standard Deviation Posttest of EG and CG Interest level

Group	N	Mean	SD	MD
EG	65	3.92	0.42	
				0.67

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CG	63	3.25	0.51

The reported posttest mean interest score was higher in the MLT group (M = 3.92, SD = 0.42) than in the lecture group (M = 3.25, SD = 0.51), a mean difference of 0.67 in favour of the experimental group. This implied that the treatment appears to have effect on the experimental group.

Hypothesis 1: There is no statistically significant difference in the mean interest scores of students taught Biology concepts using MLT and those taught the same concepts using the lecture method.

Table 2: t-test Analysis of Posttest Mean Scores of the EG and CG

Group	N	Mean	SD	Df	T	P	Remark
EG	65	3.92	0.42				
				126	6.78	0.000	Sig
CG	63	3.25	0.51				

Significant at p ≤ 0.05

Table 2 shows that the t-test 6.78, and p-value 0.000 at degree of freedom 126. Since the p-value is 0.000 at 0.05, it means that there is a significant difference in favour of the experimental group exposed to MLT teaching strategy. With this result, the null hypothesis 1 is rejected.

Research Question 2: What is the difference between the mean academic performance scores of students taught Biology concepts using MLT and those taught the same concepts using the lecture method?

Descriptive statistics of mean and Standard Deviation were used to answer the research question and the summary of the result is presented in Table 3

Table 3: Mean and SD of Posttest of EG and CG on Academic Performance

Group	N	Mean	SD	MD
EG	65	68.25	8.50	
				7.15
CG	63	61.10	7.90	

The reported posttest mean performance score was higher in the MLT group (M = 68.25, SD = 8.50) than in the lecture group (M = 61.10, SD = 7.90), a mean difference of 7.15 in favour of the experimental group. This implied that the treatment appears to have effect on the experimental group.

Hypothesis 2: There is no statistically significant difference in the mean academic performance scores of students taught Biology concepts using MLT and those taught the same concepts using the lecture method.

Table 4: t-test Analysis of Posttest Mean Scores of the EG and CG

Group	N	Mean	SD	Df	t	P	Remark
EG	65	68.25	8.50				
				126	3.85	0.000	Sig
CG	63	61.10	7.90				

Significant at p ≤ 0.05.

Table 4 shows that the t-test 3.85, and p-value 0.000 at degree of freedom 126. Since the p-value is 0.000 at 0.05, it means that there is a significant difference in favour of the experimental group exposed to MLT teaching strategy. With this result, the null hypothesis is rejected.

Discussion of Findings

The descriptive findings in Table 2 indicate higher posttest interest scores among students taught with MLT than among students taught through the lecture method. One plausible explanation is that the model–guided practice–independent performance sequence gives students clear examples, opportunities to participate, and structured practice. These features may help students feel more capable of engaging with Ecology concepts. This interpretation is consistent with literature

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that associates active participation and learner-centered approaches with students' interest. For instance Adebayo (2020) reported that active instructional strategies foster curiosity, interest and motivation in science learning. Furthermore, the significant improvement in students' interest aligns with the work of Okebukola and Jegede (2018), who reported that active participation and feedback promote students' interest, motivation and engagement in learning.

The result findings in experimental group, Table 4 also had a higher reported mean performance score than the lecture group. This could be as a result of modelling which can make a process or expected response explicit, guides practice, provides opportunities to correct misunderstandings, and independent practice which allows students to demonstrate learning. These features offer a plausible explanation for the mean difference obtained. The finding is broadly consistent with research on active learning in Biology and STEM education (Taraban et al., 2007; Freeman et al., 2014). Usman (2019) also reported in his study that active learner-centred instructional approaches significantly improve science performance compared to lecture methods.

Conclusion

Based on the findings of this study, the following conclusions were drawn:

1. Model-Lead-Test instructional strategy provides a structured and learner-centred approach capable of enhancing students' interest in Ecology concepts by involving them in modelling, guided practice and independent learning activities. The MLT was found to significantly improve students' interest.
2. Model-Lead-Test instructional strategy has the potential to improve students' academic performance in Ecology concepts by providing opportunities for active participation, practice, feedback and application of learned concepts.

Recommendations

1. Biology teachers should consider using MLT when teaching concepts that benefit from explicit demonstration, guided practice, and independent application, while adapting the strategy to lesson objectives and available resources.
2. Professional development for Biology teachers should include practical demonstrations of how to model concepts, guide student practice, and assess independent application.
3. Further studies should use clearly reported pretest-adjusted analyses, larger and more diverse samples, and transparent reporting of implementation procedures to examine whether the findings generalize to other Biology topics and locations.

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Correlation Between Life Skills Counselling and Youth Empowerment among Secondary School Students in Maiduguri Metropolis, Borno State, Nigeria

AMUDA, Bitrus Glawala[1]
Bitrusglawala01@gmail.com & bitrus.gamuda@kiu.edu.ng
08038887613
[1]Department of Education, Kashim Ibrahim University, Njmtilo, Maiduguri Borno State, Nigeria
NASIRU, Aishatu[2]
aishatusalako@gmai.com
07036104058
[2]Department of Education, University of Maiduguri, Borno State, Nigeria
Mustapha, Botul
antybotus@gmail.com[3]
08068216181
[3]Kashim Ibrahim University, Njmtilo, Maiduguri Borno State, Nigeria

Abstract

This study investigated the relationship between life skills counselling and youth empowerment among secondary school students in Maiduguri Metropolis, Borno State, Nigeria. The study adopted a descriptive survey research design. The population comprised Senior Secondary School II (SS II) students in public secondary schools in Maiduguri Metropolis, while a sample of 400 students was selected through a multistage sampling procedure. Data were collected using a researcher-developed instrument titled Life Skills Counselling and Youth Empowerment Questionnaire (LSCYEQ). The instrument was subjected to face and content validation by experts, while a reliability coefficient of 0.87 was obtained using Cronbach's Alpha. Data collected were analysed using mean, standard deviation, and Pearson Product Moment Correlation (PPMC), with the hypotheses tested at the 0.05 level of significance. The findings revealed that secondary school students reported a generally favourable level of life skills counselling, particularly in evaluating alternatives before acting, making better academic decisions, and developing confidence in making choices. The findings also indicated a generally high level of youth empowerment, particularly in leadership skills, employment-related skills, goal attainment, independent decision-making, and management of personal and academic life. Furthermore, the findings established a significant positive relationship between decision-making skills counselling and youth empowerment ($r = .531$, $p < .05$), communication skills counselling and youth empowerment ($r = .679$, $p < .05$), and overall life skills counselling and youth empowerment ($r = .547$, $p < .05$). The study concluded that life skills counselling is significantly associated with youth empowerment among secondary school students in Maiduguri Metropolis. It was recommended that school authorities and educational policymakers strengthen guidance and counselling services by providing adequate professional counsellors, functional counselling facilities, and structured life skills programmes focusing on decision-making, communication, interpersonal relations`hips, problem-solving, resilience, and leadership development.

Keywords: Life skills counselling; youth empowerment; decision-making skills; communication skills

Introduction

Education in the twenty-first century, the purpose, extends beyond academic achievement to include the acquisition of knowledge, values, attitudes, and practical competencies that enable individuals to function effectively in an increasingly complex and dynamic society. Adolescents in secondary schools are expected to develop the cognitive, emotional, social, and vocational competencies necessary to become productive citizens. Consequently, educational systems worldwide have increasingly integrated life skills education and counselling into school programmes to equip students with the competencies required to navigate personal, academic, and societal challenges (World Health Organization [WHO], 1997). Life skills counselling refers to a structured counselling intervention designed to equip individuals with psychosocial competencies and adaptive behaviours that enable them to effectively manage the demands and challenges of everyday life. These skills include self-awareness, empathy, effective communication, interpersonal relationship skills, decision-making, problem-solving, creative thinking, critical thinking, emotional regulation, and stress management. The World Health Organization (WHO, 1997) identifies life skills education as a framework for developing psychosocial competencies among children and adolescents. Through counselling sessions, students learn how to evaluate alternatives, solve problems rationally, manage interpersonal conflicts, regulate emotions, communicate effectively, and make responsible decisions. These competencies are increasingly recognised as essential for academic success, career

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development, psychological well-being, and social adjustment (Botvin & Griffin, 2014). In Nigeria, the importance of life skills development is reflected in the National Policy on Education, which recognizes guidance and counselling as an essential educational service for facilitating students' academic, vocational, personal, and social development (Federal Republic of Nigeria, 2014). Despite the policy provisions, many secondary schools continue to experience inadequate counselling services, limited counselling personnel, poor counselling facilities, and insufficient implementation of life skills programmes (Federal Republic of Nigeria, 2014). The need for life skills counselling is particularly evident in Maiduguri Metropolis, Borno State, where years of insurgency have significantly disrupted educational activities and adversely affected the psychosocial well-being of adolescents. Many students have experienced displacement, trauma, bereavement, insecurity, poverty, interruption of schooling, and psychological distress arising from armed conflict. These experiences often contribute to low self-esteem, anxiety, depression, poor decision-making, aggressive behaviour, and limited educational aspirations (UNICEF Nigeria, 2019). Without effective counselling interventions, such challenges may hinder students' capacity to develop resilience, confidence, leadership skills, and positive life outcomes. The relationship between life skills counselling and youth empowerment is supported by Bandura's (1986, 1997) Social Cognitive Theory, which emphasises that individuals develop competence and self-efficacy through observation, learning, and successful experiences. Life skills interventions are intended to strengthen personal and social competence. Botvin and Griffin (2014) discuss life skills training as an approach to preventing substance misuse and enhancing individual and social competence. Nasheeda et al. (2019) reviewed life skills education research and identified both promising contributions and important gaps in the evidence. Life skills counselling is founded on the belief that many adolescent behavioural problems—including substance abuse, examination malpractice, school violence, cultism, risky sexual behaviour, bullying, and poor career decisions—can be prevented through early acquisition of psychosocial competencies. Research has consistently shown that students who participate in life skills counselling programmes demonstrate higher levels of self-esteem, resilience, leadership ability, emotional intelligence, and academic engagement (Botvin & Griffin, 2014; WHO, 1997).

According to Zimmerman (2000), empowerment is a multidimensional construct involving psychological competence, perceived control, critical awareness, and active participation in community development. Empowered youths possess confidence in their abilities, believe they can influence their environment, and actively contribute to solving societal problems. The Commonwealth Secretariat (2016) published the Global Youth Development Index and Report, which provides a comparative framework for considering youth development. For the present study, youth empowerment is discussed as a multidimensional process involving perceived competence, control and participation (Zimmerman, 2000). Youth empowerment can be understood as a process involving competence, confidence, participation and the ability to influence decisions affecting one's life (Zimmerman, 2000). These components collectively prepare young people for productive adulthood and national development. Decision-making is one of the psychosocial competencies included in the WHO's (1997) life skills framework. Decision-making counselling encourages critical reflection, responsibility, self-control, and accountability. Hargie (2021) reviews research, theory and practice concerning interpersonal communication. Effective communication is relevant to students' ability to express ideas, develop relationships, seek assistance and participate in group activities.

Theoretical Framework

This study is anchored on Life Skills Theory (WHO, 1997). The principal theory underpinning this study is the Life Skills Theory, developed by the World Health Organization in 1993 and formally articulated in 1997 to promote psychosocial competence among adolescents. The theory was developed in response to increasing global concerns regarding adolescent health, substance abuse, violence, HIV/AIDS, and other behavioural challenges. The theory posits that individuals who possess essential life skills are better equipped to make healthy decisions, solve problems effectively, manage emotions, communicate successfully, and establish positive interpersonal relationships. According to WHO (1997), psychosocial competence refers to an individual's ability to deal effectively with the demands and challenges of everyday life. Nasheeda et al. (2019) investigated the effectiveness of life skills education among secondary school students in the Maldives using a mixed-method research design. The study involved 450 students selected through stratified random sampling. Data were collected using questionnaires, focus group discussions, and classroom observations. The findings indicated that life skills

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programmes significantly improved students' communication abilities, emotional regulation, critical thinking, decision-making, and interpersonal relationships. Students also demonstrated increased self-confidence and greater participation in school leadership activities. The empirical literature supports the relevance of life skills education to adolescent psychosocial development, although findings should be interpreted in light of differences in programme design and research quality. Nasheeda et al. (2019), in a systematic narrative review, identified life skills education as an important area for adolescent development and highlighted the need for stronger evaluation and more consistent research. Botvin and Griffin (2014) also describe life skills training as an approach intended to strengthen personal and social competence and prevent substance misuse. Evidence from north-eastern Nigeria underscores the need to consider students' psychosocial context when planning school-based support. UNICEF Nigeria's (2019) rapid needs assessment documented substantial psychosocial distress among children affected by conflict in the region, including anxiety-related concerns, irritability, sleep difficulties, withdrawal and problems with concentration. This report establishes a contextual need for appropriate psychosocial support; it should not be interpreted as an evaluation proving that a particular life skills counselling programme improved outcomes. The present study therefore addresses a local evidence gap by examining the association between life skills counselling and youth empowerment among secondary school students in Maiduguri Metropolis. Its correlational findings can indicate whether the measured variables are related, but they cannot by themselves establish that counselling caused changes in empowerment.

Statement of the Problem

The development of young people into responsible, productive, and self-reliant citizens remains a major objective of secondary education in Nigeria. Beyond academic achievement, schools are expected to equip students with the psychosocial competencies, decision-making abilities, interpersonal skills, and resilience required to cope with the complexities of modern society. However, despite the recognized importance of life skills counselling, many secondary school students continue to experience challenges that undermine their personal and social development. In recent years, adolescents in Nigerian secondary schools have been confronted with numerous developmental challenges, including poor decision-making, low self-esteem, peer pressure, substance abuse, examination malpractice, violence, bullying, emotional instability, unemployment anxiety, and poor career planning. These challenges are more pronounced in conflict-affected areas such as Maiduguri Metropolis, Borno State, where prolonged insurgency has exposed many students to trauma, displacement, poverty, family disruption, loss of educational opportunities, and psychological distress. Such experiences may weaken students' confidence, resilience, leadership abilities, interpersonal relationships, and capacity to make informed life choices, thereby limiting their overall empowerment. Several empirical studies have examined guidance and counselling services in relation to academic achievement, career choice, behavioural adjustment, mental health, and students' attitudes. However, there is a paucity of empirical studies that specifically investigate the relationship between life skills counselling and youth empowerment among secondary school students, particularly within the unique socio-economic and post-conflict context of Maiduguri Metropolis. This represents a significant gap in the literature. Furthermore, despite government policies advocating the integration of guidance and counselling services into the educational system, there is limited empirical evidence on the extent to which life skills counselling contributes to empowering secondary school students in Maiduguri Metropolis. It is against this background that this study seeks to investigate the relationship between life skills counselling and youth empowerment among secondary school students in Maiduguri Metropolis, Borno State.

Objectives of the Study

The objectives of the study are to determine the:

1. level of life skills counselling received by secondary school students in Maiduguri Metropolis.
2. level of youth empowerment among secondary school students in Maiduguri Metropolis.
3. relationship between life skills counselling and youth empowerment among secondary school students in Maiduguri Metropolis.
4. influence of decision-making skills counselling on youth empowerment among secondary school students in Maiduguri Metropolis.

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5. influence of communication and interpersonal relationship skills counselling on youth empowerment among secondary school students in Maiduguri Metropolis.

Research Questions

The following research question guided the study:

1. what is the level of life skills counselling received by secondary school students in Maiduguri Metropolis?
2. What is the level of youth empowerment among secondary school students in Maiduguri Metropolis?

Research Hypotheses

The following null hypotheses was tested at the 0.05 level of significance:

H_{01}: There is no significant relationship between decision-making skills counselling and youth empowerment among secondary school students in Maiduguri Metropolis.

H_{02}: There is no significant relationship between Communication skills counselling and youth empowerment among secondary school students in Maiduguri Metropolis.

H_{03}: there is no significant relationship between life skills counselling and youth empowerment among secondary school students in Maiduguri Metropolis.

Research Methodology

Research Design

This study adopted a descriptive survey research design. A descriptive survey design is appropriate because it enables the researcher to collect data from a representative sample of respondents and describe existing conditions regarding the influence of life skills counselling on youth empowerment among secondary school students without manipulating any variables. Creswell and Creswell (2023) describe survey research as a quantitative approach for collecting data from a sample to describe trends, attitudes or opinions in a population. The design is considered appropriate for this study because it enables the researchers to examine the influence of the independent variable (life skills counselling) on the dependent variable (youth empowerment) among secondary school students in Maiduguri Metropolis.

Population and Sample Size of the Study

The target population for this study comprises all Senior Secondary School II (SS II) students enrolled in public secondary schools in Maiduguri Metropolis during the 2026/2027 academic session. According to records obtained from the Borno State Ministry of Education, there are approximately 8,540 SS II students distributed across 32 public secondary schools in Maiduguri Metropolitan Council (MMC) and Jere Local Government Area. SS II students are selected because they are developmentally mature, have had sufficient exposure to school guidance and counselling services, and are actively making academic and career decisions. The sample size for the study was determined using the Krejcie and Morgan (1970) Sample Size Determination Table. Given a population of approximately 8,540 students, a minimum sample size of 367 respondents is adequate. To improve representativeness and account for possible non-response or incomplete questionnaires, the researcher increased the sample size to 400 students. A multistage sampling technique was employed. Stage One: Selection of Local Government Areas. Stage Two: Selection of Schools: Simple random sampling using the ballot method was employed to select 10 public secondary schools from the list of eligible schools within the metropolis. Proportionate sampling was used to allocate the number of respondents to each selected school based on student population. Finally, simple random sampling was used to select the required number of SS II students from each school.

Instrument for Data Collection

Data was collected using a researcher-developed questionnaire titled: Life Skills Counselling and Youth Empowerment Questionnaire (LSCYEQ). The questionnaire consisted of two sections. Section A obtained respondents' demographic information, including: Gender, Age, School and Class. Section B was measured the major variables of the study. The questionnaire contained 40 items. Responses will be measured on a four-point Likert scale: Strongly Agree (SA) = 4, Agree (A) = 3, Disagree (D) = 2 and Strongly Disagree (SD) = 1. The instrument undergone face and content validation. One expert in Educational Psychology, and Measurement and Evaluation, all from University of Maiduguri. A pilot study was conducted using 40 SS II students from a public secondary school outside the selected sample but with similar characteristics. The collected data was analysed using Cronbach's Alpha to determine the internal consistency of the instrument. A reliability coefficient of 0.87 was obtained.

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Method of Data Analysis

Data collected was coded, entered, cleaned, and analysed using the Statistical Package for the Social Sciences (SPSS), Version 29 (or a comparable current version). Descriptive statistics, including: frequencies, percentages, means, and standard deviations, was used to answer the research questions. Inferential statistics was used to test the hypotheses at the 0.05 level of significance. The analyses include: Test H01–H03 using Pearson Product Moment Correlation (PPMC).

Presentation of Results

Research questions one: what is the level of life skills counselling received by secondary school students in Maiduguri Metropolis?

Table 1: Mean and standard deviation distribution of the participants' responses on the level of life skills counselling received by secondary school students in Maiduguri Metropolis.

S/N	Statement	N	Mean	Std.D
1	Life skills counselling helps me make informed decisions.	400	1.07	.282
2	Counselling improves my ability to evaluate alternatives before acting.	400	3.27	.892
3	I can make better academic decisions because of counselling.	400	3.01	.778
4	Counselling has improved my confidence in making choices.	400	3.08	.765

Table the means ranged from 1.07 to 3.27. The statement that counselling improves students' ability to evaluate alternatives before acting recorded the highest mean of 3.27 with a standard deviation of 0.892. This indicates that students generally agreed that counselling had enhanced their ability to consider different alternatives before making decisions. The item "Counselling has improved my confidence in making choices" recorded a mean of 3.08 and standard deviation of 0.765. This suggests that counselling contributed positively to students' confidence in making choices. The statement "I can make better academic decisions because of counselling" obtained a mean of 3.01 and standard deviation of 0.778. This indicates general agreement that counselling assists students in making better academic decisions. It suggests that life skills counselling may have practical relevance to students' academic planning and adjustment.

Research questions two: What is the level of the youth empowerment among secondary school students in Maiduguri Metropolis?

Table 2: Mean and Standard deviation distribution of the participants' responses on the youth empowerment among secondary school students in Maiduguri Metropolis.

S/N	Statement	N	Mean	Std.D
1	I understand my goals and aspirations better.	400	3.05	.949
2	I feel capable of achieving my goals.	400	3.11	.877
3	I possess leadership skills needed for societal development.	400	3.47	.929
4	I actively participate in community and campus activities.	400	2.79	.688
5	I can independently make important life decisions.	400	3.04	.791
6	I am confident in my ability to overcome challenges.	400	2.69	1.082
7	I possess skills necessary for future employment.	400	3.33	.783
8	I feel empowered to contribute positively to society.	400	2.90	.804
9	I can effectively manage my personal and academic life.	400	3.01	.859

Table two indicates the highest mean was obtained for the statement "I possess leadership skills needed for societal development" (M = 3.47, SD = 0.929). This indicates a high level of perceived leadership competence among the students. The item "I possess skills necessary for future employment" recorded a mean of 3.33 (SD = 0.783), indicating that students generally perceived themselves as having relevant skills for future employment. Students also reported that they felt capable of achieving their goals (M = 3.11, SD = 0.877) and understood their goals and aspirations better (M = 3.05, SD = 0.949). These results suggest positive levels of goal orientation and self-efficacy. The mean of 3.04 for the ability to independently make important life decisions also indicates a generally favourable perception of personal autonomy. Similarly, students reported that they could effectively manage their personal and academic lives (M = 3.01, SD = 0.859). However, confidence in the ability to overcome challenges had the lowest mean (M = 2.69, SD = 1.082), followed by active participation in community and campus activities (M = 2.79, SD = 0.688). These results suggest that, although students

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generally perceive themselves as empowered, resilience in overcoming challenges and active participation may require additional attention.

H_{01}: There is no significant relationship between decision-making skills counselling and youth empowerment among secondary school students in Maiduguri Metropolis.

Table 3: Result of Persons Product Moment Correlation on the relationship between decision-making skills counselling and youth empowerment among secondary school students in Maiduguri Metropolis.

Variable	N	$\bar{x}$	SD	DF	R	P-Value
Youth empowerment	400	24.22	3.93	1		
					.531	.000
Decision-making skills counselling	400	12.22	2.29	400		

The result in Table 3 revealed a positive and statistically significant relationship between decision-making skills counselling and youth empowerment. The correlation coefficient was r = .531 with p = .000, based on 216 respondents. Since p < .05, the null hypothesis stating that there is no significant relationship between decision-making skills counselling and youth empowerment is rejected. The positive coefficient indicates that higher levels of decision-making skills counselling are associated with higher levels of youth empowerment. The magnitude of r = .531 represents a moderate-to-strong positive relationship. Thus, students who receive greater decision-making counselling tend to report greater empowerment.

H_{02}: Communication skills counselling has no significant relationship between communication skills and youth empowerment among secondary school students in Maiduguri Metropolis.

Table 4: Result of Persons Product Moment Correlation on the relationship between and Communication skills counselling on youth empowerment among secondary school students in Maiduguri Metropolis.

Variable	N	$\bar{x}$	SD	DF	R	P-Value
Youth Empowerment	400	24.22	3.93	1		
					.679	.000
Communication skills counselling	400	11.73	1.90	400		

Table 4 shows a positive and statistically significant relationship between communication skills counselling and youth empowerment (r = .679, p = .000). Because p < .05, the null hypothesis is rejected. The result demonstrates that communication skills counselling is significantly associated with youth empowerment. The coefficient of .679 indicates a relatively strong positive relationship. This suggests that communication skills counselling may be particularly important in enhancing students' confidence, interpersonal competence, participation, leadership and perceived ability to contribute to society.

H_{03}: There is no significant relationship between life skills counselling and youth empowerment among secondary school students in Maiduguri Metropolis.

Table 5: Result of Persons Product Moment Correlation on the relationship between and Life skills counselling on youth empowerment among secondary school students in Maiduguri Metropolis.

Variable	N	$\bar{x}$	SD	DF	R	P-Value
Youth empowerment	400	24.22	3.93	1		
					.547	.000
Life Skills counselling	400	11.90	2.30	400		

Table 5 indicates a statistically significant positive relationship between overall life skills counselling and youth empowerment, with r = .547 and p = .000. The null hypothesis is therefore rejected. The finding means that higher levels of life skills counselling are significantly associated with higher levels of youth empowerment among secondary school students. The correlation coefficient of .547 represents a moderate-to-strong positive relationship. This provides empirical support for the central proposition of the study that life skills counselling is related to youth empowerment.

Discussion of Findings

The finding that students generally reported favourable exposure to life skills counselling suggests that counselling services are contributing to students' development of important psychosocial competencies. This finding is consistent with the position of the World Health Organization that life skills enable individuals to deal effectively with the demands and

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challenges of everyday life. It also agrees with Nasheeda et al. (2019), who reported improvements in decision-making, communication, emotional regulation and interpersonal relationships following life skills education. The finding that students reported improved confidence in making choices is particularly important for youth empowerment. Confidence is closely associated with self-efficacy and personal agency. Bandura's Social Cognitive Theory explains that successful learning experiences can strengthen individuals' beliefs in their ability to perform tasks and overcome challenges. Therefore, counselling that provides students with opportunities to analyse problems, consider alternatives and practise responsible decision-making can contribute to stronger perceptions of competence and control. The finding that youth empowerment was generally high is also noteworthy. Students reported particularly high levels of leadership competence and possession of skills necessary for future employment. This finding is consistent with the conceptualisation of youth empowerment as a multidimensional process involving competence, confidence, leadership, participation and perceived control. Zimmerman (2000) argues that empowered individuals develop psychological competence, critical awareness and active participation. Similarly, Jennings et al. (2006) emphasise supportive environments that enable young people to develop leadership, critical awareness and self-efficacy. This is particularly relevant within the conflict-affected context described in the study, where students may have experienced significant social and educational disruption. The finding is consistent with UNICEF Nigeria (2019) and the UNICEF Nigeria (2019), which reported the importance of psychosocial and life skills interventions for resilience, emotional regulation and social participation among conflict-affected adolescents. The significant positive relationship between decision-making skills counselling and youth empowerment ($r = .531$, $p < .001$) indicates that students who receive stronger decision-making counselling tend to demonstrate higher levels of empowerment. This finding supports Nasheeda et al. (2019), who found a significant positive relationship between decision-making competence and career preparedness among secondary school students. It also agrees with Botvin and Griffin (2014), who reported that decision-making counselling improved responsible decision-making and students' independence. The significant positive relationship between communication skills counselling and youth empowerment ($r = .679$, $p < .001$) was the strongest relationship identified in the study. This finding suggests that communication competence is a particularly important component of youth empowerment. Effective communication enables students to express ideas, negotiate, seek assistance, build interpersonal relationships, resolve conflicts and participate in leadership activities. The finding supports Hargie (2021), who reported that communication competence significantly predicted leadership development among secondary school students. The significant positive relationship between overall life skills counselling and youth empowerment ($r = .547$, $p < .001$) provides direct support for the central proposition of the study. The result suggests that life skills counselling is an important psychosocial resource for developing empowered young people. The finding is consistent with the Life Skills Theory, which proposes that psychosocial competencies such as decision-making, problem-solving, communication, interpersonal relationships, emotional regulation and stress management enable individuals to cope effectively with life's challenges. The finding also supports the Positive Youth Development perspective, which emphasises competence, confidence, connection, character and caring as important dimensions of healthy adolescent development. School-based counselling provides an institutional context in which these competencies can be intentionally developed.

Recommendations

Based on the findings of the study, the following recommendations are made:

1. School authorities should strengthen life skills counselling programmes by integrating structured sessions on decision-making, communication, problem-solving, emotional regulation, interpersonal relationships and stress management into the secondary school guidance and counselling programme.
2. The Borno State Ministry of Education should ensure that public secondary schools have adequate numbers of professionally trained guidance counsellors to provide regular individual, group and classroom-based life skills counselling.
3. Counselling programmes should give particular attention to decision-making skills because the study established a significant positive relationship between decision-making counselling and youth empowerment.

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4. Communication skills training should be given priority because communication counselling recorded the strongest relationship with youth empowerment. Counsellors should employ role-play, group discussion, debates, peer mentoring, public-speaking exercises and conflict-resolution activities.
5. Schools should develop resilience-building programmes that help students strengthen their confidence in overcoming personal, academic and social challenges in Maiduguri Metropolis.
6. Schools should create opportunities for students to practise leadership and civic participation through student clubs, peer counselling, community service, entrepreneurship activities and school leadership programmes.

Conclusion

The study concludes that life skills counselling is significantly and positively related to youth empowerment among secondary school students in Maiduguri Metropolis, Borno State. Students generally reported favourable experiences of counselling, particularly in relation to evaluating alternatives, making academic decisions and developing confidence in making choices. The students also demonstrated generally positive levels of youth empowerment, especially in leadership competence, employment-related skills, goal attainment and independent decision-making. The study further established significant positive relationships between decision-making skills counselling and youth empowerment, communication skills counselling and youth empowerment, and overall life skills counselling and youth empowerment. These findings indicate that life skills counselling constitutes an important developmental component of secondary education. It can provide students with psychosocial competencies that support personal agency, leadership, communication, responsible decision-making and preparation for future employment.

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Reality Therapy and Choice Theory in Marital and Family Counselling: An Integrative Review of Evidence, Applications and Research Gaps

IBRAHIM, Nasiru[1]
nasiruibrahimz2018@gmail.com
08032229072

AHMED, Hussaini Iyawa[2]
hussainiamediyawa@gmail.com
08034650919
[1]Department of Education, Zamfara College of Arts, Science and Technology (ZACAS), Gusau, Zamfara State, Nigeria
[2]Adamawa State College of Education Hong, Adamawa State, Nigeria

Abstract
Reality therapy, grounded in William Glasser's choice theory, offers a present-focused and practical approach to marital and family counselling. This integrative review examines the theoretical foundations, counselling processes, empirical evidence, and research gaps relating to the use of reality therapy with couples and families. Choice theory proposes that behaviour is internally motivated and directed toward the satisfaction of five basic needs: survival, love and belonging, power, freedom, and fun. Relational difficulties are understood to arise when individuals attempt to control others or when their behaviour does not responsibly meet their needs. The WDEP system—Wants, Doing, Evaluation, and Planning—provides a structured framework for helping clients clarify goals, evaluate current behaviour, and develop constructive plans. Available evidence suggests that reality therapy may improve marital satisfaction, intimacy, adjustment, communication, and sexual satisfaction in several populations, including couples experiencing infertility and chronic illness. However, much of the evidence derives from small, predominantly Iranian samples, focuses on women rather than couples, relies on self-report measures, and employs brief follow-up periods. The review identifies the need for culturally diverse, dyadic, and longitudinal studies that examine both the effectiveness and the mechanisms of change in reality-based marital and family counselling. Recommendations are offered for counsellor training, culturally responsive practice, ethical counselling, and future research.

Keywords: reality therapy; choice theory; marital counselling; family counselling; WDEP system; integrative review

Introduction
Marital and family conflict can affect emotional well-being, social functioning, and relationships across generations. Counselling approaches differ in their explanations of relational difficulties and in the strategies they use to promote constructive change. Reality therapy, developed by William Glasser in the 1960s, offers a brief, solution-focused, and choice-centred approach that has been applied in marital and family counselling (Robey et al., 2012). Reality therapy operationalises choice theory, which presents human behaviour as internally motivated and directed toward the satisfaction of five basic needs: survival, love and belonging, power, freedom, and fun (Wubbolding, 2011). Rather than concentrating mainly on past experiences or unconscious processes, reality therapy emphasises present choices, their consequences, and clients' capacity to choose more effective behaviour (Wubbolding, 2017). This orientation is particularly relevant to marital and family counselling, where clients often seek practical improvement in communication, cooperation, and emotional connection. This paper presents an integrative review of theoretical, empirical, and counselling-practice literature on reality therapy in marital and family contexts. The review has four aims: first, to clarify the theoretical foundations of reality therapy; second, to examine the counselling processes through which relational change may occur; third, to appraise the empirical evidence for its effectiveness; and fourth, to identify gaps that should guide future counselling practice and research.

Literature Search Strategy
Relevant literature was identified through searches of Google Scholar, PubMed/MEDLINE, PsycINFO, Scopus, and ProQuest. Search terms included reality therapy, choice theory, WDEP, marital counselling, couple counselling, family counselling, marital satisfaction, marital intimacy, and marital adjustment. Priority was given to peer-reviewed empirical studies, theoretical papers, and book chapters concerned with reality therapy or choice theory in marital, couple, or family contexts. Studies were included when they examined the application of reality therapy to marital or family relationships,

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reported measurable relational outcomes, or provided theoretical guidance for counselling practice. Studies were excluded when they focused exclusively on individual concerns without a marital or family counselling component.

Conceptual Clarification

Marital counselling refers to structured counselling support provided to partners to improve communication, mutual understanding, conflict management, intimacy, and relationship satisfaction. Family counselling refers to counselling that addresses relational patterns, roles, communication, and problem-solving among family members. Reality therapy is a counselling approach based on choice theory that helps clients clarify their needs, evaluate their current behaviour, and choose more responsible and effective actions. In this review, counselling is understood as a collaborative, non-judgmental process that supports clients to identify goals, examine choices, strengthen relationships, and develop practical strategies for change. The focus is therefore on promoting relational competence and constructive interaction rather than on diagnosing or treating individual disorder.

Theoretical Foundations

Historical Development

Reality therapy developed from Glasser's counselling and educational work in California during the 1950s and 1960s. His foundational text, *Reality Therapy*, was published in 1965, while choice theory was later articulated as the broader explanatory framework for the approach (Wubbolding, 2011).

Choice Theory and Basic Needs

Choice theory holds that behaviour is internally motivated and directed toward the satisfaction of one or more basic needs. These needs are commonly described as survival, love and belonging, power or inner control, freedom, and fun or enjoyment (Wubbolding, 2011). The theory presents individuals as active participants in their relationships rather than passive products of their circumstances.

View of Human Nature and Change

Reality therapy is based on an optimistic view of human potential. The counsellor's main task is not to label clients or concentrate on past difficulties, but to help them examine whether their present behaviour moves them toward or away from the people and outcomes they value. Wubbolding (2011) presents reality therapy as a practical approach in which problem-solving, self-evaluation, and responsible choice-making are central counselling activities. In family counselling, choice theory has been described as pragmatic and culturally responsive because it focuses on broadly shared human needs while allowing clients to identify workable behaviours within their own relational and cultural contexts (Graham et al., 2013). Its emphasis on changing interactional patterns can support second-order change, whereby couples and families alter recurring patterns of relating rather than addressing isolated concerns alone.

Mechanisms of Change in Marital and Family Counselling

Self-Evaluation Through the WDEP System

Reality therapy may promote relational change through the WDEP system, a structured counselling process involving self-evaluation and planning (Wubbolding, 2017). Clients are helped to clarify what they **W**ant from their relationship and from counselling; describe what they are currently **D**oing, including actions, thoughts, feelings, and physiological responses; **E**valuate whether that behaviour is helping them obtain what they want; and develop a **P**lan for more effective action.

Wubbolding (2017) identifies self-evaluation as the central element of the process because it enables clients to recognise differences between their goals and their conduct without the counsellor imposing judgement. In marital counselling, this process can help partners move from mutual blame toward shared responsibility for change.

Reducing External Control

Reality therapy addresses external control psychology. Glasser and Glasser (2000) argued that attempts to coerce, blame, manipulate, or induce guilt in another person damage close relationships. In marital and family settings, such patterns may appear as criticism, withdrawal, threats, or persistent blaming.

Reality counselling helps clients recognise these patterns and move toward internal control: the recognition that individuals can control their own behaviour but not the behaviour of others (Glasser & Glasser, 2000). The counselling relationship models this principle through respectful, non-coercive engagement (Robey et al., 2012).

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Promoting Mutual Need Satisfaction

Reality therapy emphasises need satisfaction within relationships. Glasser and Glasser (2000) applied choice theory directly to marriage, arguing that relational difficulty often emerges when partners' needs are frustrated or when one partner attempts to control the other. Counselling therefore helps partners identify unmet needs and develop behaviours that increase mutual satisfaction. This emphasis on constructive action is consistent with the solution-focused character of reality therapy (Wubbolding, 2011).

