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Perceived Influence of Conversational AIs on Research Learning and Knowledge Acquisition among Science Education Undergraduates, Benue State University, Makurdi

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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, legitimisation 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., 2026c; 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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