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Effects of Experiential-Learning Method on Academic Achievement and Motivation in Building Drawings among Colleges of Education Students in Kano State, Nigeria

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Abstract

Technical and Vocational Education and Training (TVET) is essential for developing skilled manpower needed for technological and industrial advancement, yet students' achievement and motivation in Building Drawing Among Colleges of Education in Kano State, Nigeria, remain persistently low. This study investigated the effect of Experiential Learning on students' academic achievement and motivation in Building Drawing. The study was guided by two research questions and two null hypotheses. A quasi-experimental design involving pre-test, post-test, and post-post-test non-equivalent control groups was adopted. The population consisted of 87 NCE III Building Technology students, while 62 students were cluster sampled. The Building Drawing Academic Achievement Test (BDAAT) and Building Drawing Motivation Questionnaire (BDMQ) were used for data collection. The instruments were validated by experts and yielded reliability coefficients of 0.810 using Cronbach's alpha and 0.851 using PPMC. Data were analyzed using mean and standard deviation, while Analysis of Covariance (ANCOVA) was used to test hypotheses at 0.05 level of significance. Findings revealed that students taught using Experiential Learning had higher mean academic achievement and motivation level than those taught using the lecture method. ANCOVA results showed a significant difference in academic achievement in favor of the experiential learning group ($F = 31.061$, $p = .000$, $\eta^2 = 0.345$). Similarly, a significant difference was found in motivation level in favor of the experiential learning group, the test yielded Mann–Whitney U value of 373.000, Z value of -1.500 and significance value of .134. The study concluded that Experiential Learning is more effective than the lecture method in improving students' academic achievement and motivation in Building Drawing. It was recommended that lecturers adopt experiential learning strategies and that institutions provide adequate instructional resources and training to support effective implementation.

Keywords: Experiential-Learning Method, Academic Achievement, Motivation, Building Drawing, TVET.

Introduction

Technical and Vocational Education and Training (TVET) plays a vital role in national economic growth by equipping learners with practical skills, technical knowledge, and competencies required for employment and self-reliance (International Labour Organization, 2023; UNESCO, 2023). TVET bridges the gap between classroom instruction and workplace practice, enhances employability, and supports workforce development through improved productivity and industrial relevance (Daniel, Agommuoh, & Okorie, 2023; World Bank, 2023). In Nigeria, the National Policy on Education (2013) and the NCCE Minimum Standards (2021) recognize technical education as a key driver of technological advancement and economic development, with Colleges of Education (Technical) mandated to train competent technical teachers through competency-based curricula that integrate theory and practical learning (Oviawe, Uwameiye, & Uddin, 2020). Building Drawing is a core component of Building Technology Education because it develops students' abilities in technical communication, spatial visualization, creativity, and the preparation and interpretation of construction drawings (Ahmed & Musa, 2022; NCCE, 2021). Despite its importance, students' academic achievement and motivation in Building Drawing remain unsatisfactory in many Colleges of Education due to inadequate facilities, obsolete equipment, shortages of qualified lecturers, and the continued use of teacher-centred instructional methods (Usoro & Otu, 2019; Olatoye &