Counselling Relationship and Client Responsibility

The counselling relationship is a necessary condition for change. Wubbolding (2011) emphasises the importance of establishing a trusting and respectful relationship before inviting clients to evaluate their behaviour. In couple and family counselling, the counsellor must build working relationships with several people at the same time, acknowledge conflicting perspectives, and maintain a non-judgmental stance. Clients remain active participants responsible for implementing plans and evaluating their progress (Wubbolding, 2017).

Empirical Evidence

Overview of Evidence

Available studies suggest that reality therapy may improve marital satisfaction, intimacy, adjustment, communication, and sexual satisfaction. However, the evidence base is uneven in quality and scope. Many studies used quasi-experimental designs, small samples, self-report measures, and short or absent follow-up periods. In addition, several interventions were delivered to women only, even though marital satisfaction, intimacy, and communication are relational outcomes that involve both partners

Study	Context and participants	Counselling approach	Main findings	Main limitations
Ebadi et al. (2020)	40 participants from counselling centres in Ahvaz, Iran; pretest–posttest control-group design	Reality therapy based on choice theory; ten 60-minute sessions	Significant improvement in marital intimacy and satisfaction	Convenience sampling; no follow-up reported; limited generalisability.
Koleshtajani et al. (2022)	15 infertile women; quasi-experimental design	Reality therapy; eight weekly 90-minute sessions	Significant improvement in sexual satisfaction and marital intimacy	Very small sample; women-only participation; limited dyadic evidence.
Farhadi et al. (2020)	Newly married women in Ardabil, Iran	Reality therapy based on choice theory	Improved marital intimacy and sexual satisfaction	Women-only sample; reliance on self-report measures.
Elsayed and Elyas (2016)	Emotionally separated Saudi wives	Reality-based counselling programme	Improved marital adjustment	Women-only sample; cultural and contextual factors may limit transferability.
Fallah Berejestanaki et al. (2022)	Women experiencing marital conflict	Group reality therapy compared with group cognitive-behavioural counselling	Positive effects on marital satisfaction and self-control	Comparative conclusions require caution because of differences in outcomes and intervention conditions.

Marital Satisfaction, Intimacy, and Adjustment

Ebadi et al. (2020) conducted a pretest–posttest control-group study with 40 participants recruited from counselling centres in Ahvaz, Iran. Participants were assigned to experimental and control groups, and the experimental group received ten 60-minute sessions of reality therapy based on choice theory. The study reported significant improvement in marital intimacy and satisfaction. However, the use of convenience sampling and the absence of a reported follow-up stage limit the strength

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of the conclusions. Koleshtajani, et al., (2022) examined reality therapy among 15 infertile women using a quasi-experimental design. The intervention consisted of eight weekly 90-minute sessions and produced significant improvements in sexual satisfaction and marital intimacy. Although the findings are promising, the small sample and women-only participation restrict conclusions about change in the couple relationship. Farhadi et al. (2020) reported improvements in marital intimacy and sexual satisfaction among newly married women who received reality therapy based on choice theory. The study adds to the evidence for reality-based counselling in early marriage, but its focus on women rather than couples means that changes in the non-participating partner and in the couple relationship were not directly assessed. Evidence from Saudi Arabia also supports the potential value of reality therapy for marital adjustment. Elsayed and Elyas (2016) found that a counselling programme based on reality therapy improved marital adjustment among emotionally separated Saudi wives. The study is relevant to counselling practice in collectivist and religiously influenced contexts, but its women-only sample and specific cultural setting limit generalisability.

Couples Facing Chronic Illness

Reality therapy has also been discussed in relation to couples facing chronic illness. Shaffer (2012) suggests that the approach can help couples focus on what remains within their control and identify ways to meet basic needs despite illness-related limitations. Such applications are promising for counselling practice, but they should be regarded as practice-based observations rather than strong outcome evidence.

Comparative Counselling Approaches

Fallah Berejestanaki, et al., (2022) compared group reality therapy with group cognitive-behavioural counselling among women experiencing marital conflict. The study reported positive effects on marital satisfaction and self-control, suggesting that reality therapy may be a viable alternative to cognitive-behavioural counselling in some contexts. Nevertheless, claims of equivalence between the two approaches should be made cautiously. Related comparative research found differential effects: cognitive-behavioural counselling was more effective for self-control, whereas reality therapy was more effective for empathy. The relative effectiveness of reality therapy therefore appears to depend on the specific counselling outcome and the characteristics of the clients involved.

Cultural Applicability

Reality therapy has been applied in diverse cultural settings, including Iranian, Saudi, and Western contexts. Graham et al. (2013) describes choice theory as potentially culturally responsive because it focuses on broadly shared human needs while allowing flexibility in how those needs are met. Wubbolding (2011) also discusses cross-cultural applications and notes that the approach may be most congruent with cultural settings in which personal choice is valued. Evidence from Iranian and Saudi populations suggest potential cross-cultural relevance. Nevertheless, counsellors should adapt the language of choice, responsibility, and independence to clients' cultural frameworks rather than assume that findings from one context will transfer directly to another.

Gaps in the Literature

Although available studies suggest potential benefits of reality therapy, several gaps restrict the strength of the conclusions. Many studies use quasi-experimental designs, small samples, self-report measures, and short follow-up periods. In addition, much of the evidence has been conducted in Iranian settings, with several interventions delivered to women rather than to couples jointly. This limits both cultural generalisability and conclusions about dyadic relational change. The literature also provides limited evidence on the counselling processes through which reality therapy produces change. Although WDEP offers a plausible process involving self-evaluation, responsibility, and planning, few studies have examined whether these components account for improvements in relational outcomes. Comparative research with established couple counselling approaches, including emotionally focused therapy, the Gottman method, and integrative behavioural couple therapy, remains limited. Further research is also needed on clients' experiences of reality counselling. Qualitative studies could examine how couples interpret responsibility, choice, and self-evaluation within their cultural and family contexts. Such research may identify barriers to engagement and inform culturally responsive counselling practice.

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Application of the WDEP System in Marital and Family Counselling

Exploring Wants

In the *Wants* phase, the counsellor helps each partner clarify what they desire from the relationship and from counselling. Differences between partners' wants are treated as material for negotiation rather than as evidence of blame or personal inadequacy.

Describing Current Behaviour

In the *Doing* phase, clients describe their current behaviour in specific and observable terms. This includes actions, thoughts, feelings, and physiological responses, which choice theory conceptualises as components of total behaviour. A counsellor might ask what a partner does when feeling disconnected, rather than asking why the partner feels disconnected.

Evaluating Effectiveness

The *Evaluation* phase is central to change. Clients assess whether their present behaviour is helping them obtain what they want and whether it brings them closer to or further from their partner. Wubbolding (2017) identifies several forms of self-evaluation, including judgements of effectiveness, need satisfaction, and personal responsibility.

Developing Action Plans

In the *Planning* phase, clients develop specific, attainable, and repeatable action plans. Effective plans are small enough to begin immediately and clear enough to be evaluated. The counsellor helps clients anticipate obstacles, revise plans, and sustain new patterns of interaction.

Illustrative Counselling Scenario

In a marital counselling session, a partner who repeatedly withdraws during conflict may first identify a want for emotional closeness. The counsellor helps the partner describe the withdrawing behaviour, evaluate whether it is bringing the couple closer, and develop a specific plan, such as requesting a short break before returning to the discussion. The other partner may similarly identify a want for respectful communication and plan to express concerns without criticism or blame. Through this process, both partners move from assigning fault to identifying choices that may improve their relationship.

Supplementary Counselling Strategies

Beyond WDEP, reality counselling may include reframing, role-play, reinforcement, and problem-solving strategies. These strategies are not exclusive to reality therapy, but their use within a choice-theory framework gives them a coherent focus on responsibility, need satisfaction, and relationship repair (Robey et al., 2012; Wubbolding, 2011).

Limitations and Counselling Considerations

Conceptual Limitations

Reality therapy has limitations. Critics note that it gives relatively limited attention to unconscious processes, developmental history, trauma, and broader systemic factors that may influence relational difficulties (Corey, 2017). It may therefore be insufficient as a standalone approach where clients need extended exploration of past experiences, unresolved trauma, or complex family dynamics.

Responsibility and Contextual Factors

The emphasis on personal responsibility requires careful application. Although choice theory recognises that individuals cannot directly control others, an excessive focus on individual choice may understate the influence of poverty, gender inequality, family pressure, illness, and other contextual constraints. Wubbolding (2011) acknowledges the importance of considering contextual factors, suggesting that reality counselling should be applied with sensitivity to clients' environments.

Cultural Considerations

Cultural considerations are particularly important in counselling practice. Assumptions about autonomy, choice, and personal responsibility may require modification in collectivist settings where family obligation, hierarchy, and communal decision-making carry different meanings (Graham et al., 2013). Evidence from Iranian and Saudi populations suggests potential cross-cultural applicability, but counsellors should remain attentive to how clients understand choice, responsibility, gender roles, and family obligation.

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Ethical and Safety Considerations

Reality-based marital counselling should not be used where intimate partner violence, coercive control, or significant safety concerns are present. In such situations, the counsellor should prioritise safety planning, individual counselling where appropriate, referral to specialised services, and collaboration with relevant support systems. Couple counselling should not be presented as a substitute for protection from harm.

Recommendations for Counselling Practice and Research

1. Counsellor Training and Supervision; Counsellors should receive specific training and supervision in the use of reality therapy with couples and families. Applying WDEP when several family members are present requires skills beyond those needed in individual counselling, including conflict management, relationship-building, and facilitation of joint planning.
2. Indications for Counselling Practice; Counsellors may consider reality therapy as a viable approach or complementary technique when the main counselling goals are improving marital intimacy, communication, mutual responsibility, and constructive problem-solving. Where emotion regulation, trauma, or serious relational distress is central, reality therapy may be more appropriately combined with emotion-focused, systemic, or trauma-informed counselling approaches.
3. Culturally Responsive Counselling; Counsellors should adapt reality therapy to clients' cultural values and family structures. This includes using culturally appropriate language, respecting family decision-making patterns, and avoiding assumptions that individual autonomy has the same meaning across all cultural groups.
4. Priorities for Future Research; Researchers should conduct studies with larger and more diverse samples, longer follow-up periods, and validated outcome measures. Future studies should include both partners where appropriate and assess relational outcomes at the couple or family level.
5. Comparative and Implementation Research; Future research should compare reality therapy with established couple and family counselling approaches, including emotionally focused therapy, the Gottman method, and integrative behavioural couple therapy. Researchers should also examine implementation issues, including counsellor competence, adherence to reality therapy principles, appropriate session frequency, supervision, and the feasibility of using WDEP in school, community, religious, and family counselling settings.

Conclusion

Reality therapy offers a coherent, practical, and increasingly researched approach to marital and family counselling. Its foundation in choice theory provides a clear account of motivation and relational difficulty, while the WDEP system provides a structured yet flexible method for facilitating change. Available evidence suggests potential benefits for marital satisfaction, intimacy, adjustment, communication, and sexual satisfaction, particularly among populations experiencing infertility, illness, or marital conflict. However, the evidence base remains limited by small samples, brief follow-up periods, reliance on self-report measures, concentration in particular cultural contexts, and limited attention to couples and families as the primary units of analysis. With further rigorous research, culturally responsive practice, and appropriate counsellor training, reality therapy is well placed to contribute meaningfully to marital and family counselling.

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Teachers–Parents Collaboration and Effective Inter-House Sports Competitions among Secondary Schools in Abia State, Nigeria

SOLOMON, Jahbuike Nelson[1]
Solomonjahbuikenelson@gmail.com

ONWUHANZE, Jude Uche[1]
Onwuhanze.jude@mouau.edu.ng
[1]Department of Educational Management, College of Education, Michael Okpara University of Agriculture Umudike

Abstract

This study investigated teachers–parents' collaboration and effective inter-house sports competitions in secondary schools in Abia State, Nigeria. Specifically, it examined the relationships between financial contribution, decision-making involvement and effective inter-house sports implementation. The study was guided by two research hypotheses and anchored on Coleman's Social Capital Theory. An ex-post facto research design was adopted for the study. The target population comprised 142,332 respondents, including 7,436 teachers and 134,896 parents whose wards attend public secondary schools in Abia State. A sample size of 399 respondents was determined using Taro Yamane's formula, while convenience sampling was adopted to select accessible and willing participants. Data were collected using a structured questionnaire, and the hypotheses were tested using Pearson correlation at the .05 alpha level. The findings revealed that financial contribution had a significant relationship with effective inter-house sports competitions. The findings also indicated that decision-making involvement had a significant relationship with effective inter-house sports competitions. These findings show that adequate financial support and meaningful participation in planning and decision-making are important dimensions of teachers–parents' collaboration in organizing school sporting activities. It was concluded that strengthening financial accountability and participatory planning could promote effective inter-house sports competitions in secondary schools. It was recommended that school administrators and parent–teacher associations should establish transparent arrangements for mobilizing and managing sports resources and actively involve teachers and parents in planning, coordinating and evaluating inter-house sports competitions.

Keywords: Teachers–parents' collaboration, financial contribution, decision-making involvement, inter-house sports

Introduction

Education is a social institution through which society transmits knowledge, develops human capacities, promotes social integration and prepares young people for responsible participation in community life. The effectiveness of education therefore depends not only on classroom instruction but also on the quality of relationships among schools, families and the wider community. Epstein (2018) emphasizes the importance of school, family and community partnerships in supporting students' learning and development, while Coleman (1988) explains that social relationships can provide resources that facilitate educational outcomes. Within this context, co-curricular activities constitute an important aspect of school life because they provide opportunities for students to develop competencies and social values that complement formal classroom learning. School-based sports, in particular, can contribute to physical development, social interaction, cooperation and students' engagement with their school community (Kovács et al., 2022; Okeke & Nweke, 2023). Secondary education is an important stage in the development of young people because it provides opportunities for intellectual, physical, social, emotional and moral development. Although academic instruction occupies a central position in secondary education, co-curricular activities also contribute to students' holistic development. Among these activities, inter-house sports competitions provide opportunities for students to develop physical fitness, teamwork, discipline, leadership, cooperation, sportsmanship and respect for rules (Bailey, 2020). Inter-house sports also create opportunities for interaction among students, teachers, parents and members of the wider school community. Kovács et al. (2022), in a systematic review of parental involvement in school-based sports, observed that parental engagement can take different forms, including consultation, meetings and participation in organized activities. Similarly, Okeke and Nweke (2023) found a significant relationship between parental involvement and sports participation among secondary school students in Anambra State, Nigeria. These findings suggest that the organization of school sports should be understood not merely as a physical education activity but also as a social process requiring cooperation among relevant stakeholders. Inter-house sports competition refers to the process of planning, organizing, coordinating, conducting and evaluating sporting competitions among the houses within a school. Effective inter-house sports competitions is reflected in adequate

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preparation, availability of necessary equipment and facilities, proper scheduling, student participation, observance of safety procedures, effective supervision, fair officiating and the orderly conduct of sporting events (Fan & Chen, 2021). When these elements are adequately coordinated, inter-house sports can provide meaningful educational experiences beyond classroom instruction. Conversely, inadequate funding, insufficient equipment, weak planning, limited stakeholder participation and poor coordination may undermine the quality of the event and restrict the benefits students derive from participation. The importance of investigating the contribution of different stakeholders to school-based sports is reinforced by Kovács et al. (2022), whose review identified a relatively limited body of sufficiently rigorous research on the effectiveness of parental involvement in school-based sports and health programmes. This limitation provides a basis for further context-specific investigations into the organizational conditions that support school sports. In the context of secondary education, teachers and parents constitute important stakeholders whose collaboration may influence the availability of resources and the quality of school-based activities.

Teachers-parents collaboration refers to a cooperative relationship in which teachers and parents communicate, share responsibilities, contribute resources and participate in decisions concerning students' education and school activities (Griffin & Steen, 2021). Such collaboration extends beyond attendance at parent–teacher meetings or the payment of approved school levies. It involves sustained engagement in identifying needs, setting priorities, mobilizing resources, resolving problems and evaluating school programmes. Coleman's (1988) social capital theory provides a sociological explanation for this relationship by emphasizing the resources embedded in social networks, obligations, expectations and information channels. Applied to inter-house sports, teachers–parents collaboration may be reflected in discussions about the proposed event, agreement on resource requirements, contributions towards approved expenses, provision of sporting materials, participation in planning committees and consultation on matters affecting students' safety and participation. Two dimensions of this collaboration examined in the present study are financial contribution and decision-making involvement. Financial contribution is one dimension of teachers–parents collaboration that may be relevant to effective inter-house sports implementation. It refers to the financial support provided by parents and, where applicable, resources mobilized through approved school–home partnerships to meet the legitimate costs of organizing sporting activities (Henderson & Mapp, 2022). Such costs may include the procurement and maintenance of sports equipment, preparation of playing grounds, provision of first-aid materials, arrangement of drinking water, production of event materials and other approved logistical requirements. Adequate and timely funding can enable school administrators and organizing committees to prepare for the event without unnecessary interruptions. However, financial contributions should be managed transparently, and schools should avoid making students' participation conditional on their families' ability to pay. Schools and education authorities also retain responsibility for ensuring that essential educational activities are appropriately supported. Empirical research on parental financial participation provides relevant evidence for investigating this variable. Hakizimana and Sikubwabo (2024), in their study of parents' participation in secondary school activities in Nyabihu District, Rwanda, examined parental involvement in financial and academic activities in relation to students' academic achievement. Using a descriptive and correlational design, they obtained data from 301 participants drawn from a target population of 1,224 through a structured questionnaire, interviews and documentary evidence. Their findings indicated that parental participation in financial activities was associated with students' academic performance. Although academic achievement differs from effective inter-house sports implementation, the study illustrates the potential relevance of parents' financial participation to the functioning of school-related activities. The implication for the present study is that the role of financial contributions in school programmes warrants investigation in relation to the specific demands of inter-house sports. Similarly, Ajalo and Mohammed (2025) investigated parents' financial participation and academic performance among students in selected Universal Secondary Education schools in Kumi District, Uganda. The researchers employed a cross-sectional design involving parents, teachers and students and collected quantitative data through structured questionnaires and school records. Their findings indicated a positive association between parents' participation in school financing and students' academic performance, although participation in financial management itself was not significantly associated with performance. The study highlights an important distinction between contributing financial resources and participating in decisions about how those resources are managed. This distinction is relevant to the present research because financial contributions may assist schools in meeting the costs of inter-house sports, but their usefulness

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may depend on transparent management, appropriate allocation and coordination with other organizational requirements. Nevertheless, neither the Rwandan nor the Ugandan study directly examined inter-house sports, making it necessary to investigate this relationship within the context of secondary schools in Abia State. Decision-making involvement is another dimension of teachers–parents collaboration. It refers to the participation of teachers and parents in identifying needs, establishing priorities, developing plans and making decisions concerning the organization and conduct of inter-house sports (Epstein et al., 2019). Such involvement may occur through school-based committees, parent–teacher association meetings, consultation with housemasters and housemistresses, and discussions about schedules, facilities, safety arrangements, student participation and the evaluation of sporting events. Decision-making involvement is distinct from simply being informed about decisions already taken by school administrators. Meaningful involvement requires opportunities to express views, consider alternatives, contribute relevant information and participate in determining agreed courses of action. When parents and teachers are involved in decisions, the resulting plans may reflect a wider range of experiences and needs (Christenson & Reschly, 2021). Shared decision-making may also strengthen stakeholder commitment because participants are more likely to understand and support arrangements they have helped to develop.

Empirical studies of parental involvement in school management provide evidence relevant to decision-making involvement. Abiodun-Oyebanji (2021) examined parental involvement and the effective management of public primary education in Oyo State, Nigeria. The study considered parental involvement in the provision of basic school facilities, attendance at school functions and participation in decision-making processes. The findings indicated significant relationships between parental involvement and school management, including the relationship between parental participation in decision-making and effective management of public primary schools. Although the study focused on primary education rather than secondary school sports, it demonstrates the relevance of parental involvement in school decisions to the management of educational activities. In relation to the present study, participation by parents and teachers in decisions about equipment, schedules, safety and the allocation of resources may provide a basis for better coordination of inter-house sports. In another Nigerian study, Okendu (2012) investigated the roles of school boards, school heads and parent–teacher associations in the effective management of public secondary schools in Khana Local Government Area of Rivers State. Using a structured questionnaire administered to 251 secondary school teachers, the study employed descriptive and inferential statistical procedures, including Pearson product-moment correlation and analysis of variance. The findings indicated that the functions of school heads and parent–teacher associations were significantly related to school management operations, whereas the school board did not demonstrate a significant relationship with the school management system. This finding suggests that the contribution of stakeholder bodies to school management may depend on their actual roles and involvement in school operations. For inter-house sports, the implication is that establishing a parent–teacher association alone may not be sufficient; what matters is whether teachers and parents participate meaningfully in planning, coordination and the implementation of agreed activities. However, because Okendu's study addressed general school management rather than sporting events, the relationship between decision-making involvement and effective inter-house sports implementation remains an empirical question. The relevance of parental involvement to school-based sports is further supported by existing sports-specific scholarship. Kovács et al. (2022), in a systematic review following the PRISMA framework, examined school-based sports and health programmes that incorporated parental involvement. Their review included 17 studies of interventions and programmes and identified diverse forms of parental participation, such as information provision, meetings, consultations and involvement in organized activities. The authors concluded that the evidence concerning the effectiveness of parental involvement remained limited and varied across programmes. Their findings caution against assuming that parental involvement automatically improves every school outcome and emphasize the need to examine particular forms of involvement in specific contexts. Similarly, Okeke and Nweke (2023) investigated parental involvement and school connectedness as correlates of sports participation among 400 Senior Secondary One students in co-educational secondary schools in Anambra State, Nigeria. Using a correlational survey design, a questionnaire and multistage sampling, the researchers analyzed the data using Pearson product-moment correlation and regression-related procedures. They found a significant relationship between parental involvement and students' sports participation and recommended that schools encourage regular sports programmes, including inter-house sports competitions. While this study provides direct contextual evidence concerning parental involvement and school

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sports, it examined student sports participation rather than the effectiveness of inter-house sports implementation. The distinction reinforces the need for the present investigation. The present study is situated within the sociology of education because schools operate as social institutions whose activities are influenced by relationships among individuals, families and educational organizations. The effective implementation of school programmes depends not only on formal policies and material resources but also on social relationships, shared expectations, trust and collective action. Social capital theory, associated with Coleman (1988), provides an appropriate theoretical explanation for understanding how relationships between parents and teachers may generate resources that support educational activities. Coleman explained social capital in terms of resources embedded in social relationships, including obligations and expectations, information channels and social norms. Applied to inter-house sports, these relationships may facilitate the exchange of information, mobilization of financial resources, coordination of responsibilities and development of shared commitment to the success of school activities. Financial contribution represents one way in which cooperative relationships may support resource mobilization, while decision-making involvement represents a way of coordinating information, priorities and responsibilities. The theory therefore provides a useful framework for investigating the two independent variables in relation to effective inter-house sports implementation.

In secondary schools in Abia State, inter-house sports require cooperation among school administrators, teachers, parents and students. The extent to which these stakeholders provide financial support, participate in planning and share responsibility may be associated with the quality of sports preparation and execution. However, the presence of a parent–teacher association does not necessarily guarantee meaningful collaboration, just as the collection of funds does not automatically ensure effective implementation. Financial contributions may be inadequate or delayed, and decisions may be made without sufficient consultation. Equally, active participation in meetings may not necessarily translate into the availability of facilities, appropriate safety measures or orderly conduct of sporting events. These possibilities make it necessary to distinguish the financial and decision-making dimensions of collaboration rather than treating parental involvement as a single undifferentiated construct. Although existing studies have examined parental financial participation in school activities, parental involvement in school management and parental involvement in sports participation, the studies reviewed above have not directly established the separate relationships between financial contribution, decision-making involvement and effective inter-house sports implementation in secondary schools in Abia State. The financial participation studies by Hakizimana and Sikubwabo (2024) and Ajalo and Mohammed (2025) focused on academic performance rather than sports implementation, while the school-management studies by Abiodun-Oyebanji (2021) and Okendu (2012) examined broader management outcomes. The sports-specific studies by Kovács et al. (2022), and Okeke and Nweke (2023) examined parental involvement in sports and related programmes but did not establish the distinct contributions of financial support and decision-making involvement to the effectiveness of inter-house sports implementation in Abia State. This constitutes a contextual and outcome-specific empirical gap. Addressing this gap may help school administrators and parent–teacher associations understand whether financial resource mobilization, meaningful participation in decisions or both are associated with effective inter-house sports. The findings may also inform the development of transparent financial arrangements, participatory planning procedures and practical strategies for coordinating school sports. It is against this background that the present study investigates teachers–parents collaboration and effective inter-house sports implementation in secondary schools in Abia State, specifically examining financial contribution and decision-making involvement as the independent variables and effective inter-house sports implementation as the dependent variable.

Statement of the Problem

Inter-house sports are intended to provide secondary school students with opportunities to develop physical fitness, teamwork, discipline, leadership, cooperation and sportsmanship. For these benefits to be realized, sporting events must be adequately planned, appropriately funded, safely conducted and effectively coordinated. However, the successful organization of inter-house sports may be constrained when schools experience inadequate resources, limited parental participation, weak communication, delayed preparation and insufficient stakeholder involvement in planning. These challenges may arise when financial responsibilities are not clearly understood, contributions are inadequate or delayed,

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and decisions concerning equipment, facilities, schedules, safety and student participation are made without sufficient consultation. Under such circumstances, schools may experience difficulties in procuring sporting materials, preparing venues, coordinating activities and ensuring that students participate under appropriate conditions. Nevertheless, it cannot be assumed that these problems occur uniformly across secondary schools in Abia State or that they are necessarily caused by inadequate teachers–parents collaboration. Their extent and relationship with collaboration require empirical investigation. The specific problem addressed by this study is the insufficient context-specific empirical evidence concerning the extent to which financial contribution and decision-making involvement in teachers–parents collaboration are associated with effective inter-house sports implementation in secondary schools in Abia State. Without such evidence, school administrators and parent–teacher associations may find it difficult to determine which aspects of collaboration require greater attention when planning school sports programmes. The study therefore investigates the relationship between financial contribution and effective inter-house sports competitions, as well as the relationship between decision-making involvement and effective inter-house sports competitions in secondary schools in Abia State. The findings are expected to provide evidence that can inform stakeholder engagement, resource mobilization and shared planning for school sports activities.

Purpose of the Study

The main purpose of the study was to examine the relationship between teachers–parents' collaboration and effective inter-house sports competitions in secondary schools in Abia State. Specifically, the study:

1. Determine the relationship between financial contribution and effective inter-house sports competitions in secondary schools.
2. Examine the relationship between decision-making involvement and effective inter-house sports competitions in secondary schools.

Research Hypotheses

The following null hypotheses guided this study.

1. There is no significant relationship between financial contribution and effective inter-house sports competitions in secondary schools.
2. There is no significant relationship between decision-making involvement and effective inter-house sports competitions in secondary schools.

Research Methodology

The study adopted the correlational research design. This design is appropriate because the study seeks to establish the direction and strength of the relationships between financial contribution, decision-making involvement and effective inter-house sports competitions without manipulating the variables. Since the study is non-experimental, any significant relationship identified will be interpreted as an association rather than proof of causation. The study was conducted in Abia State, Nigeria. The state has many public secondary schools serving students from diverse social and economic backgrounds. These schools provide a suitable setting for examining teachers–parents collaboration in the organization of co-curricular activities, including inter-house sports competitions.

The target population for this study was 142,332 respondents. It comprised 7,436 teachers in public secondary in secondary schools in Abia State and 134,896 parents whose wards are in secondary schools in Abia State. The teacher population was established using current records from the relevant state education authorities. The sample size for the study was determined using Taro Yamane's formula at a 5% level of precision. Based on the population of 142,332 respondents, the calculated sample size was approximately 399 respondents. The convenience sampling technique was used to select the respondents. This technique involved selecting teachers and parents who were readily accessible, available, willing to participate, and sufficiently knowledgeable about parental involvement in the planning and implementation of inter-house sports in public secondary schools in Abia State. Teachers were approached through participating schools, while parents were reached through parent–teacher association meetings, school communication channels, and other appropriate school-related engagements. Data were collected using a researcher-developed instrument titled Teachers–Parents Collaboration and Effective Inter-House Sports Competitions Questionnaire. The instrument contained measure teachers–parents collaboration through financial contribution and decision-making involvement, as well as effective inter-house sports

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competitions. Financial contribution items assess the timeliness and adequacy of approved contributions, transparency in resource mobilization, support for equipment procurement and assistance with legitimate logistical expenses. Decision-making involvement items assess consultation, participation in planning meetings, representation on organizing committees, communication about event arrangements and participation in evaluating the programme. The dependent-variable items assessed the adequacy of preparation, availability of facilities and equipment, coordination of events, student participation, safety arrangements, fairness of competition and overall organization. Responses were measured on a four-point rating scale ranging from strongly agree (4) to strongly disagree (1). Experts in measurement and evaluation validated the instrument, and the internal consistency of the instrument using Cronbach alpha was .77. Copies of the questionnaire were administered to the respondents. Respondents were informed about the purpose of the study, voluntary participation and confidentiality of responses. Data were analyzed using the Statistical Package for the Social Sciences. Mean and standard deviation were used to answer the research questions. Pearson product moment correlation were used to test the two null hypotheses at the .05 level of significance.

Presentation of Results

Hypothesis One

There is no significant relationship between financial contribution and effective inter-house sports competitions in secondary schools.

Table 1: Summary of Pearson correlation between financial contribution and effective inter-house sports competitions

		financial contribution	effective inter-house sports competitions
financial contribution	Pearson Correlation	1	.725**
	Sig. (2-tailed)		.000
	n	399	399
effective inter-house sports competitions	Pearson Correlation	.725**	1
	Sig. (2-tailed)	.000	
	N	399	399

Significant at .05 alpha level

The result in Table 1 shows that the Pearson Product Moment Correlation coefficient (r) between financial contribution and effective inter-house sports competitions is .725, with a p-value of .000. Since the p-value is less than the .05 alpha level, the relationship is statistically significant and strongly positive. This indicates that higher levels of financial contribution is associated with effective inter-house sports competitions. Therefore, the null hypothesis, which states that there is no significant relationship between financial contribution and effective inter-house sports competitions in secondary schools, is rejected.

Hypothesis Two

There is no significant relationship between decision-making involvement and effective inter-house sports competitions in secondary schools.

Table 1: Summary of Pearson correlation between decision-making involvement and graduate employability skills acquisition in universities

		decision-making involvement	effective inter-house sports competitions
decision-making involvement	Pearson Correlation	1	.729**
	Sig. (2-tailed)		.000
	N	399	399
effective inter-house sports competitions	Pearson Correlation	.729**	1
	Sig. (2-tailed)	.000	
	N	399	399

Significant at .05 alpha level

The result in Table 1 shows that the Pearson Product Moment Correlation coefficient (r) between decision-making involvement and effective inter-house sports competitions is .729, with a p-value of .000. Since the p-value is less than the

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.05 alpha level, the relationship is statistically significant and strongly positive. This indicates that higher levels of decision-making involvement are associated with effective inter-house sports competitions. Therefore, the null hypothesis, which states that there is no significant relationship between decision-making involvement and effective inter-house sports competitions in secondary schools, is rejected.

Discussion of Findings

The finding from hypothesis one showed that financial contribution had a significant relationship with effective inter-house sports competitions in secondary schools. This finding suggests that financial support from parents, when coordinated with teachers and school authorities, is an important dimension of collaboration that may facilitate the successful planning, organization and conduct of inter-house sports competitions. The implementation of these events requires resources for procuring and maintaining sporting equipment, preparing playing grounds, providing first-aid materials and drinking water, organizing officials, and meeting other legitimate logistical expenses. Where financial contributions are adequate, timely and properly managed, schools may be better positioned to provide these resources and minimize disruptions during sporting activities. The finding is consistent with Hakizimana and Sikubwabo (2024), who reported an association between parental participation in financial activities and students' school activities. This finding supports the broader argument that parents' financial participation can contribute to the functioning of educational activities. This finding suggests that financial support may help schools meet the material and logistical requirements necessary for organizing inter-house sports effectively. Similarly, this finding is in line with that of Ajalo and Mohammed (2025) who found a positive association between parents' participation in school financing and students' academic outcomes. Financial contribution may provide the resources needed for inter-house sports, but its practical value may depend on how transparently and appropriately the funds are allocated and used. The finding also accords with the broader argument advanced by Coleman's (1988) social capital theory, which explains how social relationships can provide resources that facilitate collective action. When parents and teachers maintain cooperative relationships, they may be better able to mobilize financial resources, agree on priorities and coordinate the provision of materials required for school activities. Applied to inter-house sports, such relationships may help ensure that funds are mobilized in good time and directed towards essential needs. Financial contribution, therefore, may represent not merely the transfer of money but also an expression of shared responsibility for students' educational and social development. The implication is that school administrators and parent–teacher associations should develop transparent and inclusive arrangements for mobilizing and managing resources for inter-house sports. Schools should communicate anticipated expenses, explain how contributions will be used and maintain appropriate financial records.

The finding from hypothesis two revealed that decision-making involvement had a significant relationship with effective inter-house sports competitions in secondary schools. This finding indicates that the participation of parents and teachers in identifying needs, setting priorities, developing plans and making decisions about sporting activities is an important aspect of school–home collaboration. Effective inter-house sports require more than the availability of financial resources and sporting facilities; they also require decisions concerning event schedules, the allocation of responsibilities, student participation, safety arrangements, equipment, supervision and the resolution of organizational challenges. When teachers and parents have opportunities to contribute to these decisions, planning may benefit from a broader range of information, experiences and perspectives. This finding is consistent with Abiodun-Oyebanji (2021), who found a significant relationship between parental involvement in school decision-making and effective school management. This finding shows that involving parents in decisions can contribute to the effective coordination of educational activities. Further, this finding supports that of Okeke and Nweke (2023), who found a significant relationship between parental involvement and students' sports participation. The present finding complements their work by highlighting decision-making involvement as a specific dimension of collaboration that is significantly related to effective inter-house sports implementation. The finding can also be explained through Coleman's (1988) social capital theory. The theory emphasizes that social relationships create channels for exchanging information, developing expectations, establishing norms and coordinating collective action. When parents and teachers participate meaningfully in decisions about inter-house sports, they can exchange relevant information, clarify their respective responsibilities and develop a shared understanding of the objectives

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and requirements of the event. Such collaboration may improve coordination and strengthen commitment to agreed plans. For instance, consultation may help identify students' needs, establish appropriate schedules, determine safety arrangements and clarify how available resources should be used. These processes can reduce misunderstandings and support the orderly implementation of sporting activities. The implication of this finding is that secondary school administrators should strengthen participatory planning for inter-house sports by involving teachers and parents in relevant committees and consultations. Schools should communicate proposed plans early, invite stakeholder contributions, clarify responsibilities and provide opportunities to review the conduct of sporting events after completion. Parent–teacher associations should serve as practical channels for consultation and cooperation rather than functioning only as platforms for announcements or financial requests.

Conclusion

This study investigated whether financial contribution and decision-making involvement, as dimensions of teachers–parents collaboration, are associated with effective inter-house sports competitions in secondary schools in Abia State. Guided by social capital theory, it conceptualizes collaboration as a potential source of resources, information, shared expectations and collective commitment. In conclusion, the findings revealed that financial contribution and decision-making involvement were significantly related to effective inter-house sports competitions in secondary schools in Abia State. This suggests that effective organization of inter-house sports requires not only adequate financial resources but also meaningful collaboration between teachers and parents in planning, coordination and decision-making. Therefore, strengthening transparent resource mobilization and participatory planning may help schools organize inclusive, safe and effective inter-house sports competitions that promote students' physical, social and educational development.

Recommendations

The following recommendations were made based on the findings:

1. School administrators and parent–teacher associations should establish transparent and accountable arrangements for mobilizing and managing financial resources for inter-house sports. They should prepare budgets in advance, communicate expenditure priorities to parents and ensure that available funds are used appropriately to provide sporting equipment, facilities, first-aid materials and other essential resources. Financial contributions should not be compulsory in ways that exclude students from participating.
2. School administrators should encourage active participation of teachers and parents in planning and making decisions concerning inter-house sports through parent–teacher association meetings and sports planning committees. Such participation should cover scheduling, resource allocation, safety arrangements, assignment of responsibilities and evaluation of sporting events to promote shared responsibility and effective competitions.

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Lessons From National Assessment of Educational Progress for Nigeria: A Conceptual Analysis of Large-Scale Assessment Models for Improving Basic Education Outcomes

AKOGWU, Peter[1]
akogwupeter@gmail.com
+2347068729834

CHIA, Michael Mfenyina[1]
michaelchia6@gmail.com
+2349138121932

[1]Department of Mathematics and Computer Science Education, Rev. Fr. Moses Orshio Adasu University, Makurdi, Benue State, Nigeria.

ABSTRACT

This paper conceptually examines the National Assessment of Educational Progress (NAEP) in the United States and draws strategic lessons for Nigeria's basic education assessment system. Despite substantial investments in the Universal Basic Education (UBE) programme since 1999, Nigeria faces a persistent learning crisis exacerbated by weak assessment structures that prioritize certification over systemic improvement. Current assessment bodies, including the National Examinations Council (NECO) and the National Business and Technical Examinations Board (NABTEB), operate under political and examination pressures, limiting their utility for policy feedback. Through a conceptual and theoretical lens of Outcome-Based Education, Data-Driven Decision Making, and Program Evaluation Theory, this paper analyzes NAEP's design specifically its sampling methodology, matrix design, and institutional independence to illustrate how large-scale assessments can function as effective "Nation's Report Cards." The study proposes a "NAEP-Adapted Model for Nigeria" (NAM-Nigeria), recommending an independent national assessment body statutorily aligned with the Universal Basic Education Commission (UBEC) and the Nigerian Educational Research and Development Council (NERDC). By adopting rigorous sampling, disaggregating data for equity monitoring, and mandating data-driven resource allocation and teacher training, Nigeria can transform its assessment framework from a high-stakes certification mechanism into a policy-driven tool for improving learning outcomes and achieving Sustainable Development Goal 4.

Keywords: NAEP, Large-Scale Assessment, Achievement, Educational Monitoring, Data-Driven Decision Making.

Introduction

The global pursuit of educational quality has shifted focus from mere access and enrollment to actual learning outcomes, a transition signaled by Sustainable Development Goal 4 (SDG 4). As nations strive to ensure inclusive and equitable quality education, the problem of measuring and improving student achievement in basic education is still a formidable barrier (United Nations Educational, Scientific and Cultural Organization, [UNESCO], 2020). Education systems across the world are grappling with what the (World Bank, 2024) "learning crisis" a phenomenon where children spend years in school without acquiring basic literacy and numeracy skills. According to the World Bank's "Learning Poverty" indicator, approximately 53 percent of children in low- and middle-income countries cannot read and understand a simple text by age 10, a figure rises dramatically in Sub-Saharan Africa to over 80 percent. Addressing this crisis is the capacity of a nation to robustly monitor educational progress through large-scale assessments (LSAs). The utility of LSAs depends on their design and practice. When designed for accountability and high-stakes certification, they often lead to curriculum narrowing, teaching to the test, and in some cases, widespread malpractice (Jerome, 2023). When designed as monitoring tools, they may provide vital policy feedback, enabling systemic adjustments, resource targeting, and equity monitoring. The divergence in how countries deploy LSAs basically determines their efficacy in improving basic education outcomes. The function of assessment has expanded beyond the traditional gatekeeping role to encompass diagnostic, evaluative, and policy-analytic functions in global modern education (Ezewuzie et al., 2025). International assessments such as the Trends in International Mathematics and Science Study (TIMSS), the Progress in International Reading Literacy Study (PIRLS), and the Programme for International Student Assessment (PISA) have shown how cross-national assessment data can catalyze educational reform (Braun & Qian, 2005). However, for such data to be meaningful at the national level, countries must develop indigenous assessment systems that are technically rigorous, contextually relevant, and policy-oriented. In the landscape of global large-scale assessments, the National Assessment of Educational Progress (NAEP) of the United States stands out as a paradigmatic model of a monitoring assessment (Solem, 2022). NAEP is the largest continuing and

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nationally representative assessment of what American students know and can do in various subject areas. Established in 1969, NAEP was designed to provide a common national metric for student achievement, independent of the varying state standards and high-stakes testing mandates that characterize the decentralized American education system (Linn, 2000).

NAEP's unique design employing sophisticated sampling techniques and matrix item designs ensures that no student or school takes the entire test, thereby minimizing the testing burden and eliminating the incentive to "teach to the test" (Solem, 2022). NAEP serves purely as an informational tool for policymakers, educators, and the public, offering disaggregated data by race, gender, socioeconomic status, and region, which is critical for tracking educational equity and long-term trends. Unlike state-mandated tests that carry consequences for students, teachers, and schools, NAEP's results are reported only at the aggregate level, preserving its integrity as a diagnostic rather than punitive instrument. Nigeria's basic education sector, despite the practice of the Universal Basic Education (UBE) programme since 1999, continues to exhibit alarming deficits in learning outcomes (Egbebi, 2024). The National Examinations Council (NECO) and the National Business and Technical Examinations Board (NABTEB), alongside the monitoring and evaluation (M&E) frameworks of the UBE Commission (UBEC), were established to standardize and quality of basic education. However, these systems suffer from conceptual and structural weaknesses. NECO and NABTEB operate at high-stakes certification bodies. Their census-based approach testing every eligible student strain logistical capacity, compromises test security, and encourages widespread malpractice (Egbebi, 2024). The data generated by these examinations are rarely utilized for policy feedback, admission placement or curriculum reform; they serve merely as summative gatekeepers for transition from one educational level to another in science-based subject (Ayua, 2020). The UBE M&E system, intended to provide systemic feedback, is characterized by irregularity, poor funding, and a lack of technical rigor, making it impossible to track national learning trends longitudinally in the area of placement of students grading system (Ayua, 2020). The consequences of these weaknesses are far-reaching. Nigeria cannot objectively determine whether the billions of naira invested in UBE have translated into improved learning outcomes (Adekunle, 2019). Policy decisions are made in an evidence vacuum, and interventions are designed based on anecdotal observations rather than empirical data. The absence of a credible national assessment system means that Nigeria cannot benchmark its educational progress against other nations, cannot identify which regions or demographic groups are being left behind, and cannot hold itself accountable to the promises of SDG 4. Nigeria lack a credible, policy-driven assessment model capable of diagnosing the learning crisis and can also provide a solution of self-sufficiency among basic school learners through creativity (Ayua et al., 2026).

This paper is confined to a conceptual analysis of large-scale assessment models, focusing specifically on NAEP in the United States and the basic education assessment ecosystem in Nigeria. It does not delve into empirical data collection but relies on theoretical and documentary analysis, drawing from assessment literature, policy documents, and the author's extensive research on Nigerian educational assessment (Olatunji & Ajero, 2022). The paper is structured into eight sections, covering the introduction, conceptual and theoretical framework, analysis of NAEP, analysis of Nigeria's current system, lessons from NAEP, a proposed conceptual framework, policy implications, and the conclusion.

Conceptual Framework

The concepts were clearly described here as shown in Figure 1.

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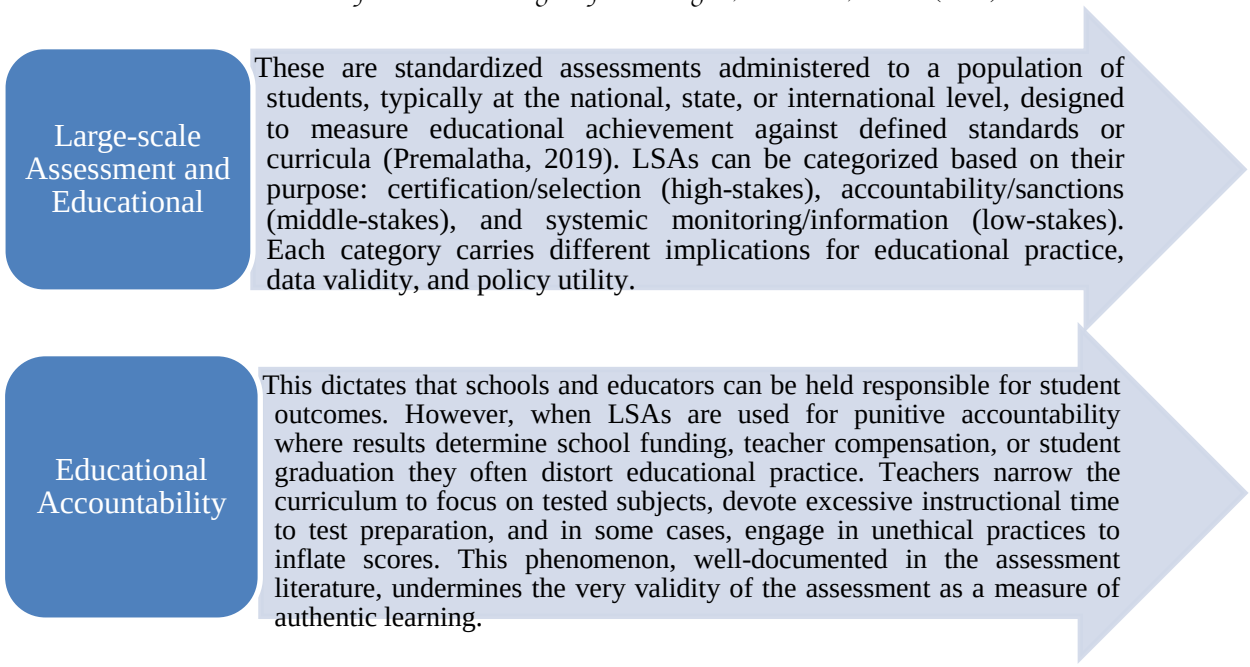


Figure 1: Diagrammatic Representation of Conceptual Framework

Theoretical Framework

This study was anchored on three theories that collectively provide a robust foundation for reimagining Nigeria's assessment system as presented in Figure 2 below:

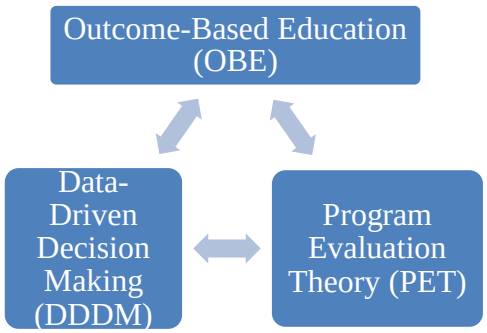


Figure 2: Diagrammatic Representation of Theoretical Review

As shown in Figure 2, OBE theory reviews that educational focus is on inputs and processes (what is taught, how long, with what resources) to the actual outcomes, what students know and can do as a result of their educational experience. OBE requires that learning outcomes can be aligned with curriculum and instruction, and robust assessment systems that verify whether outcomes have been achieved (Macayan, 2017). For OBE to be successfully implemented, a robust monitoring system can be required to verify that outcomes are being achieved across diverse populations and contexts (Umar, 2015). Nigeria's current system fails to verify OBE outcomes systemically, as NECO examinations are not designed to measure outcomes against clearly defined national proficiency levels but rather to rank students for certification purposes. Data-Driven Decision Making (DDDM) in Figure 2 posits that educational policies, resource allocations, and pedagogical strategies can be informed by empirical data rather than intuition, tradition, or political expediency (Mandinach, 2012). The utility of LSA data is central to DDDM, as large-scale assessments may provide the system-level data necessary for strategic planning. While NAEP data explicitly drives national and state policy in the United States influencing legislation, funding allocations, and curriculum standards. Nigerian assessment data from NECO is still largely

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unused for systemic decision-making (Ayua, 2022). DDDM requires not only the availability of data but also the institutional capacity and political will to use it. Program Evaluation Theory (PET) in Figure 2 shows that CIPP (Context, Input, Process, Product) model of program evaluation can provide a comprehensive framework for assessing the design, practice, and outcomes of educational programs (Aslan & Uygun, 2019). The UBE programme is a massive public intervention requiring rigorous evaluation at all four CIPP stages. Program Evaluation Theory may provide a rationale for a NAEP like assessment in Nigeria: to serve as the primary evaluation instrument to determine if the UBE programme is achieving its mandated objectives. The "Product" component of CIPP is particularly relevant, as it demands systematic assessment of learning outcomes the ultimate product of the educational system (Ayua, 2021).

Overview of Assessment in Nigeria: NERDC, UBEC, NECO, and State Assessments

Nigeria's assessment architecture is fragmented across multiple institutions with overlapping mandates and poor coordination. The NERDC, established in 1972, is responsible for curriculum development and educational research. It sets the 9-year Basic Education Curriculum that governs instruction from primary 1 through JSS 3 (NERDC, 2013). Also, UBEC, established by the UBE Act of 2004, oversees the national practice of nine-year basic education. Also, NECO, established in 1999, administers the standardized national summative evaluations, most notably the Basic Education Certificate Examination (BECE) at the end of Junior Secondary School (JSS3), which serves as a major high-stakes promotional benchmark for transition into senior secondary tracks. Additionally, state-level assessment managing local primary and junior secondary school evaluations, Continuous Assessment (CA) frameworks, and state-specific promotional examinations (Ayua, 2019). This fragmentation results in a disjointed system where the curriculum and the practice and the assessment which are poorly aligned. There is no statutory bridge that compels NECO to format its assessments to provide feedback to NERDC or UBEC, resulting in an accountability vacuum. The UBE Act mandates monitoring and evaluation, but the institutional framework for doing so is weak, underfunded, and lacks the technical sophistication necessary for credible large-scale assessment. This fragmentation is not merely bureaucratic but can reformed to achieved its educational improvement just like a quality assurance mechanism used by the local state assessment bodies (Ayua et al., 2026; Ayua et al., 2021).

Features of National Assessment of Educational Progress (NAEP)

The key features of NAEP are presented in Figure 3.

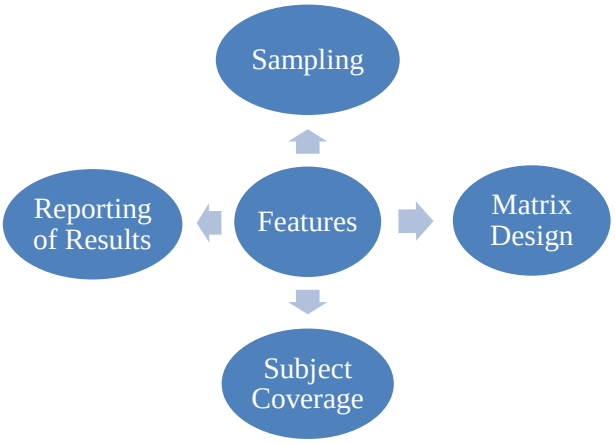


Figure 3: Schematic Representation of NAEP Features

NAEP's technical superiority lies in its sampling and item designs, which together represent the pinnacle of modern assessment engineering: Sampling as presented in Figure 3 reveals that NAEP does not test every student. It uses a complex, multistage stratified probability sample to select schools and students that are representative of the national population. The sampling design ensures that results can be generalized to the entire population with known margins of error. This drastically reduces the testing burden and cost compared to census-based testing. Matrix Design in Figure 3 shows that no student takes the entire NAEP assessment. Each student takes only a small portion of the total item pool typically three 15-minute blocks of items. Items are systematically rotated across student groups using a spiraled design. This allows NAEP

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to cover a broad and deep curriculum framework without exhausting any individual student. The matrix design is the technical innovation that makes comprehensive curriculum coverage feasible without overburdening students or schools.Subject Coverage in Figure 3 explains that NAEP periodically assesses mathematics, reading, science, writing, arts, civics, economics, geography, and history, ensuring a broad view of educational outcomes rather than a narrow focus on literacy and numeracy. This broad coverage reflects a commitment to a comprehensive vision of education that goes beyond the basic skills often emphasized in high-stakes accountability systems. Reporting of results as presented in Figure 3 explicates that results are reported at the national and state levels, disaggregated by demographic variables including race/ethnicity, gender, socioeconomic status, English learner status, and disability status. Crucially, NAEP does not report individual student or school scores, reinforcing its low-stakes nature. Results are reported in terms of achievement levels and scale scores. The reporting format is designed for policy audiences rather than individual diagnostic use.

Strengths of NAEP: Independence, Technical Rigor, and Public Reporting

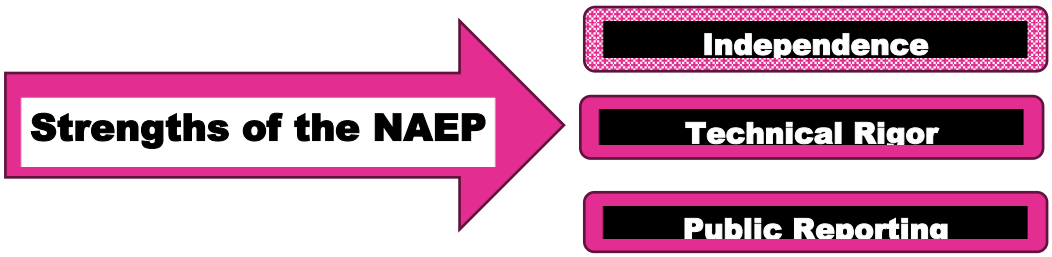


Figure 4: Diagrammatic representation of Strengths of the NAEP

The strength of NAEP as shown in Figure 4 is its institutional independence. Managed by the National Center for Education Statistics (NCES) within the U.S. Department of Education (Solem, 2022). NAEP is buffered from political control. This independence guarantees technical rigor item development, scaling, and equating are conducted by leading psychometricians using state-of-the-art methodologies. NAEP's technical reports are publicly available and subject to peer review, ensuring transparency and continuous improvement. Furthermore, public reporting ensures transparency; the data is available to all stakeholders, fostering democratic accountability (Braun & Qian, 2005). NAEP results are released through public events, press releases, and an interactive website, generating media coverage that keeps educational issues in the public discourse.

Challenges

The Nigerian assessment system is riddled with challenges that collectively undermine its utility for educational improvement as show in Figure 5.

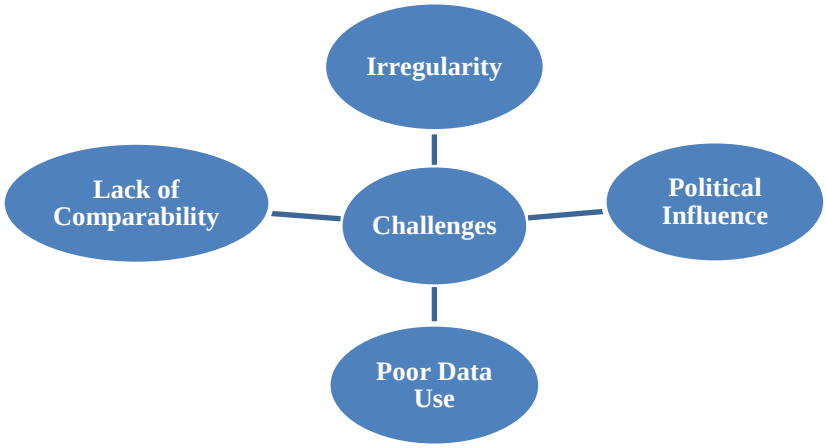


Figure 5: Schematic Representation of Challenges

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Irregularity in Figure 5 explains that UBEC's National Assessments are not conducted on a regular cycle (e.g., biennially or quadrennially), making it impossible to track longitudinal trends in learning outcomes (Akinloye, 2020). When assessments are conducted sporadically and with different methodologies, the data cannot be compared across time, rendering trend analysis impossible. Political Influence explicates that NECO and state examination bodies are highly politicized. Appointments to leadership positions are often based on political patronage rather than technical competence and creative thinking (Ayua et al., 2022; Ayua & Agbidye, 2020). There is immense pressure to pass students and release "favorable" results, leading to grade inflation and compromised standards. Poor Data Use reveals that the massive datasets generated by NECO BECE are used almost exclusively for certification and student placement. The data is not mined for policy feedback. Item-level analyses that could reveal systemic weaknesses in mathematics or reading are rarely, if ever, conducted or disseminated to NERDC or UBEC (Akinloye, 2020). This represents a colossal waste of data every year, millions of student responses are collected, processed, and discarded without generating any insight for system improvement. Lack of Comparability in Figure 5 presents that because NECO exams change in difficulty and format from year to year, and because state exams vary wildly, there is no common national metric for basic education achievement. A score of 70 in NECO one year may represent a different level of achievement than a 70 the next year, making the data meaningless for tracking progress (Terhemba & Ayua, 2025; Akinloye, 2020).

Lessons from NAEP for Nigeria

Based on the analysis of Nigeria's current assessment and monitoring system, its lesson can be significant to a study.

1. Need for an Independent National Assessment Body

The most critical lesson from NAEP is the necessity of institutional independence. Nigeria must separate its national monitoring assessment from the certification bodies (NECO) and the direct control of the Federal Ministry of Education. If the body responsible for monitoring learning outcomes is also subject to political pressures to show improvement, the data will be inherently untrustworthy. An independent National Assessment Governing Board for Nigeria, modeled on the U.S. NAGB, is essential. This body would set the assessment frameworks, determine the achievement levels, and oversee the technical administration of a "Nigeria's Report Card," insulated from political interference and exam fee revenue dependence. Independence must be enshrined in legislation, with clear protections against political interference in the appointment of board members, the setting of achievement levels, and the release of results. The model for such independence exists in other Nigerian institutions also.

2. Adopting Sampling and Matrix Models to Reduce Testing Burden

Nigeria's attempt to test every student in the country through NECO is logistically disastrous and psychometrically flawed for monitoring purposes. Adopting NAEP's sampling methodology could revolutionize the system. By testing a rigorously selected representative sample of students across the 36 states and FCT, Nigeria could obtain accurate national and state-level data on learning outcomes at a fraction of the current cost. The statistical basis for sampling is well-established. A properly designed sample of approximately 25,000-30,000 students, stratified by state, school type, and demographic characteristics, can provide estimates of national achievement with margins of error of less than 1 percentage point. This compares to the millions of students tested in the current census-based approach, with no greater accuracy and considerably more logistical challenges. Furthermore, implementing a matrix design would allow Nigeria to assess a comprehensive range of subjects and cognitive domains without overburdening individual students (Fullan, 2007).

3. Using Assessment Data for Policy and Resource Allocation

NAEP shows that the true value of an assessment lies in its use. Nigeria must transition from an "assessment of learning" (for certification) to an "assessment for learning" (for systemic improvement). This transition requires both technical capacity and political will. The data from a NAEP-adapted model may be legally mandated to inform UBEC's resource allocation. For instance, if the data reveals that girls in the North-East are underperforming in numeracy, UBEC and the Federal Ministry must direct targeted interventions, teacher training, and resources to that specific demographic. This is the essence of data-driven decision making using empirical evidence to guide the allocation of scarce educational resources. Furthermore, the data must be systematically fed back to NERDC to identify curriculum areas that are failing to translate into student learning. NERDC can use this data to revise curriculum materials, develop targeted teacher support materials, and prioritize professional development in identified areas of weakness.

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4. Reporting for Equity: Disaggregating Data by Region, Gender, and School Type

Nigeria is a highly heterogeneous society with profound educational inequalities. National average scores, often reported by UBEC, mask these disparities. A key lesson from NAEP is the necessity of data disaggregation. A Nigerian national assessment must report results by geo-political zone, state, urban vs. rural location, gender, school type (public vs. private, UBE vs. non-UBE), and disability status. Only through such granular reporting can the equity goals of SDG 4 and the UBE Act be monitored. If the assessment does not shine a light on the marginalized, it fails its primary purpose (UNESCO, 2020). The equity dimension is critical in the Nigerian context, where disparities between the North and South, between boys and girls, and between urban and rural schools are stark and persistent.

Proposed Conceptual Framework: "NAEP-Adapted Model for Nigeria"

Based on the preceding analysis, this paper proposes the "NAEP-Adapted Model for Nigeria" (NAM-Nigeria). This framework is not a wholesale transplant of the American system, but an adaptation of its core principles to the Nigerian socio-political and educational context. NAM-Nigeria rests on four pillars: Independence, Alignment, Use, and Transparency.

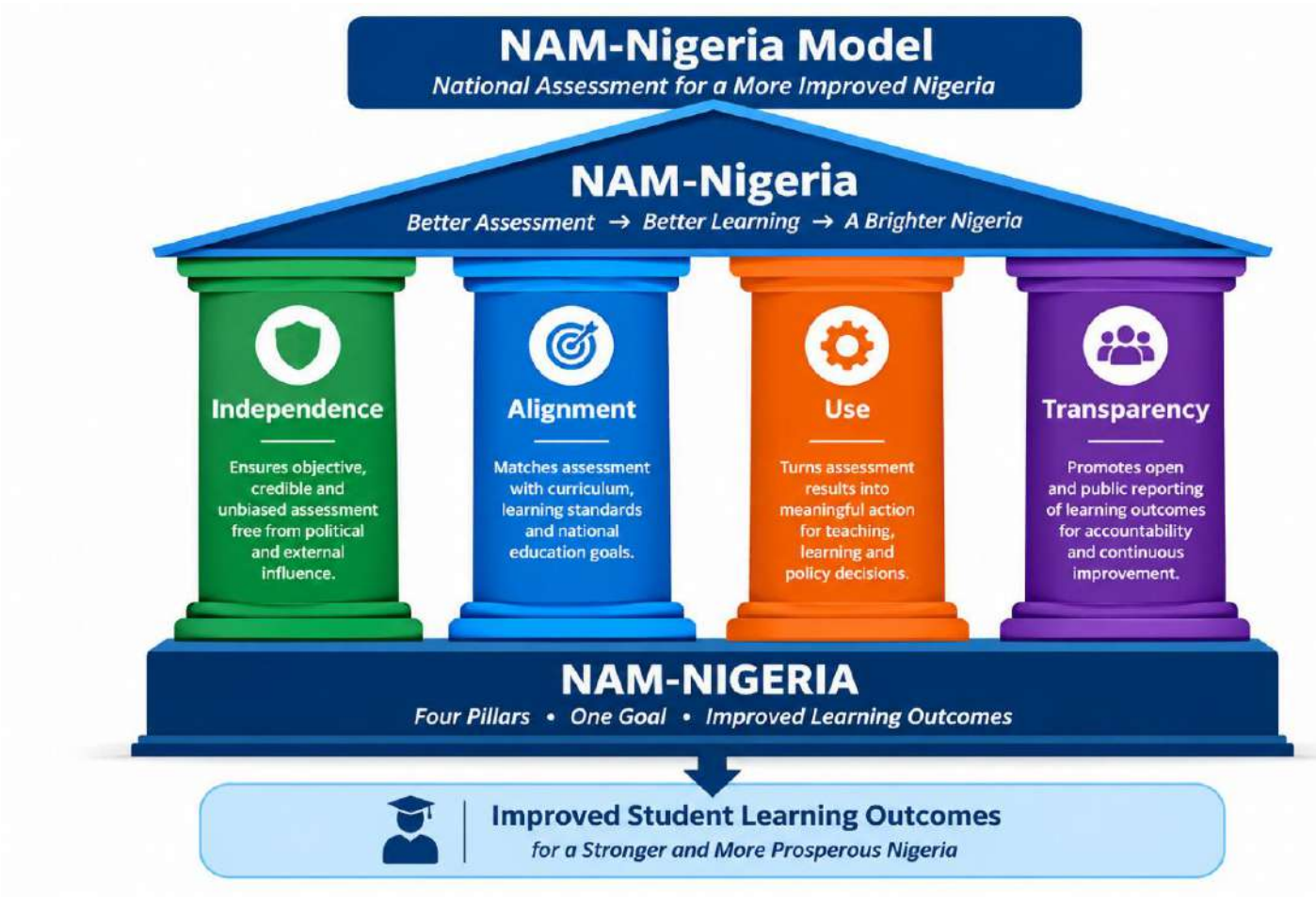


Figure 6: Diagrammatic Representation of a NAEP Model

1. Independence: Statutory Body Under UBEC/NERDC Free from Exam Pressure

NAM-Nigeria proposes the establishment of the "National Assessment and Monitoring Agency" (NAMA) as an independent statutory body. While it would collaborate with UBEC and NERDC. NAMA may be governed by an independent board comprising psychometricians, subject matter experts, civil society representatives, and teachers. The Governing Board can be appointed through a transparent process involving stakeholder nominations, with members serving

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fixed terms that are not co-terminous with political administrations (Ayua, 2019). The Director-General of NAMA may be a recognized assessment expert, appointed based on technical qualifications rather than political affiliation. The Board can include representatives from the Federal Ministry of Education, UBEC, NERDC, the National Teachers' Institute, civil society organizations, and the Nigerian Academy of Education, ensuring diverse perspectives while maintaining independence from any single governmental body.

2. **Alignment: Link Assessments Directly to Basic Education Curriculum and SDGs**

The NAMA assessment frameworks would be directly derived from the NERDC Basic Education Curriculum. This ensures that the assessment tests what the curriculum intends to teach. The framework development process would involve NERDC curriculum specialists, subject matter experts, classroom teachers, and assessment professionals, working collaboratively to define what students can know and be able to do at key grade levels. The assessment design must move beyond multiple-choice questions to include constructed-response items that measure higher-order thinking, using sophisticated matrix sampling to make this logistically feasible. Alignment also requires attention to the language of assessment. In a multilingual society like Nigeria, decisions about language of instruction and assessment are complex and politically sensitive.

3. **Use: Mandate Data Use for Planning, Teacher Training, and Intervention**

Under the NAM-Nigeria framework, data use is mandatory, not discretionary. The enabling legislation for NAMA must require UBEC and State Universal Basic Education Boards (SUBEBs) to utilize the biennial assessment report for strategic planning. This mandate should specify the types of decisions that must be informed by assessment data, including resource allocation, teacher deployment, curriculum revision priorities, and intervention design (Elems-Ikwegbu, 2023). NAMA can publish "Item Maps" showing what students at various achievement levels can do. These item maps translate statistical results into educational descriptions, making the data accessible and actionable for practitioners. Teacher training institutes and the National Teachers' Institute (NTI) may use these maps to redesign pedagogical modules. If the data shows, for example, that students struggle with algebraic reasoning but excel in arithmetic, teacher professional development can be adjusted accordingly (Ayua, 2022).

4. **Transparency: Public Annual Reporting of Learning Outcomes**

NAM-Nigeria could mandate the public for the release of a "Nigeria's Report Card" every two years. This report can be written in accessible language, highlighting national trends, state comparisons, and equity gaps. The report may include narrative descriptions of what students at different achievement levels know and can do, making the statistical results meaningful to non-technical audiences. Public reporting creates pressure on state governors and education commissioners to address failing systems. It empowers parents and civil society organizations to demand accountability. Transparency is the mechanism by which monitoring translates into systemic improvement (Fullan, 2007). The report may be released through a public event, accompanied by media engagement and stakeholder consultations. NAMA can maintain an interactive website where citizens can explore the data, compare states, and track trends over time.

Implications for Policy and Practice

The Policy implication of NAEP is comprised of the Federal ministry of Education, UBEC, NERDC and State Schools.

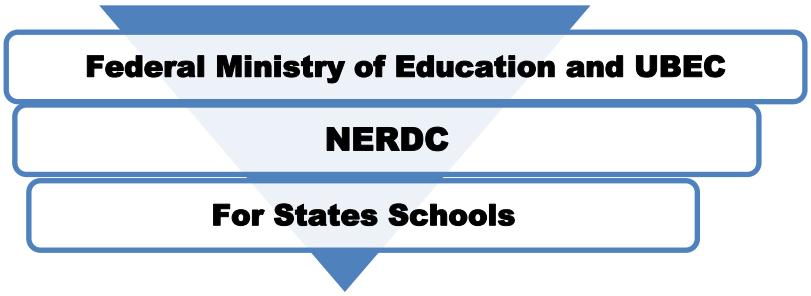


Figure 7: Schematic Representation of Policy Implication

1. **For Federal Ministry of Education and UBEC: Legal and Funding Reforms**

The implication of this conceptual analysis for the Federal Ministry of Education and UBEC is the need for statutory reform. The current legal framework prioritizes NECO and WAEC for certification purposes but provides no statutory

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basis for a national monitoring assessment. A new Act of the National Assembly is required to establish NAMA, defining its independence, mandate, and funding stream. Funding could be derived from the UBEC 2% Consolidated Revenue Fund (Umar, 2015). The legal reform may address the relationship between NAMA and existing assessment bodies. NECO can continue to administer certification examinations, but its data may be complemented by NAMA's monitoring data. The legislation could require NECO to share its assessment data with NAMA for secondary analysis, maximizing the utility of existing data collection efforts.

2. For NERDC: Curriculum-Assessment Alignment

For NERDC, the implication is a shift in how curriculum is evaluated and revised. NERDC relies recently on feedback from the classroom and sporadic research, with major curriculum revisions occurring approximately every decade. With NAM-Nigeria, NERDC will have a continuous, empirical data stream showing exactly which curriculum objectives are being achieved and which are failing. This will require NERDC to adopt a more agile approach to curriculum revision, using assessment data to refine content and pedagogical guidelines regularly, rather than waiting for a major curriculum overhaul every decade. NERDC could use NAMA data to evaluate the implementation fidelity of the curriculum. If the assessment reveals that students are not achieving certain outcomes, it may be because the curriculum is not being implemented as intended.

3. For States Schools: Use Results for School Improvement, Not Punishment

For state governments schools, the NAM-Nigeria framework implies a cultural shift in how assessment data is perceived and used. Schools selected for the sample must understand that the assessment is a diagnostic tool, not an inspector's hammer. Results should not be used to sack teachers or close schools, as punitive uses of data lead to score inflation and manipulation. Instead, school leaders should be trained in DDDM, using the disaggregated data and item maps to identify specific weaknesses in their instruction and design targeted school improvement plans (Mandinach, 2012). This requires investment in data literacy for school leaders and teachers, helping them understand and use assessment data for instructional decision-making. Building this trust, honesty, integrity, and objectivity requires clear communication about the purpose of the assessment and consistent adherence to the principle that results mostly in the science educational environment (Ayua, 2018).

Conclusion

The learning crisis in Nigeria's basic education sector is basically a crisis of information. Without a credible, technically rigorous, and policy-driven assessment system, the nation cannot diagnose the depth of its educational deficits, target interventions effectively, or track progress toward SDG 4. The current reliance on high-stakes certification bodies like NECO provides a false sense of achievement, obscured by malpractice and grade inflation, while offering no useful feedback for systemic reform. The National Assessment of Educational Progress (NAEP) in the United States provides a compelling blueprint for how a large-scale assessment can function as a true "Nation's Report Card." Through its institutional independence, sophisticated sampling and matrix designs, and commitment to disaggregated data for policy feedback, NAEP monitors educational health without distorting educational practice. Its success over more than five decades shows that monitoring assessments can coexist with, and indeed strengthen, certification systems by providing the systemic feedback that high-stakes assessments cannot generate. Nigeria cannot copy NAEP wholesale, but it can and must adapt its foundational principles. The proposed "NAEP-Adapted Model for Nigeria" (NAM-Nigeria) offers a conceptual pathway to transform the country's assessment paradigm. By establishing an independent National Assessment and Monitoring Agency, adopting sampling methodologies to reduce the testing burden and eliminate cheating, mandating the use of data for resource allocation and teacher training, and publicly reporting learning outcomes to drive equity, Nigeria can build a credible assessment system. Such a system would not merely certify failure; it would illuminate the path to improving basic education outcomes for millions of Nigerian children, ensuring that the promise of UBE becomes a reality rather than a policy rhetoric. The transformation requires political will, legal reform, technical investment, and a cultural shift in how assessment data is perceived and used. But the alternative continued reliance on a broken system that generates unreliable data for certification while providing no guidance for improvement is untenable. Nigeria's children deserve an educational system that is accountable to evidence, not to political expediency. NAM-Nigeria provides the conceptual foundation for such a system.

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Relevance of Cohesion in Digitally Delivered Sermons among Christian religious preachers

NWAEBELE, Augustina[1]
nwaebeleaugustina@gmail.com

OKEKE, Fidelia Azuka[1]
[1]Chukwuemeka Odumegwu Ojukwu University, Igbariam Campus

Abstract

The innovations in technology is providing Christian religious preachers in different parts of the world with a tool and a channel for reaching their members and non-members in different parts of the world. Preachers currently upload their sermons on social media platforms, such as YouTube, where viewers all over the world can listen to their religious teachings. These sermons, though bearing several messages, are logically delivered to ensure that meaning is not lost. One of the key linguistic devices that helps them achieve this feat is cohesion. The aim of this study, therefore, is to identify the use of cohesion in sermons delivered digitally. It collected data from four sermons delivered by two Nigerian and two non-Nigerian Pentecostal church preachers. These sermons were sourced from YouTube. Their audios were transcribed into text, after which it was qualitatively analysed through the theoretical perspective of Halliday and Hasan's (1976) theory of cohesion. Findings show the use of grammatical and lexical cohesions, which were achieved with grammatical and lexical cohesive devices, respectively. The study also discovered that the cohesive devices helped the preachers to make references, ensure clarity, show relationships, and connect ideas. It concluded that cohesion plays important roles in sermons delivered digitally.

Keywords: sermons, cohesion, cohesive devices, theory of cohesion

Introduction

Language is a system of communication that is very important in human society. It is used for delivery of messages, influencing behaviours, and persuading others. Language is used by different social institutions, including religious organisations, to make communication easier. One of the ways language is used in religion is in delivering sermons. A sermon is religious discourse that preachers, priests and pastors deliver to their audience. It is delivered during religious activities and can be broadcast in churches, streets, and, recently, the social media. Preachers use this medium to teach the doctrine of their religion, desirable morals, acceptable behaviours, and preferred attitudes (Akinwolu, 2021). Hence, it acts as the tool used by religious leaders to direct the lives and actions of their followers. Sermons can be brief or long. However, despite the length of a sermon, it needs to be logical and deliver a wholesome meaning. Faleye and Fajobi (2019) explain that the discourse are created prosodic features, such as intonations, changes in pitches, vowel lengthening, and stress, which enable listeners follow the preaching and identify the delivered messages. Adedun and Mekiluwa (2010) further identify the use of figurative expressions, especially metaphors and analogies, in sermons to ensure clarity. Akinwolu (2021) also states that the terms used in sermons always align with doctrines of the concerned religion. The observations of these scholars reveal different ways of composing sermons, however they did not explain how sermons coherently move from one idea to another. In other words, there is a need to find how cohesion is achieved in sermons. The aim of this study is to examine sermons delivered and broadcast on the internet in order to discover how the ideas and messages in them are logically connected. Specifically, the study identifies the kinds of cohesion in sermons, how cohesion is achieved with cohesive devices, and the roles played by the cohesive devices. With that, the study shows how preachers use the internet to deliver sermons successfully without creating confusions or ambiguities.

Concept of Cohesion

Cohesion, according to Guna and Ngadiman (2015), is a linguistic device that is used to connect words, phrases, clauses, and sentences. Galis et al. (2020) describe it as a form of bond created by utterances to show their relationship. Tywoniw and Crossley (2019) agree that it is not only a connection of linguistic structures but also a connection of ideas within a text. They state that such ideas may be scattered across several parts of the texts, however, the cohesive devices used in the text help to connect and bind them. This explains why Ahmad (2019) see it as a type of semantic tie. This study, therefore, perceives cohesion as the connection between different linguistic structures as a result of the semantic relationship they share. There are two basic types of cohesion. These are grammatical cohesion and lexical cohesion (Fitriati & Yonata, 2018). Grammatical cohesion is the type of linguistic connection that is achieved through the use of grammatical structures,

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such as substitution (using words, phrases or clauses to replace a previously mentioned linguistic item), reference (a word that identifies or points to another word or entity in the text), and ellipsis (replacing a word, phrase or clause with nothing). Lexical cohesion, on the other hand, is built with words that are semantically related or connected in one way or the other. This type of cohesion is achieved with the use of lexical cohesive devices, such as synonyms (words connected by similarity in meaning), antonyms (words connected by being opposite in meaning), collocation (words that usually go together), and repetition.

Previous Studies on the Use of Language in Sermons

The use of language in sermons is a topic of interest to many researchers, who seek to discover how the preachers construct meaning with the communicative device. Among the researchers that have conducted related studies are Ajayi (2019), Emeka-Nwobia (2017), Ugot and Offong (2013), Okeke (2019), Obioma (2018), and Asiamah and Israel (2022). Ajayi (2019) examined the generic structure of Christian street evangelism through the perspective of Halliday and Hasan's Generic Structure Potential Theory and observes that the sermons delivered by evangelists on the streets of South-West Nigeria are made up with prayers, songs, greetings, and sermons. However, he did not focus on how these components are successfully merged to achieve cohesion. Emeka-Nwobia (2017) focused on the use of language in sermons to attract and retain members. She conducted a thematic analysis of selected sermons through the lens of Faircough and van Dijk Critical Discourse Analysis and identified the occurrence of certain themes, especially themes surrounding demonic oppression, witchcraft, family conflict, and poverty. The study concluded that preachers use language in their sermons to construct and instil certain ideologies. However, for such ideologies to be constructed, the sermons need to flow logically and the present themes need to be connected. Unfortunately, Emeka-Nwobia did not focus on how the preachers achieved this logicality.
In their study, Ugot and Offong (2013) examined how the language used by a church aligns with its doctrine. After studying the prayers and sermons of different churches through the perspective of Consumer or Gratification Model of Communication, they discovered that churches use expressions that align with their doctrines. This linguistic analysis reveals the use of rhetorical questions, tags, neologism, and code-switching in the sermons. Nevertheless, there is no identification of the cohesive devices used in the study. Obioma (2018) also studied the use of words in sermons through the perspective of Halliday's Systemic Functional Linguistics without focusing on the use of cohesion in the religious discourse. However, he discovered that the words used in sermons show the socio-economic conditions of the country. Okeke (2019) studied how Nigerian Pentecostal church preachers use sermons to attract members. The study was anchored on cohesive, rhetorical and speech act theories as the theoretical framework. It was discovered that the church preachers use grammatical cohesive devices (especially substitution and reference), rhetorical devices (logos, pathos, and ethos), and illocution (directive, representative, and declarative) in their sermons. Asiamah and Israel (2022) explored the use of cohesive devices in sermons through the perspective of Halliday and Hasan's cohesion of English theory, which is the theory adopted by the current study. They discovered that the sermons were created with references, substitution, repetition, ellipsis, conjunction, and collocation. The studies conducted by Okeke (2019) and Asimah and Israel (2022) are closely related to this current study and they provided an insight into the types of cohesive devices used to create cohesion in sermons. However, they did not specify the roles of cohesion in sermons that are delivered digitally.

Theoretical Framework

This study adopts Halliday and Hasan's (1976) theory of Cohesion as its theoretical framework. This theory explains that communication if connected through the use of cohesion. It identifies two types of cohesion, which are grammatical and lexical cohesion. They explain that grammatical cohesion is achieved when grammatical cohesive devices, such as reference, substitution, conjunction and ellipsis are used. However, lexical cohesion is achieved with the use lexical cohesive devices, which include synonyms, antonyms, metonyms, hyponyms, collocations, and repetitions.

Reference is the linguistic structure that is used to create a semantic relation between ideas, words, phrases, and sentences so that the full interpretation of one is found in another. It includes personal pronouns (words used in place of a noun), comparative reference (words that show similarities and differences), and demonstrative reference (words that show the position of an item). Substitution is a word, phrase or sentence that is used to replace another previously mentioned linguistic item while ellipsis is the omission of a linguistic item or the replacement of a word, phrase or clause with nothing.

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Conjunction is a word used basically to join other words, phrases, clauses, sentences or paragraphs. Synonyms are words that share similar meanings; antonyms are words that share opposite meanings; metonyms are components of an item that is used to represent the whole; and hyponyms are words that indicate specificity by stating the member of a broader class. Furthermore, collocation are words that usually occur together and repetition (sometimes referred to as reiteration) is the reoccurrence of a specific word, phrase, clause or sentence within a text. The perspective of Halliday and Hasan's theory of cohesion provides this study with the perspective for examining the selected sermons to identify the type of cohesion used by the preachers to deliver them. With that, the study is able to discover how the preachers successfully make their sermons meaningful to their audience.

Research Methodology

The data for this study were collected from four sermons that were delivered by four different Pentecostal church pastors - Joel Osteen (of Lakewood Church), Kenneth Copeland (of Eagle Mountain International Church), Paul Enenche (of Dunamis International Gospel Centre), and David Oyedepo (of Living Faith Church Worldwide). These pastors were purposively selected because they have large followership, which the researchers believe is as a result of the inspirations from their sermons. The selected sermons were downloaded from their official YouTube accounts and then transcribed into texts to enable in-depth analysis. Qualitative analysis method was adopted and Halliday and Hasan's Theory of Cohesion in English provided the theoretical perspective for conducting the analysis.

Data Presentation and Analysis

The presentation and analysis of data is segmented into two parts to capture the use of grammatical and lexical cohesion.

Grammatical Cohesion in Selected Sermons

Table 1 presents examples of sentences that formed grammatical cohesion in the sermons. They reveal that the preachers achieved this type of cohesion with grammatical cohesive devices, such as references, substitution, ellipsis and conjunction.

Table 1: Grammatical Cohesive Devices in Selected Sermons

s/n	Excerpts	Preacher	Cohesive Device
1.	*They* were satisfied, *they* had something to eat, but God wasn't satisfied. *He* was taking *them* into a land flowing with milk and honey	Osteen	Personal reference
2.	If you are a good person, intending to do good with *more* money, you can do *more than* without it	Enenche	Comparative reference
3.	And today, many sitting down *here* are partakers of *that* prophetic mandate and many more are coming into it today	Oyedepo	Demonstrative reference
4.	He has enough money to start the work and no loan from any bank.	Enenche	Ellipsis
5.	Kingdom prosperity is a walk, not a game	Oyedepo	Ellipsis
6.	money affects the quality of *human* life… it affects the quality of *man's* worth life	Enenche	Substitution
7.	He had to stop what was working to force you to stretch so you can come into greater *provision*, greater *favour*	Osteen	Substitution
8.	even though he was rich, *yet* for your sake *and* my sake, he became poor	Oyedepo	Conjunction
9	Jesus went to the cross to avert every curse, *therefore*, the curse of poverty on your family linage is broken forever.	Oyedepo	Conjunction
10	determine how you want to touch human lives *first*, *then* you can go for the money that will help you to do it	Enenche	Conjunction

The person reference (no. 1) captured on the table shows how personal pronouns (in bold) are used as cohesive devices. The pronouns, 'they' and 'them', were used to refer to the Israelites, who were mentioned in a previous sentence, while

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the pronoun, 'he', was used to refer to 'God'. The comparative references (no. 2) show the degree of similarities and difference between the ideas the preacher was describing while demonstrative references (no. 3) act as the pointers of what the preacher was referring to. The ellipsis (nos. 4 & 5) achieved cohesion by eliminating the subject and verb in the second clause. In the case of substitution (nos. 6 & 7), the second words in bold ('man' and 'favour') were used to substitute the first words in bold ('human' and 'provision'). The preachers used conjunction (nos. 8-10) to join ideas (no. 8), show cause-effect relationship (no. 9), and reveal sequence of occurrence (no. 10).

Lexical Cohesion in Selected Sermons

Table 2 shows how lexical cohesion is achieved in the selected sermons through the use of repetition, synonyms, antonyms, metonyms, and collocations.

Table 2: Lexical Cohesive Devices in Selected Sermons

s/n	Excerpts	Preacher	Cohesive Device
1.	And they came to him *every day, every day every day*	Copeland	Repetition
2.	We know we have his *favour* but it feels like that *favour* has been taken away.	Osteen	Repetition
3.	*refuse* every form of addiction to money; *reject* every form of addiction to money.	Enenche	Synonym
4.	when he *authorised* him, he *empowered* him	Copeland	Synonym
5.	People that will *help* you and not *hinder* you	Osteen	Antonym
6.	But when you *sow* to it, that seed has *harvest* in it	Copeland	Antonym
7.	I was supposed to step up and pastor the *church*	Osteen	Metonym
8.	possess *kingdom* vision	Enenche	Metonym
9.	Father, we thank you *in Jesus name*	Copeland	Collocation
10.	it only defines *divine favour*	Oyedepo	Collocation

Table 2 shows instances, where lexical cohesive devices were used in the selected sermons. The captured devices are repetition, synonyms, antonyms, metonyms, and collocations. The repetitions were used for making emphasis while the synonyms, antonyms and metonyms were used to ensure clarity. However, the audience can only understand what is communicated if they understand the meaning of the related terms. Collocation was used to evoke reactions from the audience (no. 9) and to reduce ambiguity (no. 10). All these devices were used to connect meanings in the sermons.

Discussion of Findings

The analysis of this study reveals the use of grammatical and lexical cohesions in the sermons delivered by Pentecostal church preachers. The study identifies the use of references, conjunctions, substitutions, and ellipsis as devices for grammatical cohesion, thereby affirming the observations of Okeke (2019). It also observes the use of repetition, synonyms, antonyms, collocations and metonyms to achieve lexical cohesion and hence affirms the findings of Asimah and Israel (2022). Furthermore, the content of data analysis shows that the identified cohesive devices are used to direct the listener's attention to the item the preacher is referring to as well to show similarities and differences. In addition, the cohesive devices enable the preachers to connect ideas, reveal time and sequence of occurrence, show relationships, and ensure clarity.

Conclusion

Technology has provided an avenue for religious organisations to reach out to their members in different parts of the world. It is currently used as a medium for broadcasting sermons and conducting other religious activities. The sermons broadcasted on social media platforms, such as YouTube, are logically organised to move from one idea or information to another. This study identifies the use of cohesive devices to ensure the connectedness of the ideas in sermons as well as to ensure clarity. In other words, cohesion is important in sermons because it ensures that the audience receive the messages they contain as a singular coherent piece of information.

Recommendations

Based on the findings of this study, the following recommendations are made:

1. Religious organisations should use social media and other tools of the internet to broadcast their sermons.
2. Further studies should be conducted on the use of cohesion in sermons delivered by preachers of other religious sects.

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Effect of Activity-Based Learning Strategy on Understanding of Geometry Concepts among Senior Secondary School Student in Billiri, Gombe State, Nigeria

JAH, Hudung Chomo[1]
Hudungchomojah@gmail.com
KYELEVE, Iorhemen John[2]
CHIANSON-AKAA, Martha Mimi[3]
[1]Department of Mathematics and Computer Science, College of Education Billiri, Gombe State
[2&3]Department of Mathematics and Computer Science Education, Rev. Fr. Moses Orshio Adasu University, Makurdi

Abstract
This study investigated the effect of Activity-based learning strategy and its effect on senior secondary two student's understanding in geometry, Billiri, Gombe State, Nigeria. The study was guided by two research questions and two hypotheses. The quasi-experimental research design involving a pre-test and post-test was used. A population comprising of 2,881 senior secondary two (SS2) students at public secondary schools in Billiri Metropolis. Six co-education schools were selected using the simple random sampling from which 274 students (Experimental = 127 and Control = 147) from intact classes were selected to participate in the study. One validated instrument with a reliability coefficient of 0.86 tagged: Geometry Understanding Test (GUT) was used for collecting data. The experimental group were taught geometry concept using the problem-solving strategy while the Control group were taught using the conventional method. The research questions were answered using descriptive statistics (mean and standard deviation) while the research hypotheses were tested using the analysis of covariance (ANCOVA) statistics at $p \leq 0.05$ level of significance. The result of the study revealed a significant difference in understanding in favour of students exposed to Activity-based learning. With regards to gender and understanding, there is significance difference in favour of the male gender. The study concludes that the activity-based learning is effective in the teaching and learning of geometry. In addition, activity-based learning was observed to be gender friendly. Based on these finding, it was recommended that teachers should employ the activity-based learning in the teaching of geometry at the senior secondary school level to enhance students' understanding in geometry. Also, workshops and seminars for mathematics and science-based teachers should be organized by the Gombe State Ministry of Education in Billiri, Gombe State on the use of the activity-based learning in classrooms.
Keywords: Understanding, Activity-Based Learning (ABL), Geometry, Secondary School Students

Introduction
Geometry remains one of the pivotal strands of mathematics education at the senior secondary school level in Nigeria, given its foundation role in developing spatial reasoning, logical thinking and real-life problem solving (Mark, 2016 as cited in Joseph, Ubebe & Aneshe-Otapha, 2022) however, research consistently reports that Nigerian students often struggle with geometry concepts, demonstrating low achievement and weak conceptual understanding (Josehp) et al, 2022. These challenges have attributed in part to traditional teacher-centered instructional method, large class sizes, limited set of manipulatives or active strategies, and low students' engagement (Dairo, Owonkwo, & Arekwe, 2023). In contrast, pedagogical approaches that engage students actively through tasks, manipulatives, peer interaction and hands-on experiences, commonly referred to as Activity-based learning (ABL) have shown internationally to improve understanding, motivation, and retention in Mathematics and in geometry (Adam & Enu, 2023). ABL emphasizes that learners explore, manipulative experiment and reflect, thereby aligning with constructivist and active learning theories which posit that knowledge is constructed rather than passively received (Priyono & Boedi, 2017), as cited in Joseph et al., 2022). In the Nigerian context, teachers' perceptions of ABL are becoming more favourable, yet its implementation is still challenged by resource constraints, class size and insufficient professional development (Dairo et al, 2023). While several instructional strategies have been investigated in geometry in Nigeria, such as laboratory-based method (Ajai & Ogugbile, 2021) and inquiry-based learning (Joseph & Ayodele, 2025), there remains a relative paucity of studies that apply Activity-based Learning specially with senior secondary two (SS2) students in geometry in Nigerian context. For instance, Durojaiye, Jekayinfa and Oloda (2023) examined the effect of Activity-Based Instructional Strategy on retention in circle geometry among SS2 students in Abuja and found significant benefits in favour of ABL group. However, their study focused on retention rather than broad understanding, and on a specific sub-topic (circle geometry). This suggests a gap in applying ABL broadly within geometry and measuring its effect on understanding of geometric concepts in SS2 classes. Activity-

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Based learning approach is a procedure where students are actively engaged in the lesson rather than just sitting, listening, and copying notes. This is an experimental learning class where students participate actively in the learning process. Rodwell (2017) has stated that positive learning experiences are more permanent. One of the basic features of activity-based learning is that one which appeals to different emotions and allows for different learning styles. The researcher also indicated that the process is entertaining for both the teacher and the learner, and that activity-based learning is more efficient than other methods when it comes to learning many things (Rodwell, 2017). Activity- based learning includes games, music, and nursery rhymes in the learning process. Such an activity can be entertaining for children; it is based on the 3Cs of curiosity, creativity, and collaboration.

The theory of understanding that was propounded by Richard Skemp in 1987 was used in this study. According to Skemp, learners construct schemata to link what they already know with new learning. Skemp observed that mathematics involves an extensive hierarchy of concepts – we cannot form any particular concept until we have formed all the subsidiary ones upon which it depends. He suggested that emotions play a dominant part in the way in which we learn. The theory provides two kinds of learning in mathematics:

1. Instrumental understanding: A mechanical, rote or 'learn the rule/method/algorithm' kind of learning (knowing how to do something), and
2. Relational understanding: A more meaningful learning in which the learner can understand the links and relationships (knowing why something works) which give mathematics its structure (which is more beneficial in the long term and aids motivation).

Geometry is that aspect of mathematics that enables man to make prediction about the world. Geometry came into being independently in a few early cultures of humanity as practical ways for dealing with lengths, areas and volume of objects and this has influences on many fields such as architecture, physics and other branches of mathematics (Zuya & Kwalat, 2015). According to Kurumeh, Obarakpo, Odoh and kyereve (2016) geometry is seen as a basic and important branch of Mathematics that deals with the study of size, shape and position of 2- dimensional shapes and 3-dimensional figures. Geometry is a branch of Mathematics that deals with points, lines sizes, angles, surfaces, solids and shapes. Geometry is included in most of the school curricula over the world considering its considerable benefits and application in life (Arici & Aslan-Tutak, 2013). They further noted that geometry instruction develops students' spatial and perceptual abilities to interpret the dimensionality of the physical world. Geometry appears naturally in the structure of the solar system, a geological formation, rocks and crystals, plants, and flowers, and even in animals. It is also a major part of the synthetic world such as art, architecture, cars, machines and virtually everything humans create (Fabiyi, 2017). Gender is included as a moderating variable because previous Nigerian studies have examined whether male and female students respond differently to problem-solving instruction in geometry (Obinatu & Omebe, 2025; Shu'iabu & Sidi, 2020).

Susilawati, Suryadi, and Dahlan (2017) explained that geometry teaching is expected to provide an attitude or to visualize the relationship and characteristics of geometrical spaces. They emphasize that students should be provided with the opportunity and sufficient supporting learning media so that they can observe, explore, and find out geometrical principles through informal activities before applying what they have informally learned in their formal learning activities. Andriani (2020) in a study titled understanding the concept of geometry through the connected Mathematics project learning by using online media and local culture, acknowledge that Mathematics learning is very important, but it is found to be very difficult for the students. The connected mathematics project-based learning (CMP) is mathematics learning that raised everyday problems in life to explore mathematical ideas so as to foster the student-centred learning environment to solve their problems by an investigation. Samosir, Dahlan, Herman, and Prabawanto (2023), in their study titled "exploring students' mathematical understanding according to Skemp's Theory in Solving Statistical Problems" aimed at exploring students' conceptual understanding. The research was qualitative research with phenomenology. The results of this study are as follows. (1) students with relational understanding are fewer in number than students with instrumental understanding. (2) students find it most difficult to use the interconnections of various mathematical concepts in solving problems. (3) students' difficulties are due to their lack of ability in the concept of basic operations and their lack of

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understanding of the problems. Nurjanah, Jarnawi, and Wibisono (2021), in their study titled the effect of hands-on and computer based learning activities on conceptual understending and mathematics reasoning, compared two treatments namely the use of hands on activity media and computer-based media on the conceptual understanding of mathematics and the reasoning ability of students. The results showed that; the ability to understand mathematical concepts from groups of students who use computer-based media differs significantly from groups of students who use hands-on activity media and control groups.

Statement of the Problem

The persistent poor performance of senior secondary school students in standardized examinations such as the West African Senior School Certificate Examination (WASSCE) in Nigeria has been of great concern to stakeholders like parents, government, teachers and professional groups. They have lamented the poor performance of secondary school students particularly in Mathematics for which geometry is the aspect students find difficult leading to poor performance. In response to this condition in the education sector, attempts are made towards addressing this challenge. Geometry is one aspect of mathematics that creates phobia and anxiety among students which is evident in their outcome. Most research studies showed that geometry is one of the areas that most of the students find very difficult to handle during examinations. They cannot solve simple calculations such as determining the volume of spheres, surface area and perimeter of shapes. Therefore, this study examined how Activity-Based learning approach (problem solving) can improve students` understanding in geometry and mathematics generally.

Purpose of the Study

The main purpose of the study was to investigate the effect of activity-based learning strategy on students' understanding in geometry. Specifically, the study's objectives are to:

1. investigate the effect of activity-based learning (problem solving) strategy on students' understanding in geometry.
2. ascertain the understanding of male and female students in geometry when exposed to the ABL.

Research Questions

The following questions were raised to help as a guide to the study:

1. What is the difference in mean scores on understanding of students taught geometry using ABL and those taught using the conventional method?
2. What is the difference in the mean understanding scres of male and female students taught geometry using the ABL?

Research Hypotheses

The following hypotheses were tested at 0.05 level of significant.

1. There is no significant difference in mean understanding scores of students taught geometry using ABL and those taught using the conventional teaching method.
2. There is no significant difference in the mean understanding scores of male and female students taught geometry using ABL

Research Methodology

The research design adopted for this study was the quasi-experimental research design, which comprised of two-groups, one experimental (EG) and the other control (CG). Both groups were pretested before the administration of treatment to ensure uniformity and equivalence in performance at entry point. The treatment (X_1 - Activity-Based Learning) was administered to students in the experimental group only; while students in the control group were taught using the Conventional method which implies no treatment (X_O). A Post-test was administered after treatment to both groups of students to determine their respective performance. The target population is 4103 students (2527 males & 1576 females) from the co-educational public schools in Billiri for the 2024/2025 academic session. Six schools were selected using the simple random sampling as the sample school for the study. Six (6) intact classes from the SS2 arms were selected by simple random method from the schools. The sample for the study which comprised 274 students, 127 for the experimental group and 147 students for the control group. The researcher made instrument was used for data collection in this study which was titled Geometry Understanding Test (GUT): This is a 30-item objective test on geometry for the students to answer all. This set of questions are in line with the geometry topics for SS2. Each question has a total score of 1 mark

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therefore making the test out of 30 marks. The face and content validity of GPT was established by two experts in mathematics education and one expert in measurement and evaluation. Reliability of the instrument was estimated to be 0.86 by using kuder-Richardson (K-20) reliability method. Before treatment both experimental and control groups were pre-tested. Thereafter, the experimental group was taught geometry using the ABL. The students were given opportunity to interact with one another during the process of learning the concept while the teacher guided them in different situations. The control group was taught the same topics with the lesson plan using the conventional method. Data collected were analysed using descriptive statistics of mean and standard deviation, to answer the research questions. The hypotheses were tested using the analysis of covariance (ANCOVA) at 0.05 level of significance.

Presentation of Results

This section presents the result of data collected from the study, findings and the discussion of findings. The results for the study are presented in tables followed by report explaining the tables.

Research Question One

What is the difference in the mean scores of students' understanding between those taught geometry using Activity-based learning approach and those taught using the direct instruction method?

Table 1: Descriptive statistics for understanding between the experimental and control groups.

Strategies		Pre understanding	Post understanding	Mean gain
Activity-Based Learning Problem Solving Approach	Mean	9.82	17.18	7.36
	N	127	127	
	Std. Deviation	2.80	3.19	
Direct Instruction Method	Mean	8.86	12.32	3.46
	N	147	147	
	Std. Deviation	2.82	2.23	
Mean difference		0.96	4.86	3.90

Table 1 shows that the experimental group had a mean gain of 7.36 while the control group had a mean gain of 3.46. In addition, the mean difference was computed to be 3.90. This difference is in favour of the students exposed to the ABL who performed better than their counterparts who were taught using the conventional method.

Research Question Two

What is the effect of Activity-based learning problem solving approach on students' understanding of geometry in senior secondary schools across gender?

Table 2: Descriptive Statistics on Performance Between Male and Female in the Experimental Group

Gender		Pre understanding	Post understanding	Mean gain
Male	Mean	10.42	18.30	7.88
	N	77	77	
	Std. Deviation	2.81	2.95	
Female	Mean	8.90	15.46	6.56
	N	50	50	
	Std. Deviation	2.56	2.78	
Mean difference		1.52	2.84	1.32

From Table 2, the mean gain for male students was 7.88 while that of female students was 6.56. The mean difference in gain between the groups was 1.32. Clearly, a difference exists between the male and female students in favour of the latter. Hence the male students performed better than the females.

Hypothesis One

There is no significant difference between the mean understanding scores of students taught geometry using activity-based learning, problem solving approach and those taught using the direct instruction method.

Table 3: ANCOVA Test for Performance between Experimental and Control Groups

Dependent Variable: PostGUT

Source	Type III Sum of Squares	Df	Mean Square	F	Sig.	Partial Eta Squared
Corrected Model	2421.787[a]	2	1210.893	273.664	.000	.669

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Intercept	1843.125	1	1843.125	416.550	.000	.606
PreGUT	816.057	1	816.057	184.431	.000	.405
Strategies	1206.218	1	1206.218	272.608	.000	.501
Error	1199.104	271	4.425			
Total	61840.000	274				
Corrected Total	3620.891	273				

a. R Squared = .669 (Adjusted R Squared = .666)

Table 3 shows the summary of ANCOVA test results for experimental and control groups. The result shows that F(1,271) =272.608 ,P =.000<.005). Since the p value of .001 is less than the set significant value of the study (p< .005), the null hypothesis one was rejected. This indicates that, there is significant difference in the mean performance scores of SS2 students taught geometry using ABL and those taught using the conventional method.

Hypothesis Two

There is no significant difference between the mean understanding levels of male and female students taught using the activity-based learning problem solving approach.

Table 4 ANCOVA Test for understanding between Male and Female Students in the Experimental Group

Dependent Variable: PostGUT

Source	Type III Sum of Squares	Df	Mean Square	F	Sig.	Partial Eta Squared
Corrected Model	681.127[a]	2	340.564	69.720	.000	.529
Intercept	962.047	1	962.047	196.950	.000	.614
PreGUT	436.843	1	436.843	89.430	.000	.419
Gender	91.070	1	91.070	18.644	.000	.131
Error	605.707	124	4.885			
Total	38776.000	127				
Corrected Total	1286.835	126				

a. R Squared = .529 (Adjusted R Squared = .522)

The result in Table 4 shows that F(1,124) = .18.644, revealed a p-value of 0.514 > 0.05 was obtained. Thus, the null hypothesis 2 was rejected. This means that there is statistically significant difference between the mean score of male and female students taught geometry using ABL.

Discussion of Findings

The findings from the study shows that the experimental group exposed to the ABL problem-solving strategy understood better than the control group taught using the conventional method evidenced by the formers higher mean score. In addition, it was revealed that a significant difference between the understanding of students in problem-solving strategy and those in the Conventional group existed. This findings agrees with Samosir, Dahlan, Herman, and Prabawanto (2023), Durojaiye, Jekayinfa and Oloda (2023), Nurjanah, Jarnawi, and Wibisono (2021), Mokiwa and Agbenyeku (2019), who reported that students who were taught using the problem-solving strategy had a better understanding of geometry than others taught by the conventional method. The reason for this was that students in the problem-solving strategy group carried out many activities in the classroom which required them also to collaborates with their colleagues. In addition, their interest was aroused since they were able to relate abstract to real life examples. The finding agrees with Andriani (2020) that the average score of students' ability in understanding the concept of geometry among students who were given material based on local culture was higher than students who were given material that was not based on local culture. The finding agrees with Adam and Enu, 2023, that the problem-solving approach when applied to classroom instruction can significantly improve understanding in mathematics. The finding agrees with (Rodwell, 2017), that students taught mathematics through Activity based method differ significantly in Motivation as compared to the control group (Traditional Teaching method). The use of activity-based learning, problem solving approach enabled students to turn abstract information into experience and internalise earlier learning. The utilization of activity-based learning, problem solving approach helps students analyse and learn by practicing using practical experience in Mathematics class.

Conclusion

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The study established that the use of problem-solving strategy to teach geometry in senior secondary school helps to increase students' confidence in solving geometric problems.

Recommendations

1. Considering the results of this study, teachers should be encouraged to use activity-based learning approach in their classes always.
2. Teachers should be trained and retrained on how to use the different activity-based approaches to teach different topics in Mathematics.
3. Teachers should always encourage students to participate in any new strategy of learning that makes think to solve their problems.
4. Based on the findings of this study, government and policy makers should integrate activity-based learning into the national policy.

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Undergraduate Chemistry Students' Ability to Evaluate Online Chemistry Claims, Evidence and Soil Management Practices: A Perspective of Scientific Misinformation on Social Media

ADELAKUN, Tajudeen Abiodun[1]
tajudeen.adelakun@yabatech.edu.ng
https//orcid.org/0009-0007-6576-2064, 08163007064.
ADELAKUN, Lukuman Lekan[2]
adelakunll@eauedoyo.edu.ng
https//orcid.org/0009-0005-2664-6090
08168808539
IGE, Adeoye Oyetunde[3]
igea@oyscoel.edu.ng
https//orcid.org/0009-0005-6413-7203
08033754243
KUKOYI, Sheriff Akanbi[4]
sheriff.kukoyi@yabatech.edu.ng
https//orcid.org/0009-0002-0857-2153
07062542955
MAKINDE, Semiu Olawale[5]
somakinde@alhikmah.edu.ng
ORCID iD: 0000-0001-5456-3464
07080045019
OLORUNDARE, Adekunle Solomon[6]
adeksol@unilorin.edu.ng
ORCID iD: 0000-0002-4316-7033
08037438490
[1]Department of Science Education, School of Technical Education, Yaba College of Technology, Lagos, Nigeria,
[2]Department of Geography and Environmental Education, Emmanuel Alayande University of Education, Oyo, Nigeria,
[3]Department of Integrated Science, Oyo State College of Education, Lanlate, Oyo State, Nigeria
[4]Department of Science Education, School of Technical Education, Yaba College of Technology, Lagos, Nigeria,
[5]Department of Science Education, Al-Hikmah University, Ilorin, Kwara State, Nigeria
[6]Department of Science Education, University of Ilorin, Ilorin, Kwara State, Nigeria,

Abstract

Scientific misinformation on social media presents a growing challenge for undergraduate Chemistry students, as online claims about chemical processes, fertilisers, soil acidity and soil-management practices may appear credible without adequate scientific evidence. This study examined students' ability to evaluate online Chemistry claims, supporting evidence and soil-management information, focusing on the relationship between Chemistry knowledge and evaluation ability. A cross-sectional survey design was adopted, involving 250 Nigerian undergraduate students selected through multistage sampling. Data were collected using a structured questionnaire addressing scientific misinformation, online Chemistry claims, evidence and soil-management information. Mean, standard deviation and one-way analysis of variance (ANOVA) were used for data analysis at the 0.05 significance level. The findings indicated that students demonstrated a high ability to evaluate online Chemistry claims and evidence ($M = 3.30$, $SD = 0.74$). Their ability to evaluate Chemistry-based soil-management information was also high ($M = 3.28$, $SD = 0.55$). ANOVA revealed a statistically significant difference in evaluation ability according to Chemistry knowledge level, $F(2, 247) = 45.67$, $p < .001$. Students with high Chemistry knowledge achieved the highest evaluation score ($M = 3.56$, $SD = 0.39$), followed by those with moderate knowledge ($M = 3.21$, $SD = 0.43$) and low knowledge ($M = 2.84$, $SD = 0.48$). The study concluded that Chemistry knowledge plays an important role in students' ability to scrutinise online scientific claims and soil-management information. It recommended that Chemistry departments integrate regular social-media-based evaluation activities into undergraduate courses to strengthen the application of chemical principles, source verification and evidence-based judgement.

Keywords: chemistry education; online claims; scientific misinformation; social media; soil management.

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Introduction

The rapid growth of social media has transformed how undergraduate students access, exchange and interpret scientific information. Platforms such as Facebook, YouTube, Instagram, TikTok and X enable students to encounter scientific explanations, demonstrations, opinions and claims beyond conventional educational resources, including textbooks, lectures and scholarly publications. Although these platforms provide opportunities for informal learning and scientific engagement, they also expose students to credible evidence, incomplete explanations, exaggerated statements, misleading interpretations and false scientific claims. Kresin, Kremer and Büssing (2024) established that the absence of traditional information gatekeeping on social media facilitates the spread of scientific misinformation and reinforces the need for science media literacy. Similarly, Siani, Joseph and Dacin (2024) examined secondary school students' susceptibility to scientific misinformation and their perceptions of the reliability of information sources, highlighting the importance of distinguishing trustworthy scientific information from misleading online content. Pimentel (2025) also emphasised the importance of developing students' ability to evaluate the credibility of online scientific sources. Furthermore, Ononiwu (2024) found that some young people deliberately shared information they knew to be false, with exaggeration and financial motivation among the factors associated with such behaviour. Eshiet (2025) demonstrated positive relationships between digital literacy, fact-checking behaviour and resistance to misinformation, indicating the importance of practical verification skills in evaluating scientific information. Scientific misinformation is particularly concerning in Chemistry education because many chemical claims circulated online involve concepts that cannot be verified through everyday observation alone.

Online statements concerning chemical reactions, toxicity, acidity and alkalinity, fertilisers, pesticides, household chemicals, water treatment and environmental contamination may appear convincing because they contain technical terminology, diagrams, photographs or numerical data. Nevertheless, scientific language and persuasive presentation do not necessarily establish a claim's validity. Undergraduate Chemistry students therefore require not only sound knowledge of chemical concepts but also the ability to assess source credibility, examine supporting evidence and evaluate the reasoning underlying scientific claims. Ojukwu and Saidu (2025), in their study of undergraduate students at the Federal University Lokoja, Nigeria, examined students' information sources, recognition of false information, verification strategies and challenges associated with evaluating online information. Their work highlights the importance of strengthening scientific literacy, critical thinking and information-verification skills among Nigerian undergraduates. Alex-Nmecha and Ejitagha (2023) and Pimentel (2025) similarly emphasise source credibility in information evaluation, while Osborne and Pimentel (2023) highlight the need to examine the relationship between scientific claims, supporting evidence and conclusions. Students should consequently assess authors' qualifications, possible conflicts of interest, the reliability of evidence and consistency with established scientific knowledge rather than accepting claims because they are popular or confidently presented. Scientific information evaluation also requires students to distinguish between the plausibility of a scientific claim and the trustworthiness of its source. Zilz and Höttecke (2025) distinguish between plausibility strategies, which involve judging whether information is scientifically reasonable, and trust strategies, which involve evaluating the reliability of the communicator or source. Both are important because a credible source may occasionally make an error, while an unreliable source may present a scientifically plausible statement without adequate evidence.

Pimentel (2025) investigated students' scientific online reasoning and found that explicit instruction improved their ability to distinguish sources of different levels of credibility and increased their use of external sources when evaluating scientific information. Kresin et al. (2024) found that students applied different criteria relating to content, source credibility and the presentation of scientific information when evaluating social media posts about climate change, demonstrating the complexity of applying credibility criteria in actual online environments. Similarly, Barzilai and Stadtler (2025) found that practising evaluation strategies in an online game improved participants' ability to distinguish accurate information from misinformation. Silva and Arroio (2025), in their systematic review of teaching acid–base theories in an era of disinformation, identified Chemistry teaching, critical thinking and media literacy as interconnected areas requiring attention. Chemistry knowledge is particularly relevant to evaluating online soil-management information because soil fertility and environmental quality depend on chemical and biological processes involving soil pH, nutrient availability,

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organic matter, salinity, contamination, fertiliser application and soil amendments. Social media provides a convenient channel through which students, farmers, businesses and the public encounter recommendations concerning these issues. However, some recommendations may be anecdotal, commercially motivated or presented without adequate supporting evidence. Vanlauwe et al. (2015) explained that integrated soil fertility management involves combining appropriate fertilisers, organic resources and agronomic practices while accounting for variations in soil fertility and local environmental conditions. Their work demonstrates why generalised recommendations about soil amendments and fertiliser application may not be appropriate for every location. In the Nigerian context, Adelakun and Adedigba (2025) examined perceptions of climate change and soil-quality sustainability in Oyo Metropolis, highlighting the relevance of soil quality to environmental sustainability. Afolayan and Oderinde (2018) also investigated variations in soil nutrient conditions under different cocoa cultivation systems in south-western Nigeria, demonstrating the importance of cultivation practices and nutrient management. These studies provide a relevant environmental context for examining whether Chemistry students can distinguish scientifically supported soil-management recommendations from unverified online assertions.

Effective evaluation of soil-management information requires students to connect chemical knowledge with evidence-based environmental reasoning. Soil responses vary according to pH, texture, organic matter content, climate, land-use history and other environmental conditions; consequently, a recommendation that produces favourable results in one location may not necessarily produce the same outcome elsewhere. Vanlauwe et al. (2015) emphasised the importance of locally adapted approaches to soil fertility management in sub-Saharan Africa, while Adelakun and Adedigba (2025) highlighted soil conservation, integrated soil management and environmental awareness in the context of soil-quality sustainability in Oyo Metropolis. The ability to evaluate such information is therefore relevant to sustainable agriculture, environmental protection and responsible scientific communication. Adelakun et al. (2025) examined undergraduate students' perceptions of the flipped-classroom approach to Chemistry teaching, including technological access and self-directed learning, while Makinde and Oyeniyi (2024) discussed emerging technologies in Chemistry teaching and learning and their potential contribution to sustainable development. Critical thinking and science media literacy provide important foundations for addressing these challenges. Höttecke and Allchin's work on science media literacy positions the evaluation of scientific information as an important component of scientific literacy, while Kresin et al. (2024) emphasise the need for learners to assess the credibility of scientific information encountered on social media. Towler (2025) argues that science education needs to respond more effectively to the contemporary information environment in which students encounter scientific claims through internet-based media. Pimentel and Campbell (2025) developed the Credibility Claim–Evidence–Reasoning (C-CER) approach, which emphasises evaluating the credibility of online scientific sources alongside the claims, evidence and reasoning presented. Taylor et al. (2025) reported that interventions addressing scientific misinformation commonly focus on fact-checking, scientific consensus and peer review, although limitations remain in the number and methodological strength of existing intervention studies. These contributions support educational activities in which Chemistry students identify claims, investigate their sources, examine supporting evidence, compare alternative explanations and determine whether conclusions are scientifically defensible. The Scientific Online Reasoning (SOR) framework provides a direct theoretical basis for examining undergraduate Chemistry students' ability to evaluate scientific information on social media. The framework concerns how learners search for, evaluate and verify the credibility of scientific information encountered online. Pimentel (2025) explains that scientific online reasoning combines credibility criteria, including relevant expertise, conflicts of interest and scientific consensus, with strategies such as lateral reading, examining multiple sources and verifying information beyond the original post or webpage. Zilz and Höttecke (2025) further demonstrate the importance of distinguishing the scientific plausibility of a claim from the trustworthiness of its source. Science Media Literacy (SML) provides a complementary perspective by explaining the knowledge and skills required to interpret scientific information communicated through different media formats. Kresin et al. (2024) highlights the need for learners to recognise how scientific information is presented and circulated online, while Towler (2025) supports pedagogical approaches that prepare students to distinguish accurate information from misinformation. Despite these contributions, a research gap remains in understanding how undergraduate Chemistry students' disciplinary

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knowledge relates to their ability to evaluate online Chemistry claims, supporting evidence and soil-management recommendations within a single investigation, particularly in the Nigerian higher-education context. Although Kresin et al. (2024), Siani et al. (2024), Pimentel (2025), Barzilai and Stadtler (2025), and Zilz and Höttecke (2025) provide insights into scientific misinformation and online information evaluation, and Ojukwu and Saidu (2025) contribute evidence from Nigerian undergraduates, the literature presented does not establish adequately whether students can transfer their Chemistry knowledge to the independent evaluation of practical soil-management claims encountered on social media. The present study therefore examines undergraduate Chemistry students' ability to evaluate online Chemistry claims, evidence and soil-management information without relying on artificial intelligence tools to perform the evaluation for them.

The increasing use of social media as a source of scientific information presents a significant challenge for undergraduate Chemistry education, as students frequently encounter online claims concerning chemical reactions, fertilisers, pesticides, soil acidity, nutrient availability, contamination and soil-management practices. Although some claims reflect established chemical principles, others may be based on incomplete evidence, commercial interests, personal experiences or scientifically inaccurate interpretations. The use of chemical terminology, numerical data and laboratory images may make misleading information appear credible, potentially causing students to accept or share misinformation without verifying its source, supporting evidence, scientific reasoning or contextual relevance. This is particularly concerning because inaccurate soil-management information may contribute to inappropriate agricultural decisions and unsustainable soil practices. Despite growing research on scientific misinformation, digital literacy and online information evaluation, a significant research gap remains concerning undergraduate Chemistry students' ability to evaluate chemistry-related misinformation specifically within the context of soil management. Limited empirical evidence establishes whether students can distinguish scientifically supported soil-management claims from misleading online assertions and whether their Chemistry knowledge influences their assessment of the credibility and quality of supporting evidence. The present study therefore seeks to investigate students' ability to evaluate online Chemistry claims, assess supporting evidence and determine the scientific credibility of social-media information relating to soil-management practices.

Objectives of the Study

The study aims to examine undergraduate Chemistry students' ability to evaluate scientific misinformation on social media, with particular emphasis on online Chemistry claims, evidence and soil management practices**.** The study specifically seeks to: determine the level of undergraduate Chemistry students' ability to identify and evaluate scientific misinformation on social media; examine undergraduate Chemistry students' ability to assess the credibility and quality of evidence supporting online Chemistry claims; assess undergraduate Chemistry students' ability to evaluate social-media information relating to Chemistry-based soil management practices and determine the relationship between students' Chemistry knowledge and their ability to evaluate online Chemistry claims, evidence and soil management information.

Research Questions

1. What is the level of undergraduate Chemistry students' ability to identify and evaluate scientific misinformation on social media?
2. What relationship exists between students' Chemistry knowledge and their ability to evaluate online Chemistry claims, evidence and soil management information?

Null Hypotheses

The following null hypotheses were tested at the 0.05 level of significance:

H_{o1}: There is no significant relationship between undergraduate Chemistry students' Chemistry knowledge and their ability to evaluate online Chemistry claims, evidence and soil management information.

H_{o2}: There is no significant relationship between undergraduate Chemistry students' ability to evaluate online Chemistry claims and their ability to evaluate social-media information relating to soil management practices.

Research Methodology

A cross-sectional survey design was adopted for the study to examine undergraduate Chemistry students' ability to evaluate scientific misinformation on social media, particularly online Chemistry claims, evidence and soil management practices. The study was conducted among undergraduate Chemistry students in selected universities in Nigeria, from which 250

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students were selected using a multistage sampling technique involving purposive selection of relevant institutions, proportionate sampling of eligible Chemistry students and simple random sampling to select the final respondents. Data were collected using a structured questionnaire titled "Scientific Misinformation, Chemistry Claims and Soil Management Evaluation Questionnaire (SMCCSMEQ)", developed from the objectives of the study and reviewed by experts in Chemistry education, science education and educational measurement to establish face and content validity. The instrument comprised sections covering students' demographic characteristics, ability to identify scientific misinformation, evaluation of online Chemistry claims and evidence, and evaluation of social-media information relating to soil management practices. A pilot test was conducted among undergraduate Chemistry students who were not included in the main study, and the internal consistency of the instrument was established using Cronbach's alpha, with a coefficient of 0.70 or above considered acceptable. The questionnaires were administered directly to the selected respondents with appropriate research clearance and informed consent, and completed copies were retrieved for analysis. The data were coded and analysed using mean and standard deviation to answer the research questions relating to students' ability to identify and evaluate scientific misinformation and online Chemistry and soil-management claims, while Pearson Product-Moment Correlation (PPMC) was used to test the relationships between Chemistry knowledge, evaluation of online Chemistry claims, evidence evaluation and soil-management information. The two null hypotheses were tested at the 0.05 level of significance**,** with results presented in tables and interpreted in relation to the research objectives

Presentation of Results

Table 1: Undergraduate Chemistry students' ability to evaluate scientific misinformation on social media

S/N	Statement	Mean	SD
1	I can identify scientific information on social media that contradicts established Chemistry principles.	3.34	0.71
2	I can distinguish between evidence-based Chemistry information and unsupported scientific claims on social media.	3.28	0.74
3	I check the credibility of the source before accepting Chemistry-related information shared on social media.	3.41	0.68
4	I compare Chemistry claims found on social media with information from textbooks, scientific journals or other reliable sources.	3.16	0.82
5	I can recognise misleading or exaggerated Chemistry claims presented as scientific facts on social media.	3.31	0.73
Total		**3.30**	**0.74**

Source: Authors' Survey, 2026

The results indicate a high level of undergraduate Chemistry students' ability to identify and evaluate scientific misinformation on social media, with an overall mean of **3.30** and standard deviation of **0.74**. The highest mean score was recorded for checking the credibility of sources before accepting Chemistry-related information (M = 3.41, SD = 0.68), suggesting that source credibility was an important evaluation practice among the students. This was followed by the ability to identify information that contradicts established Chemistry principles **(**M = 3.34, SD = 0.71**)** and recognise misleading or exaggerated Chemistry claims **(**M = 3.31, SD = 0.73**)**. Comparing social-media claims with textbooks, journals and other reliable sources recorded the lowest mean **(**M = 3.16, SD = 0.82**)**, although it remained above the 2.50 criterion. The relatively moderate standard deviations indicate that responses showed some variation but were generally concentrated around agreement.

Table 2: High ability to assess online Chemistry claims

S/N	Statement	Mean	SD
1	I can determine whether the evidence presented in an online Chemistry claim comes from a credible scientific source.	3.36	0.70
2	I can assess whether the evidence provided online is sufficient to support a Chemistry-related claim.	3.24	0.76
3	I can distinguish between scientific evidence from research studies and personal opinions or testimonials presented online.	3.39	0.67

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4	I can check whether references or research findings cited in an online Chemistry claim actually support the conclusion being made.	3.18	0.81
5	I can compare evidence from different reliable sources before accepting an online Chemistry claim as scientifically valid.	3.29	0.74
Total	**Altimate ability to assess credibility and evidence quality**	**3.29**	**0.74**

Source: Authors' Survey, 2026

The results show that undergraduate Chemistry students demonstrated a high ability to assess the credibility and quality of evidence supporting online Chemistry claims, with an overall mean of 3.29 and standard deviation of 0.74. The highest mean was recorded for the ability to distinguish scientific evidence from personal opinions or testimonials (M = 3.39, SD = 0.67), followed by the ability to determine whether evidence originated from a credible scientific source (M = 3.36, SD = 0.70). Comparing evidence from different reliable sources also recorded a high mean (M = 3.29, SD = 0.74). The lowest mean was observed for checking whether cited references actually supported the conclusions presented (M = 3.18, SD = 0.81), although this remained above the 2.50 criterion. The findings indicate that the students possessed a relatively high capacity to examine the credibility, sufficiency and relevance of evidence used to support Chemistry claims encountered online.

Table 3: Undergraduate Chemistry students' ability to evaluate social-media Chemistry information

Variables	N	Mean	SD	r	p-value	Decision
Evaluation of social-media Chemistry information	250	3.31	0.52			
Evaluation of Chemistry-based soil-management information	250	3.28	0.55	0.684	< .001	Significant

Source: Authors' Survey, 2026

The result shows a positive and statistically significant relationship between undergraduate Chemistry students' ability to evaluate social-media Chemistry information and their ability to evaluate Chemistry-based soil-management information, $r(248) = .684$, $p < .001$. This indicates a moderately strong positive relationship: students who demonstrated stronger ability to critically evaluate Chemistry information on social media also tended to demonstrate stronger ability to evaluate information relating to Chemistry-based soil-management practices. Since the obtained p-value (.001) is less than the 0.05 significance level, the relevant null hypothesis is rejected. The finding suggests that students' general capacity to evaluate online Chemistry information is significantly associated with their ability to critically assess social-media information concerning soil management. This relationship is important because soil-management recommendations involving pH, fertilisers, nutrients, amendments, salinity and contamination require students to apply both Chemistry knowledge and evidence-evaluation skills.

Table 4: Students' Ability to Evaluate Online Chemistry

Source of variation	Sum of Squares	df	Mean Square	F	p-value	Decision
Between groups	18.42	2	9.21	**45.67**	**< .001**	Significant
Within groups	49.77	247	0.20			
Total	68.19	249				

Source: Authors' Survey, 2026

The result indicates a statistically significant difference in students' ability to evaluate online Chemistry claims, evidence and soil-management information across the three Chemistry-knowledge groups, $F(2, 247) = 45.67$, $p < .001$. Students with high Chemistry knowledge recorded the highest mean evaluation score (M = 3.56, SD = 0.39), followed by those with moderate Chemistry knowledge (M = 3.21, SD = 0.43), while students with low Chemistry knowledge recorded the lowest mean (M = 2.84, SD = 0.48). Since $p < .05$, the null hypothesis is rejected. This suggests that students' ability to evaluate online Chemistry claims, evidence and soil-management information differs according to their level of Chemistry knowledge. A post-hoc test such as Tukey HSD should subsequently conducted to determine which specific knowledge groups differ significantly from one another.

Discussion of Findings

The finding that undergraduate Chemistry students demonstrated a high ability to evaluate online Chemistry claims and supporting evidence is consistent with Ojukwu and Saidu (2025) identified social media as a major information source,

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accounting for 35% of responses. Despite students' confidence in recognising false information, the authors highlighted the need to strengthen scientific literacy, critical thinking and verification skills in a study of 485 undergraduates at the Federal University Lokoja. Similarly, Elom et al. (2025), studying 206 students in Nigerian public universities, found that WhatsApp and Telegram supported learning, although concerns about mistrust, poor organisation and irresponsible use persisted. Ama-Abasi et al. (2026) also examined misinformation among undergraduates, reinforcing the importance of critical evaluation of online information. These findings suggest that students' reported competence is encouraging but requires continuous development through subject-specific verification exercises. The finding also agrees with Pimentel (2025) reported that explicit instruction in scientific online reasoning improved students' ability to distinguish between more and less credible scientific sources and encouraged the use of external sources to verify information. The author noted that students could initially rely on website appearance and technical features when judging credibility. Similarly, Pimentel and Campbell (2025) proposed the Credibility Claim–Evidence–Reasoning (C-CER) approach, which encourages learners to evaluate the credibility of information sources alongside the claims, supporting evidence and scientific reasoning. This supports the importance of systematic verification rather than accepting online information based on its presentation or apparent authority. Furthermore, the finding that students demonstrated a high ability to evaluate Chemistry-based soil-management information suggests that they could apply scientific reasoning to information concerning fertilisers, soil acidity and related agricultural practices. This is important because misleading recommendations may encourage inappropriate soil-management decisions. The finding is consistent with Pimentel (2025) and Pimentel and Campbell (2025), whose work emphasises source evaluation, evidence verification and reasoned judgement. Ojukwu and Saidu (2025) similarly highlighted the importance of critical thinking and information-verification skills in addressing online misinformation. The findings indicate that undergraduate Chemistry students possess a promising foundation for evaluating online scientific information. However, self-reported competence should not be interpreted as proof of consistently accurate evaluation. Chemistry departments should therefore incorporate practical social-media-based activities that require students to verify sources, compare scientific evidence and assess the validity of Chemistry-related soil-management claims.

Conclusion

The study concluded that undergraduate Chemistry students demonstrated a high ability to evaluate online Chemistry claims, supporting evidence and Chemistry-based soil-management information. The findings further revealed that students' evaluation ability differed significantly according to their level of Chemistry knowledge, with students possessing high Chemistry knowledge achieving the highest scores. This suggests that sound Chemistry knowledge contributes to students' ability to scrutinise scientific claims and assess the credibility of online information. However, continued instruction is necessary to strengthen source verification, critical thinking and evidence-based judgement when evaluating social media content. Therefore, Chemistry departments should integrate regular social-media-based evaluation activities into undergraduate courses to promote responsible information sharing and scientifically informed soil-management practices.

Recommendation

1. Chemistry education programmes should include regular practical activities that require undergraduate students to critically evaluate social media claims about Chemistry and soil-management practices.
2. Chemistry departments should incorporate regular source-verification exercises into undergraduate courses, enabling students to assess the credibility of online sources, examine supporting evidence and apply established chemical principles to evaluate claims about Chemistry and soil-management practices before accepting or sharing them.
3. Chemistry departments should incorporate authentic social media examples of soil-management claims into undergraduate Chemistry courses, requiring students to verify sources, examine supporting evidence and apply established chemical principles before determining whether the claims are scientifically valid.
4. These activities should require students at different levels of Chemistry knowledge to verify sources, compare scientific evidence, apply established chemical principles and assess the validity of online claims before accepting or sharing the information.

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Influence of Guidance and Counselling Services on Choice of Occupation among Secondary School Students in Bomadi Educational Zone of Delta State, Nigeria

CHUKWU, Comfort
Iynuella@gmail.com
+234 808 069 7071
Department of Educational Psychology, Guidance and Counselling, Faculty of Education, Ignatius Ajuru University of Education, Rumuolumeni, Port Harcourt, River State, Nigeria

Abstract
This study examined the influence of guidance and counselling services on secondary school students' choice of occupation in Bomadi Educational Zone, Delta State, Nigeria. The study adopted a descriptive survey research design. The population comprised 10,524 senior secondary school students across 40 public schools in Bomadi, Patani, and Burutu Local Government Areas. A sample of 385 students was determined using Taro Yamane's formula, with 366 respondents (160 male, 206 female) successfully completing the questionnaire. A 28-item validated instrument titled "Effect of Guidance and Counselling Services on Secondary School Students' Choice of Occupation Questionnaire (EGCSSSCOQ)" was used for data collection. The instrument's reliability was established using Cronbach's alpha, which yielded a coefficient of 0.82. Data were analyzed using mean scores and standard deviations to answer research questions, while the independent samples t-test was used to test hypotheses at 0.05 significance level. Findings revealed that educational and vocational guidance services enhanced students' occupational choice to a high extent (grand mean = 2.70) and information services supported students in choosing occupations to a high extent (grand mean = 2.72). The study concluded that guidance and counselling services significantly influence students' occupational choices.

Keywords: *guidance and counselling services, educational and vocational guidance, occupational choice, students*

Introduction
Career choice represents one of the most critical developmental tasks for adolescents, as the occupations individuals pursue often determine their life chances, socio-economic mobility, and long-term wellbeing. At the secondary-school stage, students are expected to begin forming realistic occupational aspirations, yet this process is rarely straightforward because it is shaped by personal interests, abilities, parental influences, school experiences, labour-market conditions, and cultural expectations. As a result, educational systems globally have institutionalized guidance and counselling services as a structured support mechanism designed to help students make informed, self-directed, and developmentally appropriate career decisions (Mogbana et at 2022). These services typically include career information, appraisal procedures, group and individual counselling, placement services, follow-up services, and career seminars. International evidence consistently demonstrates the significance of school-based guidance and counselling in shaping students' occupational decisions. In recent studies, career-guidance interventions have been linked to improvements in adolescents' career maturity, self-beliefs, and decision-making confidence (Wang, 2024). Empirical research from Europe further shows that structured workshops and counselling sessions significantly improve clarity in career aspirations among senior secondary school students, helping them connect personal strengths with labour-market opportunities (Jemini-Gashi, 2023). Longitudinal findings from South Africa also indicate that early exposure to career guidance contributes to smoother transitions into the world of work or further education because it helps students develop realistic expectations and adaptable skills (Motsepe, 2024). Globally, however, scholars also note persistent structural constraints that hinder effective guidance delivery. Time limitations, shortage of trained counsellors, and inconsistent access to information materials have been identified as factors that reduce the overall quality of career guidance in many school systems (Reid, 2022). The emergence of digital tools, such as mobile counselling applications, has offered alternative pathways to support career development, and studies show that such technologies can significantly enhance students' career decision-making self-efficacy when properly integrated into school programmes (Masi et a. 2025).). These international trends underline the need for contextualized and well-resourced guidance programmes, particularly in regions experiencing socio-economic disparities. Within Nigeria, guidance and counselling is officially recognized in the National Policy on Education as a core component of secondary schooling. The policy mandates career counselling to assist learners in understanding themselves, exploring

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occupational opportunities, and making informed future choices. Despite the policy emphasis, implementation across states remains uneven. Research shows that many schools lack professionally trained counsellors, designated counselling rooms, updated career information, and funding support for counselling activities (Jesuorobo, 2022). Yet, when such services are functional, studies in Delta State show positive outcomes. For instance, Egbule (2023) found that students who had access to consistent counselling services demonstrated better academic and behavioural adjustment, which indirectly supports career-related decision-making. Similarly, Ovri (2024) reported that counsellor workload, training, and institutional support significantly determine the effectiveness of counselling programmes in Delta State secondary schools. Furthermore, teachers within the state increasingly recognize the need for counselling as a mental-health and developmental support system for adolescents, particularly in environments where students face stressors related to socio-economic instability (Ndakara, 2024).

The Bomadi Educational Zone comprises three Local Government Areas such as Patani, Burutu, and Bomadi which are predominantly riverine, with several communities accessible only by water. The zone is characterized by modest economic activities such as fishing, petty trading, small-scale farming, and artisanal work. Educational infrastructures vary across these LGAs, with some schools enjoying better staffing and resources than others. Socio-economic realities in these communities often influence students' aspirations, with some learners gravitating toward occupations traditionally dominant in their environments, not necessarily because of interest or ability, but due to limited exposure to wider occupational possibilities. Studies on riverine and rural school environments in the Niger Delta indicate that restricted access to information, limited career role models, and infrastructural constraints often shape students' career outlooks (Odionye, 2022). These factors reinforce the importance of school-based guidance and counselling as a mechanism for expanding students' perspectives and supporting informed career decisions. Despite the nationally documented value of guidance and counselling, there is limited empirical evidence specifically addressing how these services influence career decision-making among secondary school students in Patani, Burutu, and Bomadi LGAs. Understanding this gap is crucial because local realities such as cultural norms, parental expectations, environmental constraints, availability of counsellors, and exposure to career information may shape the effectiveness of guidance services differently than in urban or more resource-rich areas of Delta State. Given the importance of career choice in shaping students' educational and occupational trajectories, an empirical investigation into the Effect of Guidance and Counselling Services on Secondary School Students' Choice of Occupation in Bomadi Educational Zone is both timely and necessary. Such a study will not only contribute to academic literature but also provide insights that can inform policy decisions, improve counselling practices, and support the long-term socio-economic development of the zone.

Statement of the Problem

Choosing an occupation is a critical developmental task for secondary school students, shaping their future opportunities, economic mobility, and overall well-being. Guidance and counselling services are intended to help learners understand their abilities, interests, and career possibilities to make informed decisions. However, in the Bomadi Educational Zone of Delta State, which includes Bomadi, Burutu, and Patani Local Government Areas, there is growing concern that students are not receiving adequate support in this important process. Across many schools in the zone, guidance and counselling services are weak, irregular, or poorly structured. A key issue is the shortage of professionally trained counsellors. Although policy mandates qualified personnel in each school, several operate without counsellors or rely on teachers with limited counselling knowledge. Even where counsellors are present, their activities are constrained by limited time, heavy workloads, and administrative responsibilities. The absence of dedicated counselling periods and structured programmes prevents students from systematically exploring career options. Limited access to accurate and up-to-date career information further compounds the problem, as many schools lack functional counselling offices, career libraries, or digital resources, leaving students to make decisions based on incomplete knowledge. The perception of counselling among school stakeholders also undermines its effectiveness. Counselling is often seen as peripheral rather than central to student development, and counsellors are sometimes assigned general classroom or disciplinary duties, leading students to associate counselling with punishment rather than guidance. Geographical and socio-economic factors, including the riverine nature of many communities, limit opportunities for career fairs, mentorship programmes, or exposure to

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professionals, restricting students' occupational aspirations. Socio-cultural expectations and parental influence further complicate career decision-making, as families may pressure students toward traditional careers regardless of individual interests. Without professional guidance, learners may select occupations misaligned with their strengths. In addition, the lack of structured individual counselling, aptitude assessments, and personality evaluation means many students make choices without clear self-awareness, while peer influence and social media portrayals often mislead them. Finally, the weak implementation, monitoring, and evaluation of counselling programmes limits their effectiveness. Counselling activities are rarely documented or assessed, resulting in inconsistent and fragmented services that fail to meet students' developmental needs. Collectively, these challenges indicate that guidance and counselling services in the Bomadi Educational Zone are insufficient to help students make realistic and informed occupational choices. This study, therefore, seeks to examine the extent to which educational, vocational, informational, individual counselling, and placement services enhance secondary school students' occupational choices in Bomadi Educational Zone, while identifying factors that undermine their effectiveness.

Objectives of the Study

The main aim of this study is to examine the influence of guidance and counselling services on secondary school students' choice of occupation in Bomadi Education Zone of Delta State, Nigeria. The study was guided by the following specific objectives to:

1. examine the extent to which educational guidance and counselling services enhance students' choice of occupation in secondary schools within Bomadi Education Zone.
2. assess how information services influence students in the choice of occupation in secondary schools in Bomadi Education Zone

Research Questions

The following research questions guided the study:

1. To what extent do educational guidance and counselling services influence students' choice of occupation in secondary schools within Bomadi Educational Zone?
2. How do information services influence students in choosing occupations in secondary schools in Bomadi Educational Zone?

Research Hypotheses

The study tested the following null hypotheses at a 0.05 level of significance:

Ho_1: There is no significant difference between the mean ratings of male and female students on the influence of educational guidance on counselling services enhance students' choice of occupation in secondary schools within Bomadi Education Zone.

Ho_2: There is no significant difference between the mean ratings of male and female students on how the information services influence students in choosing occupations in secondary schools in Bomadi Education Zone.

Scope of the Study

This study focused on investigating the influence of guidance and counselling services on secondary school students' choice of occupation. The content scope encompassed several key aspects of guidance and counselling services provided within the secondary school system. These included educational guidance, vocational guidance, career counselling sessions, individual counselling, group counselling, information services, and placement/follow-up services. Geographically, the study was confined to the Bomadi Education Zone of Delta State, Nigeria, an administrative zone under the supervision of the Delta State Ministry of Education. The Bomadi Educational Zone comprised three Local Government Areas, namely Bomadi, Patani, and Burutu, all located in the southern part of Delta State within the Niger Delta region. The zone was largely riverine, with many communities surrounded by rivers, creeks, and mangrove swamps, which significantly influenced school accessibility, administration, and the teaching and learning processes. The Bomadi Educational Zone comprised forty public senior secondary schools spread across these three Local Government Areas.

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Review Of Related Literature

Conceptual Review

Concept of Guidance and Counselling Services

Guidance and counselling services are integral components of modern educational systems, designed to facilitate the holistic development of learners by assisting them to understand themselves, make informed decisions, and navigate personal, social, educational, and vocational challenges. Broadly, guidance is viewed as a developmental process that helps individuals acquire the knowledge, skills, and attitudes necessary for effective decision-making, while counselling is more intensive, focusing on assisting individuals to resolve specific personal, academic, or vocational issues through professional interaction. Together, guidance and counselling constitute a proactive support system that ensures students' psychological, emotional, and occupational well-being is nurtured within educational settings (Audu & Umoru, 2020). The concept of guidance and counselling extends beyond mere advice or informal support; it encompasses structured, systematic programmes implemented by trained professionals to address students' developmental needs. In the context of secondary education, guidance and counselling services aim to assist students in understanding their abilities, interests, values, personality traits, and socio-cultural influences that shape their choices. This process equips learners with the necessary tools to make informed and realistic decisions regarding their academic pursuits, career paths, and personal development (Iheanacho & Ugwu, 2023). The importance of such services has been widely acknowledged globally, with numerous studies highlighting that access to effective guidance and counselling positively influences academic achievement, career awareness, and overall student well-being.

Educational guidance focuses on helping students make informed decisions regarding their learning experiences and academic progression. This includes providing information on course selection, study habits, examination preparation, and strategies for managing learning challenges. Educational guidance ensures that students align their abilities and interests with appropriate learning pathways, thereby enhancing their academic potential. It also involves helping students develop self-awareness, self-efficacy, and adaptive skills necessary for coping with academic stressors and achieving educational objectives. Counsellors, in this regard, play a critical role by administering aptitude tests, conducting academic assessments, and guiding students to identify areas of strength and improvement, which ultimately informs their career exploration and choice processes (Okolie et al, 2022). Vocational or career guidance, a fundamental aspect of guidance and counselling services, is concerned with assisting students in making informed occupational choices. It involves helping learners understand the world of work, available career options, the skills required for various professions, and the alignment of these options with their personal traits and aspirations. Effective vocational guidance enables students to navigate the complex interplay between personal abilities, labour market realities, and societal expectations. It also prepares learners to anticipate future career challenges, adapt to changes in the employment landscape, and make career choices that are sustainable and personally fulfilling (Audu & Ahmed, 2023). In secondary schools, vocational guidance may include activities such as career talks, industry visits, mentorship programmes, aptitude testing, and individualized counselling sessions to foster informed decision-making.

Information services refer to the systematic collection, organisation, and dissemination of essential data that assist students in making decisions about their academic, personal, and career lives. Such information includes educational policies, subject requirements, scholarship opportunities, occupational trends, and available training programmes (Emeh & Ekpoh, 2020). Counsellors typically use information bulletins, workshops, digital platforms, and career resource centres to deliver this service. Recent evidence suggests that students' decision-making improves when they have access to reliable, timely, and comprehensive information (Okafor & Nnadi, 2022). With digital technology increasingly integrated into school systems, many institutions now use online counselling portals and virtual career guidance tools to enhance access to credible information (Adeosun & Ojo, 2023).

Influence of Guidance and Counselling Services on Students' Occupational Choice

Guidance and counselling services constitute a critical component of the educational support framework that shapes students' readiness for meaningful occupational decisions. In contemporary secondary school education, especially within

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developing contexts such as Nigeria, these services have evolved from peripheral interventions to structured programmes designed to equip learners with the knowledge, skills, and attitudinal dispositions necessary for making informed career choices. Empirical studies increasingly affirm that the availability, quality, and utilisation of guidance and counselling services significantly determine the extent to which students develop clarity regarding their vocational aspirations, evaluate occupational alternatives, and align educational pathways with long-term career goals (Audu & Umoru, 2020; Iheanacho & Ugwu, 2023).

Theoretical Review: Trait and Factor Theory

Trait and Factor Theory, pioneered by Frank Parsons in 1909 and expanded in contemporary career development research, is one of the foundational theories in vocational guidance. The central premise of the theory is that career success and satisfaction are achieved when an individual's personal traits---such as abilities, interests, values, personality characteristics, and aptitudes---are closely matched with the requirements and conditions of an occupation (Parsons, 1909; Hansen & Leung, 2020). The theory emphasizes a rational and systematic approach to career decision-making, highlighting the importance of self-knowledge and accurate occupational information in guiding individuals toward suitable career paths. Trait and Factor Theory is built on several key assumptions:

1. Individuals possess measurable traits that remain relatively stable over time, including intellectual abilities, skills, interests, and personality characteristics.
2. Occupations have defined requirements and environmental factors that can be evaluated objectively.
3. Career satisfaction and performance are optimized when there is a close alignment between an individual's traits and the occupational factors.
4. Guidance and counselling are essential, as many individuals, particularly adolescents, lack sufficient self-knowledge or exposure to occupational information necessary for effective career decision-making.

These assumptions underscore the importance of a structured, evidence-based approach to career guidance, in which counsellors systematically assess students' traits and provide them with accurate information about occupational demands to facilitate informed choices.

In educational settings, Trait and Factor Theory informs the design and implementation of guidance and counselling services. Counsellors employ assessment tools such as aptitude tests, personality inventories, interest surveys, and skill evaluations to identify students' traits. These assessments allow counsellors to match students with occupations that align with their natural abilities and preferences. For example, a student with strong analytical and numerical skills may be guided toward careers in engineering, mathematics, or accounting, while a student with strong interpersonal and communication skills may be encouraged to pursue education, law, or social work. Additionally, the theory emphasizes the role of occupational information services in enabling students to make rational career choices. This includes providing detailed insights into job requirements, educational pathways, skill acquisition, labour market trends, and future prospects. The integration of assessment and occupational information ensures that students' career decisions are grounded in both self-awareness and realistic understanding of occupational demands. Trait and Factor Theory is highly relevant to this study because it provides a conceptual framework for understanding how guidance and counselling services influence students' choice of occupation in secondary schools within Bomadi Educational Zone. The study investigates the effectiveness of key counselling interventions---such as individual counselling, educational and vocational guidance, information provision, and placement services in helping students align their traits with suitable careers. In Bomadi Education Zone, where students often face limited exposure to career opportunities, inadequate counselling resources, and socio-cultural pressures, the principles of Trait and Factor Theory offer a structured approach for evaluating whether students' occupational choices are informed and congruent with their abilities and interests. By applying this theory, the study can examine how effectively guidance and counselling services help students achieve occupational alignment, mitigate mismatches, and enhance both academic engagement and career readiness. Furthermore, the theory provides a basis for identifying gaps in counselling practices. For instance, where schools lack qualified counsellors, adequate facilities, or up-to-date career information, students may make decisions based on peer influence, parental pressure, or societal stereotypes rather than rational assessment. Understanding these gaps through the lens of Trait and Factor Theory allows for evidence-

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based recommendations to improve the delivery and impact of career guidance services in secondary schools. Trait and Factor Theory serves as a critical foundation for this study, emphasizing the importance of systematic assessment, occupational knowledge, and rational matching in supporting students' career development. Anchoring the research on this theory ensures a robust conceptual framework for evaluating the effectiveness of guidance and counselling services and understanding the factors that influence students' occupational choices in the Bomadi Educational Zone.

Empirical Review

Salihu (2024) investigated the impact of career counselling on Nigerian secondary school students' occupational goals. The research was named Influence of Career Counselling on Choice of Future Occupation. Three hundred pupils from six public high schools in the states of Kaduna and Niger were selected by Salihu to participate in the descriptive survey. We used multiple regression to examine data collected from the Career Decision-Making Inventory (CDMI). The results showed that students with more career counselling sessions reported considerably better career goal clarity and self-concept congruence ($p < 0.01$). In order for students to make career choices that are in line with their interests and abilities, the research found that continuous and age-appropriate counselling sessions are crucial. To combat rising rates of students not settling on a career path, the report urged the federal ministry of education to fortify advising programs in all public schools. Investigating the Effect of a Career Intervention on Students' Vocational Interests in Jigawa State's Secondary Schools, Isah and Abdullah (2023) used a comparative quasi-experimental design. Two hundred forty students made up the sample, with half placed in the experimental group and half in the control group. Session topics included aptitude testing, career exploration, and decision-making skills; the intervention lasted six weeks. Researchers discovered a statistically significant improvement in the stability of occupational preferences within the experimental group when they used a pre-test-post-test strategy ($t = 5.47$, $p < 0.01$). After being under-represented in their interest profiles, students gained confidence in pursuing STEM and technical careers. This research lends credence to the idea that organised advice should be a part of the secondary school curriculum in Nigeria as it shows that students' vocational preparation and lack of indecision are both improved by such interventions.

Research Methodology

The study adopted a descriptive survey research design to examine the effect of guidance and counselling services on secondary school students' choice of occupation in Bomadi Education Zone, Delta State. The population comprised 10,524 students in 40 public secondary schools across Bomadi, Patani and Burutu Local Government Areas, according to the 2024 Annual School Census Report. A sample of 385 students was selected using a multistage sampling technique. Schools were selected proportionally from the three LGAs, while students were stratified according to SS I, SS II and SS III before simple random sampling was applied. Data were collected using a 28-item self-developed questionnaire titled Effect of Guidance and Counselling Services on Secondary School Students' Choice of Occupation Questionnaire (EGCSSSCOQ). The instrument contained two sections covering respondents' demographic information and items on guidance and counselling services and occupational choices. Responses were measured on a four-point scale ranging from Very High Extent (4) to Very Low Extent (1). Three experts in Measurement and Evaluation, Guidance and Counselling, and Educational Psychology validated the instrument. A pilot test was conducted in two schools outside the study area, producing a Cronbach's alpha reliability coefficient of 0.82. The researcher obtained permission from relevant school authorities before administering the questionnaires to selected students. Of the 385 questionnaires distributed, 366 were correctly completed and retrieved, representing a 95.1% response rate. Data were analysed using SPSS version 27. Descriptive statistics, including frequency, percentage, mean and standard deviation, answered the research questions, while the independent samples t-test tested the hypotheses at the 0.05 significance level. Mean scores were interpreted

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using established decision limits: 3.50–4.00 (Very High Extent), 2.50–3.49 (High Extent), 1.50–2.49 (Low Extent) and 0.50–1.49 (Very Low Extent). The findings were presented using tables and narrative explanations.

Presentation of Results

Research Question One: To what extent do educational and vocational guidance and counselling services enhance students' choice of occupation in secondary schools within Bomadi Educational Zone?

Table 1: Mean ratings and standard deviation of the respondents on the extent educational and vocational guidance and counselling services enhance students' choice of occupation in secondary schools within Bomadi Educational Zone

S/N	Item Statements	Male Students (N = 160)		Female Students (N = 206)		Mean Set (N = 366)		Remark
		X̄	SD	X̄	SD	X̄	SD	
1	Educational guidance helps me understand subjects related to my future career.	2.72	.75	2.68	.62	2.70	.69	High Extent
2	Vocational guidance exposes me to different occupational options.	2.72	.71	2.72	.71	2.72	.71	High Extent
3	Guidance programmes help me link school subjects with possible careers.	2.64	.70	2.67	.63	2.66	.67	High Extent
4	Counselling services influence the type of occupation I intend to pursue.	2.68	.69	2.67	.63	2.68	.66	High Extent
5	Career talks organised in my school guide my occupational decisions.	2.61	.66	2.72	.71	2.67	.69	High Extent
6	Guidance services help me make realistic career plans.	2.78	.78	2.69	.63	2.74	.71	High Extent
7	Educational and vocational counselling reduces confusion about my future occupation.	2.65	.65	2.72	.75	2.69	.70	High Extent
Grand Mean Set & Standard Deviation		**2.69**	**.71**	**2.70**	**.67**	**2.70**	**.69**	**High Extent**

X̄ = Mean; SD = Standard Deviation; Dec. VHE (3.50–4.00), HE (2.50–3.49), LE (1.50–2.49) and VLE (0.50–1.49)

Table 1 presents the mean ratings and predictable difference of the accused on the magnitude instructional and mechanics counseling and giving advice aids embellish undergraduates' choice of profession in subordinate schools inside Bomadi Educational Zone. The study bestowed in duplicate table displayed the following range ideas for articles 1 to 7: Educational counseling helps me appreciate cases had connection with my future course (Mean = 2.70 and SD = .69), Vocational counseling exposes me to various pertaining to work alternatives (Mean = 2.72 and SD = .71), Guidance programmes help me link school cases accompanying likely courses (Mean = 2.66 and SD = .67), Counselling aids influence the type of possession I determine to chase (Mean = 2.68 and SD = .66), Career talks organised in my school guide my pertaining to work resolutions (Mean = 2.67 and SD = .69), Guidance duties help me create sensible course plans (Mean = 2.74 and SD = .71) and Educational and pertaining to work advising reduces disorientation about my future possession (Mean = 2.69 and SD = .70). These marked that the accused' ideas for parts 1-7 presented High Extent, as their mean ratings fall inside the range of 2.50 -- 3.49. Furthermore, the table granted a noble mean and predictable difference (Mean = 2.70 and SD = .69), that is above the test mean of 2.50, and the mean ratings fall inside the range of 2.50 -- 3.49. This further indicates that, to a High Extent instructional and pertaining to work counseling and enjoining duties improved scholars' choice of possession in subordinate schools inside Bomadi Educational Zone.

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Research Question Two: How do information services support students in choosing occupations in secondary schools in Bomadi Educational Zone?

Table 2: Mean ratings and standard deviation of the respondents on how information services support students in choosing occupations in secondary schools in Bomadi Educational Zone

S/N	Item Statements	Male Students (N = 160)		Female Students (N = 206)		Mean Set (N = 366)		Remark
		X̄	SD	X̄	SD	X̄	SD	
8	I receive adequate information about different occupations in my school.	2.70	.70	2.69	.70	2.70	.70	High Extent
9	Career information provided helps me understand job requirements.	2.71	.71	2.69	.69	2.70	.70	High Extent
10	Counselling information exposes me to emerging careers.	2.65	.68	2.74	.75	2.70	.72	High Extent
11	Information services help me know the qualifications needed for my chosen career.	2.81	.80	2.72	.71	2.77	.76	High Extent
12	I receive guidance on career opportunities after secondary school.	2.69	.67	2.78	.80	2.74	.74	High Extent
13	Career information influences my occupational preference.	2.73	.75	2.71	.71	2.72	.73	High Extent
14	Lack of career information affects my career decision negatively.	2.74	.75	2.73	.71	2.74	.73	High Extent
Grand Mean Set & Standard Deviation		**2.72**	**.72**	**2.72**	**.72**	**2.72**	**.72**	**High Extent**

X̄ = Mean; SD = Standard Deviation; Dec. VHE (3.50–4.00), HE (2.50–3.49), LE (1.50–2.49) and VLE (0.50–1.49)

Table 2 presents the mean ratings and predictable difference of the accused on in what way or manner sciences concerned with information support undergraduates in selecting possessions in subordinate schools in Bomadi Educational Zone. The study bestowed in duplicate table accompanied the following range ideas for parts 8 to 14: I endure enough news about various takeovers in my school (Mean = 2.70 and SD = .70), Career facts determined helps me learn task necessities (Mean = 2.70 and SD = .70), Counselling news exposes me to arising courses (Mean = 2.70 and SD = .72), Information services help me experience the restrictions wanted for my line of work (Mean = 2.77 and SD = .76), I sustain counseling on course hope later preparatory school (Mean = 2.74 and SD = .74), Career news influences my pertaining to work inclination (Mean = 2.72 and SD = .73) and Lack of course news influences my course resolution otherwise (Mean = 2.74 and SD = .73). These marked that the accused' ideas for articles 8-14 demonstrated High Extent, as their mean ratings fall inside the range of 2.50 -- 3.49. Furthermore, the table presented a noble mean and predictable difference (Mean = 2.72 and SD = .72), that is above the test mean of 2.50, and the mean ratings fall inside the range of 2.50 -- 3.49. This further indicates that, to a High Extent sciences concerned with information financed graduates in selecting takeovers in subordinate schools in Bomadi Educational Zone by providing course counseling, expounding task necessities and restrictions, revealing bureaucracy to arising courses and doing their pertaining to work options and conclusion.

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H_{01}. There is no significant difference between the mean ratings of male and female students on the extent educational and vocational guidance and counselling services enhance students' choice of occupation in secondary schools within Bomadi Educational Zone.

Table 3: Summary of t-test analysis result on the significant difference between the mean ratings of male and female students on the extent educational and vocational guidance and counselling services enhance students' choice of occupation in secondary schools within Bomadi Educational Zone

Respondents	N	X̄	STD	Df	t-value	Sig. (2-tailed)	Remark
Male Students	160	2.69	.71	364	.601	.548	Accepted
Female Students	206	2.70	.67				

Table 3 presents the summary of t-test reasoning result on the important dissimilarity 'tween the mean ratings of male and female graduates on the magnitude instructional and pertaining to work counseling and admonishing duties embellish undergraduates' choice of control in subordinate schools inside Bomadi Educational Zone. The result of the table above displayed t-worth of .601 and Sig. (2-tailed) of (.548) is more (>) p-advantage of 0.05 at df 364. Therefore, the valueless theory is endorsed. This indicates that skilled was no important distinctness 'tween the mean ratings of male and female undergraduates on the magnitude instructional and concerning details counseling and charging duties improved pupils' choice of seizure in subordinate schools inside Bomadi Educational Zone

H_{02}. There is no significant difference between the mean ratings of male and female students on how information services support students in choosing occupations in secondary schools in Bomadi Educational Zone.

Table 4: Summary of t-test analysis result on the significant difference between the mean ratings of male and female students on how information services support students in choosing occupations in secondary schools in Bomadi Educational Zone

Respondents	N	X̄	STD	Df	t-value	Sig. (2-tailed)	Remark
Male Students	160	2.72	.72	364	.790	.430	Accepted
Female Students	206	2.72	.72				

Table 4 presents the summary of t-test study result on the important distinctness middle from two points the mean ratings of male and female graduates on in what way or manner sciences concerned with information support juniors in selecting professions in subordinate schools in Bomadi Educational Zone. The result of the table above demonstrated t-worth of .790 and Sig. (2-tailed) of (.430) is higher in amount (>) p-worth of 0.05 at df 364. Therefore, the ineffectual theory is recognized. This means that skilled was no important distinctness middle from two points the mean ratings of male and female graduates on by means of what sciences concerned with information backed graduates in selecting seizures in subordinate schools in Bomadi Educational Zone.

Discussion of Findings

Secondary school students in the Bomadi Educational Zone and the Impact of Educational Services on Their Career Choices

The study's results showed that secondary school students in the Bomadi Educational Zone benefited greatly from educational and vocational counselling and guidance services while deciding on a career path. Additionally, the results demonstrated that when comparing the average ratings of male and female students in Bomadi Educational Zone secondary schools, there was no statistically significant difference in the degree to which students' use of educational and vocational counselling and guidance services influenced their career choice. In line with this discovery, a study by Audu and Umoru (2020) found that counselling and guidance services are essential parts of contemporary educational systems. These services help students develop holistically by guiding them through self-discovery, decision-making, and overcoming obstacles in their personal lives, social circles, classrooms, and careers. Counselling is more intense and focuses on helping individuals resolve specific personal, academic, or vocational issues through professional interaction, while guidance is

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seen as a developmental process that helps individuals acquire the knowledge, skills, and attitudes necessary for effective decision-making. As a whole, guidance and counselling provide a preventative framework for students' mental, emotional, and occupational health in the classroom. Moreover, this study's results are in line with those of Iheanacho and Ugwu (2023), who found that counselling and guidance go beyond providing students with informal advice and instead involve structured, systematic programs put in place by qualified individuals to meet their developmental needs. Guidance and counselling services at secondary schools work to help students gain insight into their own strengths, areas of interest, core beliefs, character attributes, and the social and cultural factors that impact their decision-making. Learners are given the tools they need to make informed and practical decisions about their academic pursuits, career paths, and personal development through this process. Research by Audu and Ahmed (2023) confirms that guidance and counselling programs take a multi-faceted approach to student development, touching on their emotional, social, vocational, and cognitive aspects. Because of the fast physical, emotional, and social changes that adolescents go through, which can affect their academic performance and career readiness, it is essential to take a multi-dimensional approach. For example, there is often a rise in academic pressure, increased peer impact, and the need to make career-related choices as students go from junior to senior year of high school. A sense of direction, purpose, and self-confidence can be fostered through the use of guidance and counselling services, which offer a structured framework for students to navigate these developmental challenges.

Effects of Bomadi Educational Zone's Secondary School Information Services on Students' Career Choices

The study's results showed that information services helped secondary school students in Bomadi Educational Zone make better occupational choices by guiding them through the process of career exploration, outlining the skills and experience needed for various jobs, highlighting new job opportunities, and swaying their preferences. Furthermore, the results demonstrated that when it came to the use of information services to assist students in making career decisions in Bomadi Educational Zone secondary schools, there was no statistically significant difference between the means of male and female students. Adeosun and Ojo (2023) found that students may get structured help in making informed career choices via educational, vocational, and personal-social counselling services. This finding is in line with that. To help students comprehend the needs and consequences of different jobs, guidance counsellors give career information, conduct aptitude tests, provide group and individual counselling, and host career fairs. Students who make use of counselling services are more likely to be job ready and to make reasonable choices about their careers, according to research.

Conclusion

This study examined effect of guidance and counselling services on secondary school students' choice of occupation in public secondary schools within the Bomadi Educational Zone, Delta State. These services enhanced students' understanding of their strengths and interests, guide informed career decisions and shaped realistic aspirations. The results underscored the importance of consistently implementing comprehensive guidance and counselling programmes in schools. Through doing so, schools can create an environment that supports career awareness, informed decision-making and personal development. Such an environment not only improves students' career readiness but also contributes to their long-term occupational success and overall educational effectiveness.

Recommendations

In light of the study's findings, the following recommendations are presented:

1. The government should make it mandatory for all secondary schools, both public and private, to employ a minimum of three qualified guidance counsellors (with additional counsellors for larger schools) to ensure all students have adequate access to continuous career guidance and support.
2. School administrators and principals should fully embrace and support guidance counsellors by providing the necessary resources, authority and recognition to enable them to perform their roles effectively.
3. The government, in collaboration with schools, should implement holistic awareness programs involving students, parents, teachers, and the community to highlight the importance of educational and vocational guidance and counselling services in supporting informed occupational choices.

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Impact of Social Media on Academic Engagement among Public Secondary School Students in Bomadi Educational Zone of Delta State, Nigeria

PUWEI, Eyanbo Justin
justinpuweism@gmail.com.
0706 247 2510
Department of Educational Psychology, Guidance and Counselling, Ignatius Ajuru University of Education, Rumuolumeni, Port Harcourt, River State, Nigeria

Abstract

This study examined the impact of social media on the academic engagement of students in public secondary schools in Bomadi Educational Zone, Delta State. The article focused on two dimensions: daily social media usage patterns and social media use in relation to students' study habits and academic focus. An ex post facto research design was adopted. The population comprised 10,524 senior secondary school students in public schools across Bomadi, Patani and Burutu Local Government Areas. A sample of 385 students was selected through multistage sampling. Data were collected using the Impact of Social Media Questionnaire and the Academic Engagement of Students Questionnaire, combined into one instrument. The instruments were validated by specialists and yielded Cronbach's alpha coefficients of 0.82 and 0.80, respectively. Of the 385 questionnaires administered, 367 were correctly completed and retrieved, representing a 95.3% response rate. Simple linear regression was used to analyse the data. Findings showed that daily social media usage patterns had a weak negative and statistically significant influence on academic engagement ($R = -0.265$, $R^2 = 0.070$, $p < .05$). Social media use in relation to study habits and academic focus also had a weak negative and statistically significant influence ($R = -0.237$, $R^2 = 0.056$, $p < .05$). The study concluded that frequent and poorly regulated social media use may undermine students' academic engagement. It recommended digital literacy education, focused study routines and improved time-management guidance.

Keywords: social media, academic engagement, study habits, academic focus, secondary school students

Introduction

The expansion of internet access and mobile communication has changed how young people obtain information, communicate and participate in social life. Social media platforms such as WhatsApp, Facebook, Instagram, TikTok, YouTube and X provide opportunities for interaction, information sharing and collaboration. For secondary school students, these platforms can extend learning beyond the classroom by supporting peer discussions, sharing educational materials and communicating with teachers and classmates. However, the same platforms can also compete with schoolwork for students' time and attention. Academic engagement refers to the extent to which students participate in and invest themselves in learning. It is commonly understood through behavioural, emotional and cognitive dimensions. Behavioural engagement involves attendance, participation in classroom activities and completion of assignments. Emotional engagement concerns students' interest, enjoyment and sense of belonging in school, while cognitive engagement reflects mental effort, concentration, self-regulation and the use of learning strategies. These dimensions are important because students' active involvement in learning supports persistence, understanding and educational progress.

Social media may promote academic engagement when students use it purposefully. Online class groups can facilitate the exchange of notes, explanations and reminders. Video-sharing platforms can provide access to instructional content, while discussion groups can enable students to ask questions and learn collaboratively. Greenhow and Lewin (2022) explain that social media can blur the boundaries between formal and informal learning by creating opportunities for knowledge exchange beyond the classroom. Similarly, Al-Rahmi et al. (2021) identify collaborative learning and communication as possible educational benefits of social media. The educational value of social media, however, depends on the purpose, frequency and duration of use. Students who frequently switch between academic tasks and online notifications may experience divided attention. Such task switching can interrupt concentration, reduce the time available for independent study and make it difficult to sustain mental effort. Research on media multitasking has associated uncontrolled digital engagement with distraction and weaker learning outcomes (Chen et al., 2021; Lau, 2021; Shah et al., 2023). The issue is particularly relevant during adolescence, when students are developing the self-regulatory skills required to manage competing demands. Secondary school students may use social media for entertainment, peer interaction and social validation while also relying on it for academic communication. When recreational use becomes excessive, it may displace

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homework, reading and revision. Conversely, purposeful and time-limited academic use may support collaboration and access to learning resources. In Bomadi Educational Zone, which comprises Bomadi, Patani and Burutu Local Government Areas in Delta State, the riverine setting and differences in access to educational and technological resources provide a distinctive context for examining students' digital practices. The source dissertation identifies a gap in local evidence on how social media use relates to academic engagement among secondary school students in this zone. Findings from urban settings or tertiary institutions may not fully explain the experiences of students in riverine public secondary schools. This study therefore examined the impact of social media on students' academic engagement, with particular attention to daily usage patterns and the relationship between social media use, study habits and academic focus.

Statement of the Problem

Social media has become part of the everyday experience of many secondary school students. Although these platforms provide opportunities for communication, information sharing and collaborative learning, concerns have emerged about their potential to distract students from academic activities. Frequent checking of messages, prolonged browsing and the use of social media during study periods may reduce concentration and interfere with the completion of schoolwork. The concern is not simply that students use social media, but that some may find it difficult to regulate the frequency, duration and timing of use. In Bomadi Educational Zone, concerns have been raised about students' attention during lessons, reading habits, independent study and assignment completion. The dissertation notes that some of these concerns are based on informal observations rather than systematic local evidence. Without empirical findings, school administrators, teachers and parents may find it difficult to determine whether and how daily social media use and its relationship with study habits and academic focus influence students' academic engagement. This study addressed the problem by examining these two dimensions among students in public secondary schools in the zone.

Aim and Objectives of the Study

The main aim of the study was to examine the impact of social media on the academic engagement of students in public secondary schools in Bomadi Educational Zone, Delta State. Specifically, the article addressed the following objectives:

1. Determine the influence of daily social media usage patterns (frequency, duration and timing) on students' academic engagement.
2. Examine the influence of social media use in relation to study habits and academic focus on students' academic engagement.

Research Questions

1. What is the influence of daily social media usage patterns (frequency, duration and timing) on the academic engagement of students in public secondary schools in Bomadi Educational Zone?
2. What is the influence of social media use in relation to study habits and academic focus on the academic engagement of students in public secondary schools in Bomadi Educational Zone?

Research Hypotheses

The following null hypotheses were tested at the 0.05 level of significance:

H_{o1}: There is no significant influence of daily social media usage patterns (frequency, duration and timing) on the academic engagement of students in public secondary schools in Bomadi Educational Zone.

H_{o2}: There is no significant influence of social media use in relation to study habits and academic focus on the academic engagement of students in public secondary schools in Bomadi Educational Zone.

Scope of the Study

The study was geographically delimited to public secondary schools in Bomadi Educational Zone of Delta State, covering Bomadi, Patani and Burutu Local Government Areas. In terms of content, the study focused on the impact of social media on students' academic engagement, specifically examining students' daily social media usage patterns, including frequency, duration and timing, as well as the influence of social media use on their study habits and academic focus. The study covered senior secondary school students in SS I, SS II and SS III. The article therefore concentrates on these two dimensions of social media use and their relationship with students' academic engagement within the selected educational zone.

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Literature Review

Social Media Use among Secondary School Students

Social media refers to internet-based platforms that enable users to create, share and exchange information and to participate in online networks. These platforms support different forms of communication, including text messages, photographs, videos, live discussions and group interaction. Students may use them for entertainment and social relationships as well as for educational purposes. WhatsApp and Telegram can support group communication and file sharing, while YouTube can provide instructional videos. Facebook and other networking platforms can host groups for sharing information and coordinating school activities. The educational implications of social media are therefore not uniform. Academic use may give students access to resources and peer support, while non-academic use during study periods may interrupt learning. Al-Rahmi and Othman (2020) associate social media-supported collaboration with learning opportunities, while Greenhow and Lewin (2022) discuss the connections between formal and informal learning. On the other hand, research on media multitasking indicates that switching attention between social media and school tasks may impose cognitive demands that interfere with learning (Chen et al., 2021; Rizvi et al., 2021).

Daily Social Media Usage Patterns and Academic Engagement

Daily usage patterns include how often students access social media, how long they remain online and the times of day when they use the platforms. Frequency, duration and timing can shape the extent to which social media competes with school-related activities. Repeated checking of notifications may interrupt reading and homework, while prolonged use late at night may reduce time available for rest and preparation for school. The effect may be more pronounced when students use platforms mainly for entertainment or social interaction during periods set aside for learning. The relationship is not necessarily negative in every circumstance. Students who use social media at planned times to discuss assignments, exchange notes or access educational videos may benefit from the connectivity it provides. The key issue is whether use is intentional and compatible with academic responsibilities. Lau (2021) and Shah et al. (2023) discuss the learning implications of social media multitasking, while Hartnell-Young and Vetere (2021) identify opportunities for structured smartphone use to support creativity and collaboration. These findings suggest that daily patterns should be considered alongside the purpose and context of use.

Social Media Use, Study Habits and Academic Focus

Study habits refer to the regular practices students adopt when preparing for lessons, completing assignments, revising and managing independent learning. Academic focus concerns the ability to sustain attention on learning tasks while limiting interruptions. Social media may affect these practices when students check messages during study periods, move repeatedly between online content and textbooks or delay assignments because of prolonged browsing. Such behaviour can fragment attention and reduce the continuity required for comprehension and memory. However, social media can also support study when students use it to ask questions, share learning materials and participate in subject-based discussions. The distinction between purposeful academic engagement and unregulated recreational use is therefore important. Students' ability to manage their time and regulate their online behaviour may determine whether social media supports or undermines their study routines. The literature reviewed in the source dissertation points to both the collaborative potential of social media and the risks associated with excessive use and distraction.

Theoretical Framework: Social Learning Theory

This study was anchored on Social Learning Theory, developed by Albert Bandura (1977). The theory explains that people learn behaviours, attitudes and patterns of response through observation, imitation and interaction with others. Learning does not occur only through direct instruction or personal experience; individuals may also acquire behaviours by observing models and the consequences of their actions. Social media provides an environment in which students are continuously exposed to the behaviour, opinions and activities of peers, influencers, teachers and other users. Students may observe classmates sharing educational resources, discussing assignments and demonstrating effective study practices. Such examples can encourage academic participation. At the same time, students may imitate patterns of excessive browsing, frequent checking of notifications or prioritising online social interaction over schoolwork. The theory therefore helps explain why social media can provide both positive and negative behavioural models.

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The theory is relevant to the present study because students' daily usage patterns and study practices may be shaped by what they observe and experience within their online networks. When students encounter peers who use social media for academic collaboration, they may adopt similar practices. When online networks reward constant interaction and entertainment, students may also develop habits that compete with academic focus. Social Learning Theory thus provides a useful basis for understanding the possible influence of social media use on students' academic engagement in Bomadi Educational Zone.

Research Methodology

Research Design

The study adopted an ex post facto research design. This design was considered appropriate because the study examined existing social media usage patterns and their influence on students' academic engagement without manipulating the independent variables.

Population and Sample

The population comprised 10,524 senior secondary school students in public secondary schools in Bomadi Educational Zone, Delta State. The zone covers Bomadi, Patani and Burutu Local Government Areas. Students in SS I, SS II and SS III were included. A sample of 385 students was selected using a multistage sampling procedure. The procedure involved selecting schools across the three Local Government Areas and selecting eligible students from the different class levels. The dissertation also describes the use of simple random selection within schools and a convenience approach for administering questionnaires to students who were available and willing to participate.

Instrument, Validity and Reliability

Data were collected using two structured instruments: the Impact of Social Media Questionnaire (ISMQ) and the Academic Engagement of Students Questionnaire (AESQ). The two questionnaires were combined into one instrument with sections for respondents' demographic information, social media use and academic engagement. Three specialists in Measurement and Evaluation reviewed the draft instrument for language clarity and content relevance. Reliability was assessed using Cronbach's alpha after a pilot exercise involving 30 senior secondary school students in a neighboring educational area outside the study population. The reported reliability coefficients were 0.82 for the ISMQ and 0.80 for the AESQ.

Data Collection and Analysis

The questionnaires were administered in selected schools with the assistance of three trained research assistants. Permission was obtained from relevant education authorities and school principals, and the study described procedures for explaining the purpose of the research and protecting respondents' confidentiality. Of the 385 questionnaires administered, 367 were correctly completed and retrieved, giving a response rate of 95.3%. Data were analysed using SPSS version 27. Simple linear regression was used to answer the research questions and test the null hypotheses at the 0.05 level of significance. The coefficient of determination (R^2) was used to show the proportion of variation in academic engagement explained by each predictor, while the regression coefficient indicated the direction of the relationship.

Presentation of Results

Demographic Characteristics of Respondents

A total of 367 correctly completed questionnaires were used for the analysis. The respondents comprised 215 male students (58.6%) and 152 female students (41.4%). In terms of age, 50 respondents (13.6%) were 12–14 years, 239 (65.1%) were 15–17 years and 78 (21.3%) were 18 years and above. The class distribution comprised 130 SS I students (35.4%), 121 SS II students (33.0%) and 116 SS III students (31.6%).

Characteristic	Category	Frequency	Valid %
Gender	Male	215	58.6
	Female	152	41.4
Age	12–14 years	50	13.6
	15–17 years	239	65.1
	18 years and above	78	21.3
Class	SS I	130	35.4
	SS II	121	33.0

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SS III	116	31.6

Source: Survey data reported in the dissertation (2026).

Research Question One

What is the influence of daily social media usage patterns (frequency, duration and timing) on the academic engagement of students in public secondary schools in Bomadi Educational Zone?

Predictor	R	R^2	Adjusted R^2	Std. Error
Daily social media usage patterns (frequency, duration and timing)	−0.265	0.070	0.068	9.500

The result indicates a weak negative relationship between daily social media usage patterns and students' academic engagement (R = −0.265). The coefficient of determination (R^2 = 0.070) shows that daily usage patterns accounted for 7.0% of the variation in academic engagement. This suggests that more frequent, prolonged or poorly timed use was associated with a modest reduction in students' academic engagement.

Research Question Two

What is the influence of social media use in relation to study habits and academic focus on the academic engagement of students in public secondary schools in Bomadi Educational Zone?

Predictor	R	R^2	Adjusted R^2	Std. Error
Social media use on study habits and academic focus	−0.237	0.056	0.054	9.420

The result shows a weak negative relationship between social media use in relation to study habits and academic focus and students' academic engagement (R = −0.237). The R^2 value of 0.056 indicates that the predictor accounted for 5.6% of the variation in academic engagement.

Test of Hypotheses

The null hypotheses were tested using the regression results reported in the dissertation.

Hypothesis / Predictor	B	Beta	t	df	p-value	Decision
Daily social media usage patterns	−0.850	−0.265	−4.470	366	< .001	Reject H_{01}
Social media use, study habits and academic focus	−0.780	−0.237	−4.110	366	< .001	Reject H_{02}

For the first hypothesis, the reported t-value was −4.470 with a p-value of 0.000, which is below the 0.05 significance level. The first null hypothesis was therefore rejected. For the second hypothesis, the reported t-value was −4.110 with a p-value of 0.000, also below 0.05. The second null hypothesis was therefore rejected. The results indicate that both daily social media usage patterns and social media use in relation to study habits and academic focus had statistically significant negative influences on students' academic engagement.

Discussion of Findings

Daily Social Media Usage Patterns and Academic Engagement

The first finding showed that daily social media usage patterns had a weak negative and statistically significant influence on students' academic engagement. The predictor explained 7.0% of the variation in engagement. This suggests that frequency, duration and timing of social media use are relevant to students' involvement in learning, although they do not account for most of the differences in academic engagement. Students who frequently interrupt schoolwork to check social media or spend extended periods on non-academic content may have less time and attention available for lessons, revision

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and assignment completion. This finding is consistent with the concern in the literature that media multitasking can fragment attention and interfere with learning. Chen et al. (2021), Lau (2021) and Shah et al. (2023) discuss the possible cognitive and academic costs of switching between social media and learning tasks. At the same time, social media can support learning when students use it deliberately for academic communication and collaboration. The implication is that schools and families should focus not simply on whether students use social media, but on the frequency, duration, timing and purpose of that use.

Social Media Use, Study Habits, Academic Focus and Engagement

The second finding indicated that social media use in relation to study habits and academic focus had a weak negative and statistically significant influence on academic engagement, explaining 5.6% of the variation. This suggests that students' online habits may affect their ability to maintain consistent study routines and concentrate on academic tasks. Notifications, repeated checking and movement between online entertainment and schoolwork can interrupt sustained attention and reduce the continuity of independent study. The finding supports the view that uncontrolled social media use can compete with academic responsibilities. However, it should not be interpreted to mean that all social media use is harmful. Platforms may provide opportunities for students to exchange educational resources, clarify difficult concepts and collaborate on assignments. Greenhow and Lewin (2022) and Al-Rahmi et al. (2021) highlight the educational potential of online interaction and collaborative learning. The practical challenge is to help students distinguish purposeful academic use from online activities that displace study time and concentration.

Conclusion

The study found that daily social media usage patterns and social media use in relation to study habits and academic focus had weak but statistically significant negative influences on the academic engagement of students in public secondary schools in Bomadi Educational Zone, Delta State. Although the proportions of explained variance were modest, the results indicate that students' frequency, duration and timing of social media use, as well as the way social media intersects with their study routines, are relevant to their engagement in learning. The study concludes that responsible and regulated use is important if students are to benefit from social media without allowing it to undermine their academic responsibilities.

Recommendations

1. Schools should provide digital literacy programmes that help students understand how frequency, duration and timing of social media use can affect their learning and academic engagement.
2. Teachers and parents should encourage students to establish focused study periods during which non-essential social media notifications and interruptions are limited.
3. Schools should organise practical time-management sessions to help students balance online activities with homework, reading, revision and other academic responsibilities.
4. Teachers should guide students towards purposeful academic uses of social media, including sharing learning resources, participating in subject discussions and collaborating on assignments.
5. Parents and school authorities should promote responsible digital habits through regular guidance and supportive monitoring that respects students' privacy.

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Influence of Family Dynamics on Academic Achievement of Public Secondary School Students in Bomadi Education Zone of Delta State, Nigeria

OMONIYE, Victoria Demes
Omoniyedemes@gmail.com
0806 267 7105

Department of Educational psychology, Guidance and Counselling, Faculty of Education, Ignatius Ajuru University of Education, Rumuolumeni, Port Harcourt, Nigeria.

Abstract

This study examined the relationship between family dynamics and the academic achievement of adolescent students in public secondary schools in Bomadi Education Zone, Delta State, Nigeria. It focused on family structure, parental socioeconomic status, parenting style and parental involvement. A correlational research design was adopted. The population comprised 10,524 students in 40 public secondary schools across Bomadi, Patani and Burutu Local Government Areas. A sample of 385 students was selected using Taro Yamane's formula and multistage sampling. Data were collected using the Academic Achievement of Adolescent Students Questionnaire and the Impact of Family Dynamics Questionnaire. The instruments had reliability coefficients of 0.78 and 0.77, respectively, determined using Cronbach's alpha. Mean and standard deviation answered the research questions, while simple linear regression tested the null hypotheses at the 0.05 significance level. Findings indicated that family structure, parental socioeconomic status, parenting style and parental involvement significantly influenced students' academic achievement. The study concluded that family dynamics play an important role in adolescents' academic success. It recommended counselling support, financial assistance, parent education programmes and stronger school-family communication to improve students' educational outcomes.

Keywords: Family dynamics; family structure; socioeconomic status; academic achievement; students

Introduction

Family dynamics constitute one of the most significant determinants of adolescents' educational development, shaping their academic behaviour, emotional well-being, and learning outcomes. Across the world, scholars have argued that the family remains the first and most influential socialising agent responsible for transmitting values, reinforcing behavioural norms, and cultivating attitudes toward education (Adebayo & Akinola, 2020; Okafor, 2021). As adolescents navigate a critical developmental stage characterised by rapid cognitive, emotional, and social transitions, the nature of interactions within the family whether harmonious, supportive, conflicted, or unstable plays a central role in influencing how they engage with learning tasks, respond to school demands, form study habits, and perform academically (Agboola & Odejide, 2020; Nwankwo & Nwosu, 2022). In contemporary educational research, the concept of family dynamics has broadened to include the structure of the family, parenting styles, communication patterns, emotional climate, parental involvement, socioeconomic stability, discipline approaches, and family cohesion. Each of these dimensions contributes uniquely to shaping adolescents' academic trajectories. Studies conducted in Nigeria and other African countries have consistently shown that adolescents who grow up in supportive, cohesive, and communicative families are more likely to exhibit higher levels of motivation, self-confidence, and academic persistence compared to those raised in families characterised by conflict, emotional neglect, or instability (Igbinedion, 2022; Eze, 2019). These findings reflect a global pattern where a nurturing home environment enhances academic achievement by providing emotional security, structured routines, and adequate resources needed for learning (Oluwatayo, 2020; Omoregie, 2021). In the last decade, Nigeria has witnessed significant changes in family composition and functioning, influenced by economic pressure, migration, marital breakdown, and socio-cultural transitions. These transformations have raised concerns regarding the implications of family dynamics for adolescent academic success. According to Adeyeye (2023), shifting family structures—particularly the rise in single-parent households often lead to reduced parental supervision, financial strain, and emotional stress, all of which negatively affect students' school engagement. Similarly, Amaechi-Udogu (2025) notes that family instability can limit

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adolescents' concentration, reduce their study time, and heighten vulnerability to academic difficulties due to the psychological burden associated with an unstable home environment.

Parental involvement has been widely recognised as a vital component of family dynamics. Recent studies confirm that adolescents whose parents actively monitor homework, participate in school meetings, provide educational materials, and maintain regular communication with teachers tend to perform better academically (Muhammed, Mustapha & Shittu, 2023; Angwaomaodoko, 2023). Parental involvement fosters academic motivation, strengthens learning discipline, and builds adolescents' confidence in their academic abilities. More importantly, when parents express high educational expectations, adolescents often internalise these expectations and work harder to meet them (Odeyemi, 2023). However, low parental involvement whether due to illiteracy, time constraints, occupational demands, or weak parent–child communication has been associated with reduced academic motivation and lower levels of achievement (Onongha, Oladiji & Raji, 2023). Another important dimension of family dynamics is socioeconomic status (SES), which influences the quality of home learning resources and opportunities available to adolescents. Families with higher SES are more capable of providing textbooks, private tutoring, technological learning tools, and a conducive study environment. In contrast, adolescents from low-income households often struggle academically due to financial constraints, inadequate home support, and limited exposure to enriching educational experiences (Agboola & Odejide, 2020; Nwankwo & Nwosu, 2022). In recent research, Zhao and Zhao (2022) highlight that family economic conditions not only affect academic resources but also shape adolescents' educational aspirations and their interactions with peers and teachers. Globally, family relational processes including cohesion, communication, emotional bonding, and conflict management have been linked with academic adjustment. Positive family relationships promote emotional stability and resilience, enabling adolescents to cope with academic stress, maintain focus, and sustain long-term learning goals. Conversely, families characterised by frequent conflict, poor communication, and emotional detachment tend to produce adolescents who show signs of anxiety, low self-esteem, and disengagement from school activities (Ezevunwo, Egbuchu & Oshoko, 2023). These challenges often manifest in poor attendance, incomplete assignments, behavioural infractions, and reduced academic performance. Within the Nigerian context, recent studies continue to emphasise the interplay between family dynamics and academic achievement. For instance, Angwaomaodoko (2023) reported that adolescents from households with high parental involvement demonstrated significantly higher academic achievement in Asaba, Delta State. Similarly, Igbinedion (2022), in a study conducted in Delta State public secondary schools, observed that adolescents from cohesive and stable families generally recorded better academic outcomes. These findings support earlier research suggesting that family support mechanisms form a crucial buffer against the socio-economic and environmental challenges experienced by many Nigerian adolescents (Oluwatayo, 2020).

The Bomadi Educational Zone, located in the riverine part of Delta State, presents a unique socio-cultural and economic context that further underscores the significance of family dynamics in adolescent education. The region is characterised by fluctuating economic activities, limited infrastructure, high levels of migration, and occupational demands that keep many parents away from home for extended periods. These conditions often weaken parental supervision and reduce family cohesion, thereby affecting adolescents' academic adjustment. Recent local studies indicate that adolescents in riverine communities may experience limited academic support at home, inconsistent parental presence, and high exposure to social pressures, all of which affect their educational engagement (Ezevunwo et al., 2023; Amaechi-Udogu, 2025). Environmental restrictions, teacher shortages, and inadequate instructional materials are some of the problems that Bomadi's public secondary schools encounter. The significance of having family support in maintaining academic motivation among teenagers is further emphasised by these considerations. Family relations have a vital role in providing academic reinforcement in cases when school elements are lacking. Therefore, teenagers in the Bomadi Educational Zone may be at a higher risk of having low academic performance if they do not receive sufficient assistance from their families. Although there is a lot of literature on how family dynamics affect students' performance in school, there is a severe lack of studies that target the Bomadi Educational Zone in particular. Many previous research have focused on family-related variables in different regions of Nigeria, including Delta State, Rivers, Oyo, Kwara, and Lagos. A context-specific examination is

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necessary, nevertheless, due to Bomadi's distinct social, cultural, and environmental features. For the purpose of developing effective educational interventions, enhancing school-family collaborations, and influencing policy choices that promote students' academic success, it is crucial to comprehend the ways in which family dynamics impact the academic performance of adolescents in this zone. Therefore, this study seeks to provide an empirical analysis of how family interactions, parenting practices, family structures, communication patterns, and socioeconomic conditions collectively influence academic achievement among adolescent students in public secondary schools in Bomadi Educational Zone. By addressing this gap, the study contributes to current discourse on adolescent education, offering insights that will support educators, policymakers, parents, and community leaders in enhancing educational outcomes through improved family dynamics.

Statement of the Problem

Education is widely recognized as a vital instrument for individual empowerment and national development, enabling people to acquire knowledge, skills, values, and competencies necessary for meaningful societal participation. Despite its importance, concerns have grown over declining academic achievement among secondary school students in Nigeria, particularly in rural and riverine communities such as the Bomadi Educational Zone of Delta State. Internal and external examination records indicate persistent underachievement among adolescents, despite government and non-governmental efforts to improve access, infrastructure, and instructional quality. Several factors contribute to poor academic performance, but evidence increasingly points to the family environment as a crucial determinant of students' outcomes. The family serves as the first and most influential agent of socialization, shaping behavioural development, emotional stability, discipline, and attitudes toward learning. Factors such as family structure, economic condition, parental involvement, and emotional relationships significantly influence how adolescents perceive education and respond to academic demands. Traditionally, Nigerian families emphasized strong parental supervision, shared responsibilities, and stable structures; however, social and economic changes including poverty, migration, unemployment, rising divorce rates, and evolving family roles have weakened these support systems.

In the Bomadi Educational Zone, which comprises Bomadi, Burutu, and Patani Local Government Areas, these challenges are heightened by geographic and economic constraints. The zone is predominantly riverine, with limited infrastructure and restricted access to social services. Most residents rely on fishing, petty trading, and subsistence farming, resulting in widespread poverty and economic instability. Many families struggle to meet basic educational needs, including textbooks, uniforms, school fees, and conducive home learning environments. Parents often lack the time, energy, or resources to monitor their children's academic activities or provide consistent emotional and moral support. In some cases, adolescents engage in income-generating activities after school, leaving them physically exhausted and disengaged from academic work. Socioeconomic disparities also create unequal educational opportunities. Students from higher-income families typically have access to learning materials, private tutoring, and literacy-enriching environments, whereas adolescents from low-income households face multiple disadvantages, including poor nutrition, irregular school attendance, limited access to resources, and low academic motivation. Consequently, the gap between urban and rural students continues to widen, reflecting broader structural inequalities within Nigerian society. Cultural factors further influence educational attitudes in riverine communities. In some families, formal schooling is secondary to immediate economic needs, resulting in irregular attendance and early school withdrawal. Cultural expectations may prioritize early marriage or domestic responsibilities, particularly for female adolescents, limiting long-term educational planning and aspirations. When combined with poverty and weak family support, these cultural orientations contribute to low achievement and increased dropout rates.

While studies on family influences on academic performance in Nigeria exist, most focus on urban centers where socioeconomic conditions and access to resources differ from the Bomadi Educational Zone. Rural-focused studies often examine variables such as parental education, income, or household size in isolation, overlooking how these factors interact to shape adolescents' academic outcomes. This limit understanding of how family structure, economic status, and emotional relationships collectively affect achievement in riverine, low-income contexts. The continued poor performance

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of adolescents in the Bomadi Educational Zone suggests that school-related factors alone such as facilities, teacher quality, and curriculum—cannot fully explain academic outcomes. Family environment, including economic condition, stability, and emotional support, plays a central role. Limited attention to home-based factors in educational policy has reduced the effectiveness of programmes aimed at improving achievement. Weak family supervision is also linked to adolescent behavioural problems, including truancy, substance use, and school dropout, as economic hardship and family disintegration leave students without adequate guidance or mentorship. Given these challenges, there is a pressing need to investigate how family dynamics influence academic achievement in the Bomadi Educational Zone. Such a study will provide insight into the interconnected roles of family structure, socioeconomic conditions, and emotional relationships, generating evidence to inform policy, educational planning, and family-oriented interventions aimed at enhancing the academic performance of public secondary school students in rural riverine communities. Therefore, this study seeks to provide an empirical analysis of how family interactions, parenting practices, family structures, communication patterns, and socioeconomic conditions collectively influence academic achievement among adolescent students in public secondary schools in Bomadi Educational Zone. By addressing this gap, the study contributes to current discourse on adolescent education, offering insights that will support educators, policymakers, parents, and community leaders in enhancing educational outcomes through improved family dynamics.

Objectives of the Study

The main aim of this study is to examine the impact of family dynamics on the academic achievement of adolescent students in public secondary schools in Bomadi Education Zone, Delta State. The study sought to explore how different aspects of family life such as family structure, socioeconomic status and parenting styles influence students' motivation, behaviour and overall performance in school.

To achieve the aim, the study was guided by the following specific objectives:

1. determine the influence of family structure on the academic achievement of adolescent students in public secondary schools within the Bomadi Education Zone.
2. assess the influence of family socio-economic status on the academic achievement of adolescent students in public secondary schools within the Bomadi Education Zone.

Research Questions

The study sought to provide answers to the following research questions

1. What is the influence of family structure on the academic achievement of adolescent students in public secondary schools within the Bomadi Education Zone?
2. What is the influence of parental socioeconomic status on the academic achievement of adolescent students in public secondary schools within the Bomadi Education Zone?

Research Hypotheses

The study formulated the following research hypotheses to be tested at 0.05 level significance:

H_{01}: There is no significant influence of family structure on the academic achievement of adolescent students in public secondary schools within the Bomadi Educational Zone.

H_{02}: There is no significant influence of parental socioeconomic status on the academic achievement of adolescent students in public secondary schools within the Bomadi Education Zone.

Scope of the Study

This study was delimited in both content and geographical dimensions to ensure focus and clarity in achieving its stated objectives. The study focused on the influence of family dynamics on the academic achievement of adolescent students in public secondary schools in Bomadi Education Zone, Delta State. Specifically, it examined family structure, parental

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socioeconomic status, parenting styles and parental involvement. Geographically, the study covered Bomadi, Patani and Burutu Local Government Areas, comprising 40 public senior secondary schools. The zone is predominantly riverine, with distinct socioeconomic, cultural and accessibility challenges that may influence students' educational experiences and academic performance.

Review of Related Literature

Conceptual Review

Concept of Family Dynamics

The family remains the most fundamental social institution that shapes the character, attitudes, and achievement patterns of individuals. It is the primary context in which children learn values, emotional expression, and social interaction. According to Strong and Cohen (2020), the family is not merely a biological unit but a system of interdependent relationships that influence members' thoughts, feelings, and behaviours. The family provides security, nurturance, and socialisation, which are essential for children's development and academic progress. In this sense, the family serves both as a microcosm of society and as the earliest school of learning, where foundational attitudes toward education and responsibility are formed. Dynamics are forces that can change or shape a system. Relationship dynamics are those interactions between people that determine how they think of one another, what they do together, how they work together, and much more. This concept can also be applied to families. The concept of family dynamics extends beyond structural descriptions such as nuclear, single-parent, or extended family. It captures the ongoing patterns of interaction, communication, and emotional exchange among family members that define how the household operates. StatPearls (2023) defines family dynamics as the "interactions between family members, their relationships, roles, and behavioural patterns that influence individual well-being and development." These dynamics evolve in response to internal factors (e.g., parental roles, communication styles, and emotional regulation) and external factors (e.g., socioeconomic conditions, cultural norms, and environmental pressures). The quality of these interactions largely determines the family's ability to provide support, discipline, and motivation for adolescents' learning. Within the Nigerian context, the family assumes an especially critical role in the educational development of adolescents. In a society where institutional resources may be limited, family interactions often compensate for the lack of formal support structures. Ohazulike (2023) observes that family systems in Nigeria are undergoing transformation due to urbanisation, economic hardship, and changing cultural expectations. These shifts affect how parents supervise, communicate, and allocate educational resources to their children. For instance, in many riverine or rural communities such as those in Delta State, extended kinship networks and collective parenting remain common. While these arrangements can provide a strong support system, they can also dilute direct parental supervision and educational guidance when roles and responsibilities are not clearly defined.

Parents and other household members form the earliest and most persistent social environment into which a child is born, and this environment exerts a powerful influence on the adolescent's development across cognitive, emotional and behavioural domains. In scholarly discourse, "family" is conceptualised not simply as a static structure, but as a dynamic system of relationships, roles and interactions that evolve over time. This systemic view emphasises that children's educational experiences are deeply embedded within patterns of interaction, expectations and resource flows that originate in the home. The concept of family dynamics thus refers to the complex interplay among family members, including how they communicate, allocate responsibilities, respond to change, and sustain emotional bonds (StatPearls, 2023).

From a functional perspective, the family provides economic support, socialisation, emotional security and educational foundations for adolescents. It is the locus where values are transmitted, coping strategies learned, and attitudes toward schooling first formed. When the interactional climate within the home is supportive, cohesive, and organised, adolescents tend to develop stronger motivation to learn, better study habits and higher academic engagement. Conversely, when the household environment is characterised by conflict, instability, or poor supervision, educational trajectories may be disrupted (Lee & McHale, 2018). In this way, family dynamics serve as both the foundation and the mechanism through which children prepare for schooling and beyond. At its core, family dynamics include three inter-related domains: (1)

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structural aspects (who lives in the household, how roles are distributed, and how caregiving is organised), (2) functional aspects (how the household operates in terms of routines, supervision, communication and emotional support), and (3) relational aspects (how members interact, negotiate power and support each other). A clear understanding of these domains is essential for unpacking how the home influences adolescent academic success. For instance, a family may be structurally intact (e.g., two parents and children) but function poorly in terms of supervision or communication, thus reducing its potential to support academic achievement. Likewise, in households where roles are fragmented or caregiving is inconsistent, adolescents may lack the stable routines and attachments that encourage productive study behaviour (Kapur & Tran, 2024).

The scholarly literature emphasises that the impact of family dynamics on adolescent outcomes cannot be fully understood by simply comparing household types (such as single-parent versus two-parent homes). Rather, attention must shift toward measuring how families function on a daily basis on how goals are set, how conflict is resolved, how members adapt to change, and how educational values are reinforced. Contemporary studies highlight that adolescents living in households that demonstrate effective communication, consistent structure, and parental involvement show better results on academic metrics than peers in structurally "traditional" but relationally weak homes (DiGangi & Bower, 2024). In the educational context, this implies that interventions seeking to improve student achievement must consider relational and functional dimensions of the home, not only structural or economic features. For example, longitudinal and cross-sectional research has found that households that maintain coherent routines, clear expectations and high levels of parent–child discussion obtain stronger academic outcomes for adolescents. In a recent multi-domain study, adolescents exposed to higher family cohesion and lower conflict displayed greater learning resilience, while those from homes experiencing multiple transitions (divorce, parental migration, or repeated caregiver changes) demonstrated lower academic persistence and higher dropout risk (Lee & McHale, 2018).

This finding underscores the idea that family dynamics encompass stability, adaptability and resource allocation over time. In addition to structural and functional domains, cultural influences shape how family dynamics manifest in different contexts. The meaning of "family" and the nature of interaction vary markedly by region, tradition and socioeconomic setting. In many Nigerian and other African societies, extended kin networks, communal caregiving, and shared economic activities are common, which means that adolescent educational support may emanate not only from parents but also from wider family members. However, such extended arrangements can also diffuse responsibility and reduce clear parental supervision unless roles and expectations are well-defined. Indeed, African research indicates that changes in family formation (such as increased single-parent households, parental migration and polygamy) are reshaping dynamics within families, thereby influencing children's schooling experiences (Ohazulike, 2023). Family dynamics are shaped by the broader environment and life events. Economic hardship, parental churn, residential mobility and community stressors all affect how families operate and interact. When parents must migrate for work, the absence of a daily supervisor and emotional anchor may diminish an adolescent's academic engagement despite the presence of structural support (e.g., two parents). In riverine or rural contexts with limited infrastructure and income instability, the relational and functional quality of families rather than structural forms alone becomes a more salient determinant of schooling success.

Influence of Family Structure on the Academic Achievement of Adolescent Students

An essential component in understanding the diversity in academic performance among teenagers is family structure, which includes the make-up and arrangement of household members. Common research structural categories include intact families with two parents, single-parent families, blended families, stepfamilies, and extended families. Decades of empirical research show that variations in financial resources, parental involvement, and the stability of caregiving arrangements are the main ways in which various types of households' impact children's academic paths.

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Influence of Family Socio Economic Status on Academic Achievement of Adolescent Students in Public Secondary Schools

Public secondary school students' academic performance has long been an area of intense interest for scholars, administrators, and legislators. Everyone agrees that a student's family's socioeconomic status is one of the most important factors affecting their academic performance. One way to look at a family's socioeconomic standing is by looking at the parents' income, level of education, and employment. All of these things come together to form the classroom setting and decide how much help students get with their studies.

Theoretical Framework: Family Systems Theory

Murray Bowen initially proposed the Family Systems Theory in 1959, and he subsequently developed it further in his extensive 1978 work Family Therapy in Clinical Practice. Family therapist and psychiatrist Bowen postulated that families serve as emotional units whose members are interdependent and linked. By arguing that the family unit as a whole is the key to understanding an individual's behaviour and emotional functioning, he broke with the tradition of individual-focused psychology (Bowen, 1978; Kerr & Bowen, 1988). According to Family Systems Theory, families function as interdependent systems where members' actions are impacted by norms of interaction, emotional ties, and relational regulations. If one family member goes through a period of transition or stress, the whole system will be impacted, as this theory states. According to this hypothesis, families are more like living organisms, with the emotions and behaviours of each member impacting the overall stability or instability of the group. Differentiation of self, triangles, the emotional system of the nuclear family, the process of family projection, emotional cutoff, the process of intergenerational transmission, the role of siblings, and the emotional process in society are the eight interrelated ideas that Bowen used to explain how families work. All of these things come together to show how habits of thought and feeling are passed down through the years. Within the realm of education and adolescent development, Family Systems Theory offers a framework for comprehending the ways in which a child's motivation, discipline, and academic accomplishment are impacted by parental relationships, family communication, and emotional stability. The stability or instability of a student's family system shapes their emotional and cognitive development, according to scholars like Nichols and Davis (2020) and Becvar and Becvar (2018).

The foundation of Family Systems Theory are a number of basic assumptions. The first goal for families is homeostasis, which is defined as "a condition of emotional and relational balance" in which members make behavioural adjustments to keep things stable (Bowen, 1978). Second, because of the interconnected nature of the family system, changes to one component can have far-reaching consequences for other parts of the system. Third, behavioural patterns and emotional functioning are passed down through generations; thus, children's emotional or academic struggles might be a result of parents' unsolved arguments or bad coping mechanisms (Nichols & Davis, 2020). A person's resilience and adaptability are determined by their amount of self-differentiation, which is defined as their capacity to retain a feeling of autonomy while being emotionally attached to their family. Anxiety, dependence, and instability are common outcomes of families that fail to distinguish enough, in contrast to highly differentiated families that encourage autonomy and stability. To better understand how differences in family interaction patterns influence learning outcomes, this study used Family Systems Theory as a theoretical framework to examine the effects of family dynamics on the academic performance of Bomadi Educational Zone adolescents. Adolescents' emotional and relational climate at home, according to the notion, is just as important as their innate intelligence when it comes to their academic success. Family Systems Theory provides an explanation for how the emotional instability among families in the Bomadi Educational Zone—a place where parental relocation and socioeconomic hardship are common—can lead to low academic engagement. For example, when one parent leaves the home for work or gets divorced, it can throw the family dynamic out of whack, leading to less monitoring and uneven punishment. Teens' attitudes toward learning may take a nosedive if they experience such volatility, which in turn could affect their academic performance.

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Family Systems Theory is applicable to this research because it provides a comprehensive framework for understanding the impact of family dynamics on student achievement. The text highlights the fact that academic success is influenced by family dynamics as much as it is by an individual's efforts. Economic hardship, traditional parenting practices, and extensive kinship networks shape family relationships in the riverine and rural communities of the Bomadi Educational Zone. The theory offers a helpful framework for investigating the effects of these environmental factors on the academic drive and achievement of teenagers. Policy and intervention can be better understood with the help of this theoretical framework. When educators and politicians see underachievement as a result of structural imbalance rather than personal failure, they may work to create programs that help families communicate better, parents become better, and teenagers get emotional support. Families can strengthen their ability to bounce back from adversity, keep their stability, and raise their children's academic performance through community-based interventions and family counselling guided by Family Systems Theory (Becvar & Becvar, 2018; Nichols & Davis, 2020). The research is grounded in Family Systems Theory, which allows for a more comprehensive comprehension of the ways in which emotional interdependence, parental roles, and family structures impact the academic development of adolescents in the Bomadi Educational Zone.

Empirical Studies

Adeyeye (2023) conducted a descriptive survey study titled "The Influence of Family Structure on Children's Academic Achievement: Evidence from Secondary Schools in Oyo State, Nigeria." The study compared 350 students from public and private secondary schools in Oyo State, Nigeria, using a random selection method. The researcher used the Academic Achievement Test (AAT) and the Family Background Questionnaire (FBQ) to gather pertinent data. Students from two-parent, intact homes had significantly higher academic mean scores compared to those from one-parent homes, according to the results. Results showed that students from more stable households had higher levels of emotional stability, more consistent and adequate academic supervision, and more reliable financial support, all of which contributed to their higher levels of achievement. In the Nigerian socio-cultural setting, where family plays a big part in a child's upbringing, Adeyeye found that the makeup of the family is a crucial factor in determining students' academic advancement and overall scholarly growth. "Effect of Family Structure on Academic Performance of Secondary School Students in Somolu Local Government Area, Lagos State" is an associated empirical study that provides more evidence of this link in a chosen metropolitan context in Nigeria. The study used a survey research design and surveyed 300 public school secondary school students. The results showed that pupils from stable two-parent households and those from monogamous or polygamous homes did better academically when compared using structured questionnaires and a study of students' academic records. Inadequate parental attention owing to conflicting demands, insufficient financial assistance for school needs, and emotional distress resulting from family conflicts or complicated relational dynamics were identified as distinct obstacles to academic performance in these situations by the study. A targeted psychosocial support system and sustained mentoring interventions should be developed and implemented by educational stakeholders, such as school administrators and local government officials, to assist students from less stable family structures in overcoming these obstacles and reaching their academic potential. Onah (2023) looked into the relationship between students' socioeconomic status and their academic performance in Kano State.

The study used a descriptive survey design to gather data from 400 students from 10 schools' final year of high school. The students' term test results, parents income and profession records, and the SES Questionnaire were all part of the data collection process. In line with global trends, the findings showed that students from higher socioeconomic status backgrounds had significantly better scores ($M = 78.6$, $SD = 6.3$) compared to students from lower socioeconomic status households ($M = 62.9$, $SD = 7.1$; $p < .001$). Most significantly, the study found that students' academic performance was most predicted by their parents' degree of education, their family's money, and their own direct access to learning tools such textbooks and a peaceful study area. Implications for practice point to the necessity of need-based scholarship programs and the systematic distribution of necessary school supplies as key tactics for raising educational achievement among Nigerian students from low-income families. Using a survey of 400 students from 10 schools in rural Nigeria, Onah (2023) explored the socio-economic factors influencing the achievement of primary and secondary school pupils.

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Standardised test scores, parental participation assessments, and socio-economic background surveys were among the instruments used. kids from lower socioeconomic status households had substantially lower scores (M = 63.9, SD = 7.3; p <.001) compared to kids from higher socioeconomic status families with active parental participation (M = 80.2, SD = 6.4). This study's implications shed light on how family dynamics and socioeconomic status interact to impact academic achievement, especially in rural and under-resourced areas.

Research Methodology

The study adopted a correlational research design to examine the relationship between family dynamics and the academic achievement of adolescent students in public secondary schools in Bomadi Education Zone, Delta State. The design enabled the researcher to collect data without manipulating the study variables. The population comprised 10,524 students enrolled in senior secondary schools across the 40 public secondary schools in Bomadi, Patani and Burutu Local Government Areas, according to records of the Delta State Post Primary Education Board (2024). A sample of 385 students was selected using Taro Yamane's formula. A multistage sampling technique was employed. First, the three Local Government Areas were selected through stratified random sampling. Schools were then selected from the three areas. Finally, students in SS1, SS2 and SS3 were selected through simple random sampling using the ballot method. Convenience sampling was also used during questionnaire administration, based on students' availability and willingness to participate. Data were collected with two structured instruments: the Impact of Family Dynamics Questionnaire (IFDQ) and the Academic Achievement of Adolescent Students Questionnaire (AASQ), combined into one questionnaire. The instrument contained three sections. Section A collected demographic information, including age, gender, socioeconomic status, family composition and parents' occupations. Sections B and C contained items on family dynamics and academic achievement, respectively, measured on a four-point Likert scale ranging from Strongly Agree (4) to Strongly Disagree (1). Three experts from Ignatius Ajuru University of Education, comprising one specialist in Measurement and Evaluation and two specialists in Educational Psychology, Guidance and Counselling, validated the instrument. A pilot test involving 50 students from six public secondary schools was conducted, and Cronbach's alpha produced reliability coefficients of 0.78 and 0.77 for the two instruments, indicating satisfactory internal consistency. The researcher obtained approval from the Delta State Ministry of Education and the principals of the selected schools before administering the questionnaires, with the assistance of trained research assistants. Of the 385 questionnaires distributed, 370 were correctly completed and returned, representing a response rate of 96.1 per cent. Data were coded and analysed using SPSS version 27.0. Frequencies and percentages summarised respondents' demographic characteristics, while mean and standard deviation answered the research questions. Simple linear regression was used to test the null hypotheses at the 0.05 level of significance. Hypotheses were rejected where the p-value was less than or equal to 0.05 and retained where it was greater than 0.05. Results were presented in tables for clarity.

Presentation of Results

Research Question One: What is the influence of family structure on the academic achievement of adolescent students in public secondary schools within the Bomadi Educational Zone?

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Table 1: Mean Ratings and Standard Deviations on Family Structure

S/N	Statements	X̄	SD	X̄	SD	X̄	SD	
1	I live with both of my parents.	2.69	.75	2.71	.75	2.70	.75	Agreed
2	My family structure provides emotional stability for my schooling.	2.52	.61	2.57	.62	2.55	.62	Agreed
3	Changes in my family structure affect my academic concentration.	2.63	.79	2.66	.82	2.65	.81	Agreed
4	My home environment allows me to study effectively.	2.67	.75	2.66	.74	2.67	.75	Agreed
5	Family conflicts at home affect my school performance.	2.61	.74	2.62	.74	2.62	.74	Agreed
6	I receive adequate supervision at home concerning my schoolwork.	2.73	.78	2.77	.78	2.75	.78	Agreed
7	Family responsibilities interfere with my academic activities.	2.60	.69	2.67	.72	2.64	.71	Agreed
Grand Mean Set & Standard deviation	Grand Mean Set & Standard deviation	2.64	.73	2.67	.74	2.66	.74	Agreed

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Table 1 presented the mean ratings and standard deviations of respondents on the influence of family structure on the academic achievement of adolescent students in public secondary schools within the Bomadi Educational Zone. The analysis presented in the table showed the following perceptions for items 1 to 7: I live with both of my parents (Mean = 2.70 and SD = .75), My family structure provides emotional stability for my schooling (Mean = 2.55 and SD = .62), Changes in my family structure affect my academic concentration (Mean = 2.65 and SD = .81), My home environment allows me to study effectively (Mean = 2.67 and SD = .75), Family conflicts at home affect my school performance (Mean = 2.62 and SD = .74), I receive adequate supervision at home concerning my schoolwork (Mean = 2.75 and SD = .78) and Family responsibilities interfere with my academic activities (Mean = 2.64 and SD = .71). These indicated that the respondents agreed with items 1–7, as their mean ratings fell within the range of 2.50–3.49. Furthermore, the table showed a grand mean and standard deviation of 2.66 and .74 respectively, which was above the criterion mean of 2.50, and the mean rating fell within the range of 2.50–3.49. This further implied that the respondents agreed that family structure influenced the academic achievement of adolescent students in public secondary schools within the Bomadi Educational Zone.

Research Question Two: What is the influence of parental socioeconomic status on the academic achievement of adolescent students in public secondary schools within the Bomadi Educational Zone?

Table 2: Mean Ratings and Standard Deviations on Parental Socioeconomic Status

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S/N	Statements	$\bar{X}$	SD	$\bar{X}$	SD	$\bar{X}$	SD	
8	My parents can afford my educational needs.	2.68	.81	2.71	.84	2.70	.83	Agreed
9	Financial challenges in my family affect my academic performance.	2.70	.78	2.69	.77	2.70	.78	Agreed
10	I have access to learning materials at home.	2.63	.75	2.66	.76	2.65	.76	Agreed
11	My parents' level of education motivates me to learn.	2.76	.80	2.81	.81	2.79	.81	Agreed
12	Economic stress at home affects my concentration in class.	2.62	.71	2.71	.74	2.67	.73	Agreed
13	My parents provide a conducive environment for studying at home.	2.70	.82	2.74	.86	2.72	.84	Agreed
14	Lack of financial support affects my school attendance.	2.72	.79	2.71	.79	2.72	.79	Agreed
Grand Mean Set & Standard deviation	Grand Mean Set & Standard deviation	2.69	.78	2.72	.80	2.71	.79	Agreed

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Table 2 presented the mean ratings and standard deviations of respondents on the influence of parental socioeconomic status on the academic achievement of adolescent students in public secondary schools within the Bomadi Educational Zone. The analysis presented in the table showed the following perceptions for items 8 to 14: My parents can afford my educational needs (Mean = 2.70 and SD = .83), Financial challenges in my family affect my academic performance (Mean = 2.70 and SD = .78), I have access to learning materials at home (Mean = 2.65 and SD = .76), My parents' level of education motivates me to learn (Mean = 2.79 and SD = .81), Economic stress at home affects my concentration in class (Mean = 2.67 and SD = .73), My parents provide a conducive environment for studying at home (Mean = 2.72 and SD = .84) and Lack of financial support affects my school attendance (Mean = 2.72 and SD = .79). These indicated that the respondents agreed with items 8–14, as their mean ratings fell within the range of 2.50–3.49. Furthermore, the table showed a grand mean and standard deviation of 2.71 and .79 respectively, which was above the criterion mean of 2.50 and the mean rating fell within the range of 2.50–3.49. This further implied that the respondents agreed that parental socioeconomic status influenced the academic achievement of adolescent students in public secondary schools within the Bomadi Educational Zone.

Test of Hypotheses

H_{O1}. There is no significant influence of family structure on the academic achievement of adolescent students in public secondary schools within the Bomadi Educational Zone.

Table 3: Regression Analysis of Family Structure

Variable	B	Beta	t	df	P-value	Remark
Family Structure	2.750	0.785	24.120	369	0.000	Rejected

Data in table 3 shows the regression analysis on the significant influence of family structure on the academic achievement of adolescent students in public secondary schools within the Bomadi Educational Zone. The result of the table above showed t-value of 24.120 and p-value of 0.000 is less than (<) p-value of 0.05 at df of 369. The null hypothesis was therefore rejected. Therefore, it was concluded that there was a significant influence of family structure on the academic achievement of adolescent students in public secondary schools within the Bomadi Educational Zone.

H_{O2}. There is no significant influence of parental socioeconomic status on the academic achievement of adolescent students in public secondary schools within the Bomadi Educational Zone.

Table 4: Regression Analysis of Parental Socioeconomic Status

Variable	B	Beta	t	Df	P-value	Remark
Parental Socioeconomic Status	2.850	0.835	27.940	369	0.000	Rejected

Data in table 4 shows the regression analysis on the significant influence of parental socioeconomic status on the academic achievement of adolescent students in public secondary schools within the Bomadi Educational Zone. The result of the table above showed t-value of 27.940 and p-value of 0.000 is less than (<) p-value of 0.05 at df of 369. The null hypothesis was therefore rejected. Therefore, it was concluded that there was a significant influence of parental socioeconomic status on the academic achievement of adolescent students in public secondary schools within the Bomadi Educational Zone.

Discussion of Findings

The Influence of Family Structure on the Academic Achievement of Adolescent Students in Public Secondary Schools within the Bomadi Educational Zone. With a grand mean of 2.66 and a standard deviation of 0.74, the study found that the academic success of adolescent students in public secondary schools within the Bomadi Educational Zone was affected by their family structure. Additionally, the results demonstrated that the academic performance of secondary school students from the Bomadi Educational Zone was significantly impacted by their family structure. The results are in line with those of the study by Ohazulike (2023), which found that, on average, teenagers from stable two-parent households outperform their counterparts from broken or single-parent households in terms of educational attainment and test scores. The difference in resources is mostly responsible for the disparity, according to early large-scale research and syntheses. This is because children from two-parent households are more likely to have constant supervision, better access to learning materials, and more resources to participate in enrichment activities. More consistent routines, help with homework, and

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chances for cognitive stimulation are all results of these material and time-use benefits, which in turn improve academic performance. The amount of time a kid spends in a certain family structure is important, according to Ohazulike (2023), who also suggested that a supplementary line of study focus on timing and exposure. Sun and colleagues found that children who experience familial instability over an extended period of time, such as numerous migrations, changes in primary carers, or many parental separations, are more likely to have worse academic achievement. Stable caregiving and supportive routines may mitigate the effects of short-term disruptions, but frequent transitions are linked to worse test scores, more absenteeism, and an increased risk of dropping out of school. There is evidence that structure interacts with local socioeconomic realities in places like the Bomadi Educational Zone. Grandparents, aunts, uncles, and older siblings may provide substantial support to children from non-nuclear households in riverine and rural communities where communal caregiving and extended families are common. According to Ohazulike (2023), when one parent is absent, these extended networks can step in to provide supervision and educational support, which in turn protects academic outcomes. Still, in areas where community resources are few and livelihoods are uncertain, not even long-term plans can alleviate the triple burden of poverty, parent mobility, and irregular education.

The Influence of Parental Socioeconomic Status on the Academic Achievement of Adolescent Students in Public Secondary Schools within the Bomadi Educational Zone. Students' academic performance was found to be impacted by their parents' socioeconomic status in public secondary schools within the Bomadi Educational Zone. This was demonstrated by a grand mean score of 2.71 and a standard deviation of 0.79. Students' academic performance in public secondary schools in the Bomadi Educational Zone was shown to be significantly impacted by their parents' socioeconomic position, according to the research. This confirms what Sirin (2020) found, which is that socioeconomic class is still a substantial predictor of academic success throughout all levels of schooling. Adolescence brings with it greater academic pressures, amplifying the effect of family socioeconomic differences in public secondary schools with diverse student bodies. Students' academic progress is heavily influenced by their family's income. Better nutrition, housing stability, healthcare, and learning resources are some of the ways in which adolescents from higher-income families tend to excel academically and experience better cognitive development. Financial hardship, a lack of learning tools, and domestic instability are some of the challenges that low-income kids confront, all of which have a detrimental impact on their ability to focus and engage in schoolwork. Results from public secondary school empirical studies show that students from low-income families routinely outperform their middle- and high-income counterparts in terms of academic achievement. Students' achievement in foundational courses like maths and English was shown to be substantially affected by their family's income, according to research by Adeyemi and Adeyinka (2021). In a similar vein, Okoye and Olatunji (2022) found that public secondary school teenagers whose families are economically struggling are less likely to study and more likely to skip class. Students whose parents have steady, professional employment tend to do better in school than those whose parents are unemployed or working in low-paying, irregular jobs, according to research. Public secondary school pupils experience mental distress and diminished concentration due to parental job insecurity, say Eze and Nwankwo (2021). Due to more parental participation and stronger expectations for their children's academic success, Jeynes (2020) found that adolescents whose parents had advanced degrees performed better in school. According to Adebayo and Yusuf (2023), students in Nigeria whose parents had completed post-secondary education outperformed their peers whose parents had not completed high school. Adolescents' intrinsic motivation to learn and self-control in the classroom are both improved by exposure to educational opportunities at home. The academic experiences that kids have are impacted by their parents' occupations, which in turn reflect their income and social position. Families benefit from financial stability and the consistency of routines that come with stable, professional professions, both of which are conducive to learning. Working parents are also more likely to take their kids to places that challenge their minds.

Conclusion

Students' family dynamics had a substantial impact on their academic performance at public secondary schools in the Bomadi Educational Zone of Delta State, according to the research. Parents' level of involvement in their children's education was the most important component, however family composition, socioeconomic status, parenting style, and parental engagement all had a role. Every one of the investigated hypotheses came true, proving that students' family

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relationships had a significant impact on their learning results. Research showed that academic success was more common among students whose families were more stable, who came from more affluent families, and whose parents used positive parenting techniques and were actively involved in their children's education. The significance of parental involvement in their children's education was further highlighted by the study, which found that families were crucial in offering academic and emotional support. Interventions targeting academic attainment should include school-based initiatives as well as family-centered measures, according to the research. Supporting students from low-income or unstable families, the study laid a practical groundwork for programs that encourage positive parenting practices, increase parental involvement, and strengthen educational systems.

Recommendations

The following recommendation were made in line with the findings of the study:

1. Schools should establish structured counseling and mentoring programmes to support students from unstable or single-parent family backgrounds.
2. Government and educational stakeholders should expand scholarship schemes and provide subsidized learning materials for students from low socioeconomic backgrounds.
3. Education authorities should develop policies that promote strong school–home collaboration to ensure continuous parental participation in students' learning activities.

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Influence of Teachers' Qualification and Experience on Academic Performance among Public Secondary School Students in Bomadi Educational Zone, Delta State, Nigeria

DEBAMO-ERE, Flora Amasomor
0816 538 1980
Department of Educational Psychology, Guidance and Counselling, Faculty of Education, Ignatius Ajuru University of Education, Rumuolumeni, Port Harcourt, Nigeria.

Abstract
This research looked at how senior secondary school pupils in Bomadi Educational Zone, Delta State, Nigeria, performed academically in relation to the quality of their teachers. A correlational survey design was used in the study. 10,524 senior high school pupils and 388 instructors from 40 public schools in the Bomadi, Patani, and Burutu Local Government Areas made up the population. Using stratified proportional random selection, a sample of 386 respondents was chosen using Taro Yamane's technique. Two self-structured questionnaires, "Teachers Quality Questionnaire (TQQ)" and "Students Academic Performance Questionnaire (SAEQ)," were used to gather the data. Both were verified by experts and had reliability tests with Cronbach's alpha coefficients of 0.81 and 0.82, respectively. While basic linear regression was used to test hypotheses at the 0.05 significance level, data were examined using mean and standard deviation to address research issues. The results showed that students' academic performance was positively and significantly impacted by instructors' academic background, years of experience, pedagogical abilities, and dedication to their jobs. The results showed that students' academic performance was positively and significantly impacted by instructors' academic background and years of experience. To increase teacher dedication and instructional efficacy, school administrators were advised to promote teachers' pursuit of higher education, put mentoring programs into place, host professional development seminars, and create incentive programs.

Keywords: *teachers' academic qualification, years of teaching experience, academic performance, Students, Schools*

Introduction
Education is universally acknowledged as the cornerstone of societal transformation and the principal means through which nations attain economic growth, social progress and political stability. It equips individuals with the intellectual and moral capacities needed to take part in national development and to adapt to a changing world. Within the school system, the teacher is the most crucial determinant of educational quality. Policies, curricula and infrastructure provide the framework for learning, but it is the teacher who interprets, implements and brings them to life in the classroom (Adeshina, 2024). Teachers are the heart of any educational enterprise. They transmit knowledge, inspire curiosity, nurture creativity and model desirable behaviour. Their instructional effectiveness, moral integrity and professional competence influence learners' attitudes and achievements more than any other school factor, and no education system can rise above the quality of its teachers (Musa, 2023). Teacher effectiveness is therefore a major determinant of whether students acquire the cognitive, affective and psychomotor skills needed for lifelong learning and productivity (Olufemi & Ayuba, 2021). Teacher quality extends beyond paper qualifications. It encompasses mastery of subject matter, pedagogical skill, classroom management, communication competence and emotional intelligence (Adeshina, 2024). Professional training provides the foundation, but continuous development, experience and personal commitment give meaning to teaching practice. A teacher who lacks mastery, enthusiasm or moral discipline can impede learning and produce students who perform below their potential.

In Nigeria, the secondary school system occupies a strategic position because it bridges primary and tertiary education. Despite this role, the quality of secondary education remains a major concern, and public debates frequently highlight declining performance in external examinations such as those of the West African Examinations Council (WAEC) and the National Examinations Council (NECO) (Musa, 2023). Analysts have linked this decline to teacher quality, including inadequate qualifications, ineffective instructional delivery and weak motivation (Mohammed & Jumare, 2020). Many public senior secondary schools have teachers who lack training in pedagogy or teach outside their area of specialisation because of staffing shortages. Inadequate supervision, poor remuneration and limited access to professional development further weaken teacher effectiveness (Erinma, 2024). The result is low morale, absenteeism and poor classroom engagement, which widen the gap between expected learning outcomes and actual achievement, particularly in rural and

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resource-poor communities. Teacher quality directly affects students' academic excellence, meaning consistently superior academic performance and intellectual growth. Academic performance reflects not only examination scores but also critical thinking, creativity, communication skills and the ability to apply knowledge to real-life situations. Competent, motivated and well-supported teachers create stimulating environments that encourage inquiry, discipline and confidence. Where teachers are unqualified, uninspired or poorly equipped, students tend to develop apathy toward learning, leading to underperformance and academic stagnation. In Delta State, and specifically the Bomadi Educational Zone, these national challenges are reflected in public senior secondary schools located in a mixture of urban and rural communities with varying resources. Reports from local education authorities and examination bodies reveal persistent under-achievement among students (Foueka, 2020). Many schools face chronic teacher shortages, insufficient instructional materials and inadequate infrastructure, and some teachers must handle multiple subjects. The lack of regular training workshops and supervision also limits opportunities for teachers to update their methods.

Teacher motivation plays a critical role as well. Teachers who receive adequate incentives, recognition and support are more likely to show enthusiasm, commitment and innovation. However, irregular payment of salaries, poor working conditions and limited career advancement diminish motivation in many public schools. A demotivated teacher cannot inspire or sustain students' interest, and the learning atmosphere becomes passive (Afolabi & Ayuba, 2020). The influence of teacher quality also goes beyond instruction. Teachers shape students' character, discipline and self-concept, and quality teachers act as mentors who model integrity, perseverance and responsibility. Innovative strategies, effective use of technology and skilful classroom management make students more likely to participate actively, retain knowledge and perform well, so improving teacher quality is central to raising educational standards (Martin, 2023). Despite government interventions such as teacher recruitment drives, capacity-building workshops and policy reforms, gaps remain in their implementation and sustainability. There is a pressing need to evaluate how far teacher quality influences students' academic excellence, particularly where socio-economic and infrastructural factors compound the challenges (Musa, 2023). The Bomadi Educational Zone is a suitable case because it mirrors the realities of Nigeria's public schools, especially in riverine and rural areas. Therefore, this study investigates the influence of teacher quality on the academic performance of students in public senior secondary schools in the Bomadi Educational Zone of Delta State.

Statement of the Problem

It is often acknowledged that education is an essential tool for both individual and national development. It provides a basis for social change, technical advancement, and economic expansion in Nigeria. The quality of educational achievements, especially at the secondary school level, continues to be a key problem despite government efforts through financing, legislative initiatives, and reforms. The ongoing drop in pupils' academic performance in public senior secondary schools is one of the most urgent problems facing Nigeria's educational system. Educators, legislators, and other stakeholders have expressed grave concerns about the efficacy and calibre of educators who are in charge of imparting knowledge and promoting learning. Over time, results from national tests like the West African Senior School Certificate Examination (WASSCE) have shown that secondary school pupils' performance has been uneven and typically subpar. Many students at Delta State do not receive credit passes in foundational courses including science, math, and English language. This tendency lowers students' prospects for future work and jeopardizes their ability to pursue higher education. Teacher quality has repeatedly been found to be one of the most significant school-related elements influencing students' learning outcomes, despite the fact that a number of factors contribute to low academic achievement. Professional competence, subject-matter expertise, pedagogical abilities, teaching experience, and the capacity to successfully include students in the learning process are all components of teacher quality. Concern over the presence of untrained and unmotivated instructors is developing in many public secondary schools, particularly in remote places like the Bomadi Educational Zone. Some educators lack the subject-matter expertise and contemporary teaching techniques required for successful education. Others have little access to possibilities for professional development that would allow them to stay up to speed on their expertise and adjust to modern teaching methods. Students' academic performance suffers as a result of this circumstance, which also undermines the teaching and learning process. The uneven distribution of excellent instructors across urban and rural schools is another major issue. Because urban schools have superior living circumstances, infrastructure, and accessibility, they often draw more experienced and professionally qualified instructors. On the other hand, less experienced instructors,

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temporary employees, or members of the National Youth Service Corps (NYSC) are frequently used in rural schools, like those in the Bomadi Educational Zone, due to teacher shortages. Although these people address staffing gaps, their lack of long-term commitment and adequate teaching experience may have an impact on the consistency and calibre of education. In the public secondary education system, low teacher motivation is still a major problem. Teachers' low morale is caused by a number of factors, including inconsistent income payments, little prospects for professional growth, unfavourable working circumstances, and insufficient welfare assistance. Teachers may become less dedicated, less prepared, and less successful in the classroom when they are demotivated. This frequently results in low academic achievement, decreased student involvement, and inefficient teaching methods. Declining teacher quality has also been attributed to deficiencies in teacher hiring, training, monitoring, and professional development. Teachers are unable to advance their teaching abilities due to a lack of ongoing professional development, and some teacher education programs do not offer enough hands-on training. Teaching efficacy is further diminished by big class sizes, a lack of resources, and insufficient monitoring. These difficulties are exacerbated in the Bomadi Educational Zone by infrastructure and geographic limitations that deter competent educators from taking or staying in rural positions. As a result, kids continue to perform badly on external exams, and many institutions run below expected academic levels. Poor academic performance still exists in many public senior secondary schools in the Bomadi Educational Zone, despite the fact that teacher quality is acknowledged as a critical factor in determining students' academic achievement. This circumstance raises the possibility that teacher-related elements including training, experience, pedagogical ability, and motivation might not be sufficient to promote successful learning. Thus, it is necessary to look at how teacher quality affects students' academic achievement in public senior secondary schools in the Bomadi Educational Zone. This will offer the empirical data required to raise student academic success and improve teacher effectiveness.

Objectives of the Study

The main aim of this study is to examine the influence of teacher quality on academic performance of public senior secondary school students in the Bomadi Education Zone, Delta State. Specifically, the study seeks to:

1. find out how the academic qualifications of teachers in Bomadi Education Zone, Delta State, affect the academic achievement of public high school seniors.
2. find out how public high school senior school students performs base on Years of teaching experience of their teachers in Bomadi Education Zone, Delta State,

Research Questions

In order to direct the investigation, we developed the following research questions:

1. In the Bomadi Education Zone of Delta State, how does the academic qualification of teachers affect the academic achievement of public senior secondary students?
2. How does the number of years a teacher has been in the field affect the grades their pupils get in Bomadi Education Zone, Delta State's public high schools?

Research Hypotheses

At the 0.05 level of significance, the following null hypotheses were tested:

H_{01}: Students' academic performance in Bomadi Education Zone, Delta State's public senior secondary schools is unaffected by instructors' academic qualifications

H_{02}: Students' academic performance in Bomadi Education Zone, Delta State's public senior secondary schools is unaffected by instructors' years of experience

Scope of the Study

This study focused primarily on examining the effect of teachers' academic qualifications, teachers' professional training, teachers' years of teaching experience, teachers' educational background, and teachers' competence on students' academic excellence among senior secondary students in Bomadi Educational Zone, Delta State. Geographically, the study was confined to the Bomadi Educational Zone of Delta State, Nigeria, an administrative zone under the supervision of the Delta State Ministry of Education. The Bomadi Educational Zone was made up of three Local Government Areas, namely Bomadi, Patani, and Burutu, all located in the southern part of Delta State within the Niger Delta region. The zone was

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largely riverine, with many communities surrounded by rivers, creeks, and mangrove swamps, which significantly influenced school accessibility, administration, and the teaching and learning processes. The Bomadi Educational Zone comprised 40 public senior secondary schools spread across these three Local Government Areas. These schools operated under similar administrative policies but differed in terms of accessibility, available resources, and infrastructural development.

Review of Related Literature

Conceptual Review

Concept of Teacher Quality

The term quality, originating from the Latin word qualis, is a complex and multifaceted concept that resists a single, universally accepted definition. Its meaning varies according to individual perspectives, the criteria used, and the context in which it is applied. Generally, definitions of quality revolve around the value of a product or service and the degree to which it meets expectations. From the consumer's standpoint, quality is often evaluated based on the output or outcome, whereas, from the provider's viewpoint, it is assessed through the process involved in production or delivery. In the educational context, process quality refers to the effectiveness of teacher--student interactions during the teaching and learning process. Teacher quality is widely acknowledged as one of the most significant school-level determinants of learners' academic progress and lifelong success. In contemporary educational literature, teacher quality is conceptualized as a holistic combination of knowledge, competence, reflective practice, and professional behaviour demonstrated by teachers within instructional settings (Darling-Hammond et al., 2020). The emphasis in current scholarship is that teacher quality is not just about the possession of degrees or formal qualifications but the ability of teachers to translate knowledge into effective classroom practices that support meaningful student learning. As noted by Akinyemi and Afolabi (2022), the value of teacher quality emerges more clearly when teachers' professional attributes manifest in observable academic improvements among learners. Teacher quality reflects a complex interaction between teachers' subject matter knowledge, instructional decisions, learning-support abilities, and the professional dispositions that shape learning environments. According to OECD (2021), quality teachers demonstrate strong command of subject matter, evidence-based instructional competence, effective communication, and the capacity for differentiated instruction. These characteristics enable them to respond to diverse learner needs, encourage active participation, and manage instructional time efficiently. Furthermore, teacher quality has become a dynamic rather than a static construct; it improves through continuous teacher learning, reflective engagement, and participation in instructional communities (Adebanjo & Ajayi, 2023). Conceptually, teacher quality is therefore best understood as a composite attribute expressed through professional judgment, knowledge application, instructional delivery, learner support and ethical responsibility. This conceptualization aligns with contemporary educational quality frameworks that position teachers as central to cognitive, emotional and behavioural learning outcomes (OECD, 2021). Based on current evidence, teacher quality remains a benchmark for determining school performance, educational advancement, and system accountability. In summary, teacher quality is an evolving multidimensional construct grounded in teachers' mastery of subject knowledge, ability to facilitate meaningful learning, reflective orientation, ethical conduct and adaptive instructional practice. Recent research consistently shows that where teacher quality thrives, students demonstrate improved academic progress, classroom engagement, and resilience towards learning tasks. Consequently, developing, supporting and retaining quality teachers remains foundational to achieving desirable educational outcomes in all academic settings.

Teachers' Academic Qualification and Students' Academic Performance

Because it defines the breadth and depth of instructors' subject knowledge, instructional competency, and capacity to successfully convey curriculum information, instructors' academic qualifications are a significant component that impacts students' academic achievement. Academic qualification is the sum of a teacher's years of schooling and professional experience; it's what gives them the chops to be good educators. Teachers with the right credentials are more likely to show mastery of the material, use effective pedagogical practices, and meet the individual needs of their pupils. There is a strong correlation between the level of academic preparation of instructors and the impact on students' learning experiences and academic performance. Many studies in the field of education have focused on the correlation between instructors'

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levels of education and their pupils' academic achievement. Appropriate subject area knowledge, strong classroom management abilities, and the capacity to choose appropriate instructional strategies to improve students' comprehension are all anticipated qualities of qualified educators. Due to their superior subject knowledge and pedagogical abilities, children of highly trained instructors routinely outperform their peers in school, as highlighted by Darling-Hammond et al. (2020). The results show that the academic credentials of instructors have a major impact on the classroom teaching that children get. Students' academic performance is significantly impacted by the academic qualifications of their teachers. It improves educators' subject-matter expertise, pedagogical efficacy, assessment skills, and capacity to build classroom communities that foster student success. Improving educational results requires maintaining the current emphasis on making sure instructors have the appropriate academic credentials, as student success is strongly correlated with classroom instruction.

Teachers' Years of Experience and Students' Academic Performance

The number of years a teacher has spent actually teaching is a good indicator of how much they know about the subject and how comfortable they are with the classroom setting. Having a teacher with experience tends to improve their teaching talents, classroom management skills, and knowledge of their students' learning requirements, all of which have a positive impact on their students' academic success. Teachers may enhance their teaching methods and create more successful learning experiences through ongoing contact with learners, where they gain practical knowledge. Teachers' levels of experience can have a substantial impact on pupils' academic performance. Having a better grasp of both the curricular standards and classroom procedures over time makes experienced teachers generally better at delivering subject matter. Typically, they have experience with many types of classroom obstacles and have techniques in place to help kids who are struggling. According to Darling-Hammond et al. (2020), instructors with more expertise in the field are better able to pick effective teaching strategies and provide conducive learning environments for their students, which in turn leads to higher student accomplishment. This suggests that instructors' capacity to promote higher academic outcomes might be enhanced with experience. The amount of years a teacher has been in the field is not the only factor that determines the impact of their experience on their pupils' academic success. Additional considerations should include the level of expertise, dedication to continuing education, and openness to innovative pedagogical approaches. Teachers with more experience may still use antiquated tactics that fail to meet the needs of today's students, while those with less experience but more training may be able to meet those needs effectively. According to UNESCO (2023), it is crucial for teachers to participate in continual professional development so that they can keep up successful teaching methods even after many years in the field.

Theoretical Review: Constructivist Learning Theory (Piaget, 1970; Vygotsky, 1978)

The Constructivist Learning Theory shows individual of ultimate effective example in instructional therapy, basically forming existing understandings of by what method learners achieve information and expand intellectual ability. Pioneered by Jean Piaget (1970) and Lev Vygotsky (1978), the hypothesis stresses that education is an alive, helpful, and culturally arbitrated process at which point learners build their own understanding through interplay accompanying their surroundings and date accompanying possible choice. Rather than regarding learners as lifeless receivers of information, constructivism supposes that things energetically found message from knowledge established forethought and intelligent forms. Piaget's intelligent constructivism focuses on individual intelligent happening and within state of mind, while Vygotsky's friendly constructivism climaxes the friendly and educational ranges of knowledge, specifically the act of vocabulary, cooperation, and led interplay in information building (Schunk, 2020). Together, their everything supply a inclusive foundation for understanding by means of what instructors can aid deep and significant knowledge by conceiving surroundings that help survey, logical, and thinking. Constructivist hypothesis is educated in the acceptance that information is not sent but somewhat assembled by learners as they interconnect accompanying original-globe occurrences and define ruling class through their existent intelligent foundations. Learning is visualized as a process of modification at which point new news is adjusted and sustained into existent schemas. According to Piaget, this vital process of evenness and instability provokes intelligent development, admitting learners to advance from hardened to abstract interpretation (Piaget, 1972).

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Vygotsky (1978), in another way, imported the idea of the Zone of Proximal Development (ZPD)---the distance 'tween what a beginner able and usually willing to change alone and what they can attain accompanying the support of a more educated added, to a degree a coach or peer. He stressed the significance of public interplay, cooperation, and educational circumstances in forming intelligent growth. Central to welcome outlook is the plan of stage, place instructors specify short-lived support buildings to help pupils reach greater levels of understanding, evenly killing help as learners gain freedom. Both theorists acquire that knowledge is a dependent and shared process that flourishes in surroundings place learners are heartened to question, investigate opportunities, and request information in significant frameworks. In the educational world, the Constructivist Learning Theory supplies a establishment for teaching practices that advance undergraduate-concentrated knowledge. Teachers are not solely transmitters of information but facilitators the one design knowledge happenings that admit graduates to undertake energetically accompanying ideas, conspire accompanying peers, and degrade their understanding. Effective education, from a constructivist outlook, includes founding common classrooms place learners can combine new plans accompanying forethought through argument, test, and finding. In the framework of subordinate instruction, constructivist law guide instructors to engage plans in the way that asking-located education, logical approaches, and joint education game plans, that reassure deeper understanding alternatively memorization learning. The belief again underlines the meaning of supervisors' teaching content information and homeroom administration in upholding changed education knowledge. Teachers the one learn constructivist standard can tailor their teaching actions to meet scholars' enlightening needs, so supporting academic superiority through alive partnership and date. Moreover, constructivist hypothesis advocates for unending professional growth between professors. Educators must wait thoughtful practitioners---constantly amending their teaching methods and mixing learners' socio-educational existences into the education process. This approach guarantees that instruction remnants appropriate, vital, and transformational The pertinence of Constructivist Learning Theory to the study on the effect of assistant character on academic superiority display or take public allure importance on the coach's duty as a planner of education. Teachers' condition mirrored in their teaching ability, school room administration, and strength to construct charming education atmospheres is main to the constructivist view of instruction. In the Bomadi Educational Zone, as in additional knowledge circumstances, lecturers the one administer constructivist approaches are more inclined reinforce pupils' academic superiority by advancing detracting thinking, artistry, and logical capabilities. Furthermore, the belief supports the debate that assistant kind cannot be dissociated from the knowledge atmosphere. High-quality lecturers use teaching systems that accustom to scholars' needs and enlightening.

Empirical Review

Adeyemi and Adetona (2019), Adeyemi and Adetona's study named Teachers' Professional Development and Students' Academic Achievement in Southwest Nigeria working a correlational survey design to decide the connection betwixt educators' professional preparation and scholars' academic consequences honestly subordinate schools. The populace contained 1,500 assistants and 4,000 SS3 pupils across six states, accompanying a sample intensity of 350 educators and 1,200 pupils fatigued through multi-stage inspecting. Using a Professional Development Questionnaire (PDQ) and patterned success tests, dossier were resolved utilizing Pearson equating and diversified reversion study. Findings disclosed a meaningful helpful equating ($r = 0.73$, $p < 0.01$) 'tween the commonness of professional happening partnership and undergraduate academic realization. The study decided that persuasive professional preparation improves teaching practices and, as a consequence, junior education. It urged constant behavior therapy and state-backed ability-construction programs to endure extreme education guidelines. Shittu (2024) examined the connection betwixt educator status and the academic accomplishment of senior senior high school juniors in Osun State, Nigeria. Employing a explanatory survey design, the study sampled 500 graduates through layered random examination. Data were calm utilizing organized questionnaires alongside juniors' academic records, and resolved through Pearson equivalence and reversion studies. The study proven the theory that faculty member condition considerably influences graduates' academic consequences and establish a powerful certain equating ($r = 0.68$, $p < 0.05$). Regression results told that scholar status elucidated 46% of the difference in academic conduct, suggesting that larger faculty member restrictions, teaching abilities, occurrence, and assurance donate extensively to graduate attainment. This study focal points the need for maintained contribution in coach professional growth to help knowledge consequences.

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In Kenya, Obonyo and others., (2022) examined the effect of educator requirements on scholar accomplishment in Kisii County subordinate schools. The study selected a cross-localized survey design, sipping 600 juniors and 60 faculty members utilizing layered methods. Multilevel forming was working to resolve the dossier, putting on instructor requirement levels (scope, recognition, and license) and their connection accompanying junior success gains. The study speculated that taller faculty member requirements would considerably increase pupil consequences. Findings habitual this anticipation, show that graduates instructed by well limited educators shown considerably bigger attainment gains (β = 0.42, $p < 0.05$), when in fact less skillful coaches were guide lower acting levels. The study decided that scholar aptitude is a detracting cause of scholar knowledge, stressing the need for tactics that reinforce scholar instruction and professional incident. Namulondo and Wabuna (2025) attended a accompanying study honestly subordinate schools in Kampala, Uganda, to decide by what method scholar abilities influence juniors' academic act. A explanatory survey design was secondhand accompanying a sample of 450 scholars and 45 schoolteachers picked intentionally. Data were composed utilizing organized questionnaires and end-of-term academic results, resolved through Pearson equivalence and reversion. The study speculated that instructor restrictions definitely influence academic consequences. Results told a meaningful helpful friendship middle from two points lecturer restriction and scholar efficiency ($r = 0.61$, $p < 0.01$), specifically with instructors accompanying professional certifications or state-of-the-art qualities. This displays that scholar knowledge is a forceful prophet of academic realization, augmenting the significance of constant professor professional incident in reconstructing education consequences.

Research Methodology

The study adopted a correlational research design, a non-experimental approach that examines the relationship between variables without manipulating them (Creswell & Creswell, 2018). A survey methodology was used to obtain quantitative data from teachers and students on teachers' credentials, years of teaching experience and students' academic performance. The population comprised all senior secondary school teachers and students in the 40 public senior secondary schools in Bomadi Educational Zone (ten in Bomadi, ten in Patani and twenty in Burutu), made up of 388 teachers and 10,524 students (Delta State Ministry of Education, 2023). Taro Yamane's formula was used to determine the sample size, which gave 386 participants, and stratified proportionate random sampling ensured that Bomadi, Patani and Burutu Local Government Areas were represented according to their student populations. Data were collected with two self-structured questionnaires, the Teachers Quality Questionnaire (TQQ) and the Students Academic Excellence Questionnaire (SAEQ), both rated on a 4-point Likert scale from Strongly Agree (4) to Strongly Disagree (1). For validity, the instruments were given to three specialists from the departments of Measurement and Evaluation and Educational Psychology, Guidance and Counselling, and their feedback and recommendations were used to produce the final version. For reliability, a test-retest pilot study was conducted on thirty senior secondary students from a neighbouring zone (Warri South) who were not part of the study, with a two-week interval, and Cronbach's alpha coefficients of 0.81 and 0.82 were obtained, above the 0.70 threshold. The researcher administered the questionnaires over four weeks, after obtaining consent from the principals and the Delta State Post Primary Education Board and informed consent from participants. Of the 386 questionnaires distributed, 360 were completed and returned, a response rate of 93.3%. Data were analysed with SPSS version 27. Frequencies and percentages described respondents' demographics, mean and standard deviation answered the research questions, and simple linear regression tested the null hypotheses at the 0.05 level of significance, with R^2 and β-coefficients showing the variance explained and the direction and strength of the effect. A null hypothesis was rejected when the p-value was 0.05 or less.

Presentation of Results

Research Question One: What is the influence of teacher's academic qualification on the academic performance of public senior secondary students in Bomadi Educational Zone, Delta State?

Table 1: Mean ratings and standard deviations of respondents on the influence of teacher's academic qualification on the academic performance of public senior secondary students in Bomadi Educational Zone, Delta State

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S/N	Item Statements	Teachers (N = 180)		Students (N = 180)		Mean Set (N = 360)		Remark
		X̄	SD	X̄	SD	X̄	SD	
1	My academic qualification adequately prepares me to teach my subject effectively.	2.70	.75	2.72	.75	2.71	.75	Agreed
2	The subject I teach aligns with my area of academic specialization.	2.53	.61	2.55	.61	2.54	.61	Agreed
3	My professional training has enhanced my ability to explain complex concepts clearly.	2.63	.80	2.65	.79	2.64	.80	Agreed
4	Teachers with higher qualifications perform better academically in the classroom.	2.67	.75	2.67	.74	2.67	.75	Agreed
5	Continuous academic advancement improves teaching effectiveness.	2.59	.75	2.62	.74	2.61	.75	Agreed
Grand Mean Set & Standard Deviation		**2.62**	**.73**	**2.64**	**.73**	**2.63**	**.73**	**Agreed**

X̄ = Mean; SD = Standard Deviation

Table 1 bestowed the mean ratings and standard changes of accused on the influence of teacher's academic aptitude on the academic efficiency of public senior subordinate juniors in Bomadi Educational Zone, Delta State. The study of the table accompanied the following mean set ideas for parts 1 to 5: My academic aptitude sufficiently planned me to educate my subject efficiently (Mean = 2.71, SD = .75), The subject I instructed joined accompanying my extent of academic business (Mean = 2.54, SD = .61), My professional preparation reinforced my talent to describe complex ideas definitely (Mean = 2.64, SD = .80), Teachers accompanying taller aptitudes acted better academically in the school room (Mean = 2.67, SD = .75) and Continuous academic progress enhanced education influence (Mean = 2.61, SD = .75). The results recorded that accused came to terms articles 1--5, as all the mean principles drop inside the criterion range of 2.50--3.49. Furthermore, the table told a great mean and predictable difference (Mean = 2.63, SD = .73), that was above the test mean of 2.50. This unspoken that teacher's academic ability had a definite influence on the academic depiction of public senior subordinate graduates in Bomadi Educational Zone, Delta State.

Research Question Two: What is the influence of teacher's years of experience on the academic performance of public senior secondary students in Bomadi Educational Zone, Delta State?

Table 2: Mean ratings and standard deviations of respondents on the influence of teachers years of experience on the academic performance of public senior secondary students in Bomadi Educational Zone, Delta State

S/N	Item Statements	Teachers (N = 180)		Students (N = 180)		Mean Set (N = 360)		Remark
		X̄	SD	X̄	SD	X̄	SD	
6	My years of teaching experience have improved my instructional delivery.	2.75	.78	2.77	.78	2.76	.78	Agreed
7	Experienced teachers manage classroom challenges better than less experienced teachers.	2.62	.70	2.64	.70	2.63	.70	Agreed
8	Teaching experience enhances students' academic performance.	2.68	.82	2.70	.82	2.69	.82	Agreed
9	With experience, I better understand students' learning difficulties.	2.71	.78	2.70	.77	2.71	.78	Agreed
10	Teaching experience improves lesson planning and time management.	2.63	.76	2.65	.76	2.64	.76	Agreed

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S/N	Item Statements	Teachers (N = 180)		Students (N = 180)		Mean Set (N = 360)		Remark
		X̄	SD	X̄	SD	X̄	SD	
Grand Mean Set & Standard Deviation		**2.68**	**.77**	**2.69**	**.77**	**2.69**	**.77**	**Agreed**

X̄ = Mean; SD = Standard Deviation

Table 2 bestowed the mean ratings and standard departures of accused on the influence of schoolteachers' age of knowledge on the academic acting of public senior subordinate pupils in Bomadi Educational Zone, Delta State. The study of the table displayed the following mean set ideas for parts 6 to 10: My age of education occurrence have upgraded my teaching transmittal (Mean = 2.76, SD = .78), Experienced faculty members control homeroom challenges better than less knowledgeable educators (Mean = 2.63, SD = .70), Teaching happening improves undergraduates' academic depiction (Mean = 2.69, SD = .82), With occurrence, I better appreciate juniors' knowledge troubles (Mean = 2.71, SD = .78) and Teaching occurrence develops communication preparation and occasion administration (Mean = 2.64, SD = .76). The results marked that accused came to terms articles 6--10, as all the mean principles shoot inside the yardstick range of 2.50--3.49. Furthermore, the table told a dignified mean and predictable difference (Mean = 2.69, SD = .77), that was above the test mean of 2.50. This implicit that lecturers' age of happening had a definite influence on the academic accomplishment of public senior subordinate juniors in Bomadi Educational Zone, Delta State.

H_{01}. There is no significant influence of teachers' academic qualification on the academic performance of public senior secondary school students in Bomadi Educational Zone, Delta State.

Table 3: Regression analysis on the significant influence of teachers' academic qualification on the academic performance of public senior secondary school students in Bomadi Educational Zone, Delta State

Variable	B	Beta	t	df	P-value	Remark
Teachers' Academic Qualification	1.780	0.536	12.011	359	0.000	Rejected

Data in Table 3 accompanied the reversion reasoning on the meaningful influence of scholars' academic requirement on the academic depiction of public senior prep school juniors in Bomadi Educational Zone, Delta State. The result of the table accompanied right-advantage of 12.011 and a p-advantage of 0.000, that was inferior (<) the 0.05 level of importance at 359 points of immunity. The ineffectual theory was accordingly rebuffed. Therefore, it was decided that skilled was a meaningful influence of scholars' academic restriction on the academic acting of public senior preparatory school graduates in Bomadi Educational Zone, Delta State.

H_{02}. There is no significant influence of teachers' years of experience on the academic performance of public senior secondary school students in Bomadi Educational Zone, Delta State.

Table 4: Regression analysis on the significant influence of teachers' years of experience on the academic performance of public senior secondary school students in Bomadi Educational Zone, Delta State

Variable	B	Beta	t	df	P-value	Remark
Teachers' Years of Experience	1.709	0.541	12.160	359	0.000	Rejected

Data in Table 4 displayed the reversion study on the important influence of schoolteachers' age of knowledge on the academic accomplishment of public senior preparatory school undergraduates in Bomadi Educational Zone, Delta State. The result of the table displayed right-worth of 12.160 and a p-advantage of 0.000, that was inferior (<) the 0.05 level of meaning at 359 strengths of privilege. The ineffectual theory was then rebuffed. Therefore, it was decided that skilled was a meaningful influence of scholars' age of occurrence on the academic accomplishment of public senior high school undergraduates in Bomadi Educational Zone, Delta State.

Discussion of Findings

Influence of Teacher's Academic Qualification on the Academic Performance of Public Senior Secondary Students in Bomadi Educational Zone, Delta State

The judgments of the study told that professors' academic restriction had a definite influence on the academic conduct of public senior middle school scholars in Bomadi Educational Zone, Delta State, as registered by a dignified mean of 2.63

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and predictable difference of 0.73. The judgments too accompanied that skilled was a important influence of instructors' academic ability on the academic acting of public senior senior high school graduates in Bomadi Educational Zone, Delta State. This indicates that the level of instruction and professional confirmation achieved by educators plays an main act in forming pupils' academic depiction. This judgment joins accompanying the study administered by Adewale and Aina (2021), that elucidated that instructors' academic abilities form a gist facet of educator status and are essential for direct lecture room direction. Academic ability indicates the insight of precise instruction and subject-particular preparation collected by scholars, that in proper sequence influences in what way or manner well they appreciate and transfer syllabus content. Similarly, Darling-Hammond (2021) stressed that scholars accompanying forceful academic upbringing carry deeper subject information, that authorizes ruling class to demonstrate ideas more openly, recognize juniors' knowledge troubles, and request appropriate education policies that advance significant understanding. In subordinate schools, place issues are more specific, the pertinence of a educator's academic ability to their education field enhances specifically main. Empirical studies in evolving instructional methods have again proved that undergraduates instructed by trained educators likely to obtain taller academic results distinguished to those instructed by less limited schoolteachers (Adewale & Aina, 2021; Ofoegbu & Alonge, 2023). Teachers accompanying forceful academic aptitudes are more certain in communication transfer, better in evaluation practices, and more persuasive in lecture room administration, all of that help upgraded junior conduct. However, current composition still outline that academic requirement unique concede possibility not completely guarantee extreme junior success. Its influence is heartened when linked accompanying constant professional happening and the experienced request of sound teaching abilities (Kola & Sunday, 2022). This climaxes the experience that coach aptitude is a powerful groundwork, but it must lie by continuous preparation and teaching influence to solve optimum academic effects.

Influence of Teachers Years of Experience on the Academic Performance of Public Senior Secondary Students in Bomadi Educational Zone, Delta State

The judgments of the study told that coaches' age of knowledge had a certain influence on the academic efficiency of public senior prep school juniors in Bomadi Educational Zone, Delta State, as proved by a lofty mean of 2.69 and predictable difference of 0.77. The judgments more demonstrated that skilled was a important influence of assistants' age of happening on the academic accomplishment of public senior middle school scholars in Bomadi Educational Zone, Delta State. This means that the number of age a coach spends lazy hall practice donates to revised scholar education effects. This judgment joins accompanying the study administered by Kraft and Papay (2020), that told that educators likely to enhance more direct in their early and middle age of education as they gain better understanding of educational program necessities, scholar knowledge nature, and appropriate amount actions. This piecemeal bettering in education practice frequently indicates in reinforced pupil academic depiction. Similarly, studies inside Nigerian and different African instructional circumstances have proved that pupils instructed by more knowing faculty members mainly act better academically than those instructed by less knowledgeable instructors (Okeke & Dlamini, 2021; Eze & Obasi, 2023). Experienced professors are more skillful in communication transmittal, study hall institution, and the unification of forethought, that helps undergraduates accept ideas in a more excellent manner and maintain well-informed material. However, existent composition likewise signifies that the influence of education occurrence is not rigidly undeviating. While influence bears to increase in the inception of a assistant's course, it grant permission decrease or decline alternatively situated constant professional incident and inspiration (Papay & Kraft, 2020). This plans that education occurrence reinforces academic conduct most efficiently when linked accompanying continuous preparation, thoughtful practice, and bland support plans.

Conclusion

The study found that teacher quality plays a key role in determining academic performance among senior secondary school students in the Bomadi Educational Zone of Delta State. This indicates that teachers who are well qualified, experienced, and professionally competent tend to improve learners' performance through effective instructional delivery and sound classroom practices. The results further suggest that sustained investment in teacher development, continuous professional training, and adequate motivation is essential for improving learning outcomes. Strengthening instructional practices and supporting teachers in the classroom were also identified as important steps toward enhancing student success. In addition,

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the study emphasizes that policymakers, school administrators, and education stakeholders should prioritize teacher quality as a central strategy for improving academic outcomes in secondary schools, particularly within contexts such as the Bomadi Educational Zone. Overall, enhancing teacher quality remains fundamental to raising student achievement and achieving broader educational goals, reaffirming the central role of teachers in shaping academic success.

Recommendations

The following recommendations were made in line with the findings of the study:

1. School administrators and policymakers should support teachers to pursue higher academic qualifications and subject-specific certifications through sponsorship, online programs and continuous learning initiatives to enhance their competence and improve students' academic excellence.
2. School administrators should implement structured mentorship and peer coaching programs where experienced teachers guide and support less-experienced colleagues, fostering knowledge transfer and improving students' academic excellence.
3. School administrators should organize regular professional development workshops focused on curriculum mastery, innovative teaching strategies and digital pedagogy to strengthen teachers' competence and enhance students' academic excellence.

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