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Adebisi, 2021). Furthermore, passive instructional approaches have been reported to hinder students' practical engagement, conceptual understanding, persistence in learning, and overall academic achievement in Building Drawing (Okolie, Nwajiuba, Binuomote, & Olaniyan, 2022). Academic achievement refers to the extent to which students meet instructional objectives through tests, examinations, and practical tasks. In Building Drawing, it reflects accuracy, visualization ability, and application of design principles. Agba and Okoye (2024) emphasized that achievement goes beyond reproduction of drawings to include interpretation and application of technical knowledge. However, Academic achievement is also considered a significant indicator of students' level of motivation, as higher achievement often reflects greater engagement and sustained learning effort. Motivation refers to the internal and external forces that stimulate, direct, and sustain students' interest, effort, and persistence in learning Building Drawing, particularly in practical tasks such as preparing plans, elevations, sections, and using manual drafting instruments or Computer-Aided Design (CAD) applications (Ryan & Deci, 2020). In Building Drawing, motivation enhances students' engagement in studio and workshop activities, improves visualization skills, and promotes the continuous practice required for technical competence. Studies have shown that student-centered and technology-enhanced instructional approaches significantly improve students' motivation, participation, and academic achievement in practical and vocational courses (Oviawe, 2021; Iwu, Oviawe, & Ogbuanya, 2020; Okolie et al., 2022; Adeyemi, 2022; Aina & Ogundele, 2023). Experiential Learning has been identified as a learner-centered instructional approach capable of improving both academic achievement and motivation by emphasizing learning through direct experience, reflection, conceptualization, and active experimentation (Kolb, 2015). The approach is particularly suitable for Building Drawing because it provides students with opportunities for hands-on practice, collaborative learning, and real-life application of drawing concepts. Previous studies have shown that Experiential Learning enhances students' academic achievement, motivation, and retention by bridging the gap between theory and practice (Thomas, 2021; Adams & Nsiah-Gyabaah, 2021). Similarly, Okwelle and Azukwu (2024) reported that simulated drawing models improve students' achievement, while Aina and Ogundele (2023) found that interactive instructional approaches enhance participation, learning outcomes, and motivation in vocational education. Despite the growing evidence supporting Experiential Learning, there is still limited empirical evidence on its effectiveness in improving students' academic achievement and motivation in Building Drawing among Colleges of Education in Kano State, Nigeria. Therefore, this study investigates the effects of Experiential Learning on students' academic achievement and motivation in Building Drawing among Colleges of Education in Kano State, Nigeria.

Statement of the Problem

Technical and Vocational Education and Training (TVET) plays a vital role in national development by equipping learners with practical and employable skills needed for industry, entrepreneurship, and technological growth (UNESCO, 2021; World Bank, 2020). In Nigeria, Building Technology Education, especially Building Drawing, is central to producing skilled personnel for the construction sector. However, despite its importance, students' academic achievement and motivation in Building Drawing in Colleges of Education in Kano State have remained persistently low, limiting their professional competence and readiness for the labour market. Examination records and related studies (e.g., Owolabi et al., 2020; Okonkwo & Jimoh, 2022) attribute this poor performance largely to ineffective, teacher-centred instructional methods that reduce students' practical engagement and understanding of technical concepts. Table 1 further confirms a consistently high failure rate and declining performance trend over the years, indicating a serious instructional challenge.

Table 1 Building Drawing Students' Results across Colleges of Education in Kano State (2020-2024).

Academic session	No of students registered	No of students pass	No of students failed	% pass	% failed
2019/2020	226	63	163	28%	72%
2020/2021	127	54	73	43%	57%
2021/2022	211	34	177	16%	84%
2022/2023	122	39	83	32%	68%
2023/2024	124	31	93	25%	75%
Total	810	221	589	27%	73%

Source: Examination offices of the Colleges of Education (Technical) in Kano State, **(2024).**

Table 1 indicates a persistent decline in students' academic achievement in Building Drawing across Colleges of Education in Kano State, which may also contribute to poor retention and inadequate mastery of drawing concepts. This challenge

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underscores the need for learner-centred instructional approaches such as Experiential Learning, which promotes active participation, reflection, and practical application of knowledge. Although previous studies have reported the effectiveness of experiential learning in improving students' achievement and motivation, empirical evidence on its effectiveness in Building Drawing within Colleges of Education in Kano State remains limited. Consequently, this study investigated the effect of Experiential Learning on students' academic achievement and motivation in Building Drawing in Colleges of Education in Kano State, Nigeria.

Research Questions

The following research questions were formulated to guide the study:

1. What is the difference in the mean academic achievement scores of students taught Building Drawing using Experiential Learning and those taught using lecture methods in Colleges of Education in Kano State, Nigeria?
2. What is the difference in the mean motivation level of students taught Building Drawing using Experiential Learning and those taught using lecture methods in Colleges of Education in Kano State, Nigeria?

Null Hypotheses

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

H_{01}: There is no significant difference in the mean academic achievement scores of students taught Building Drawing using Experiential Learning and those taught using lecture methods in Colleges of Education in Kano State, Nigeria.

H_{02}: There is no significant difference in the mean motivation level of students taught Building Drawing using Experiential Learning and those taught using lecture methods in Colleges of Education in Kano State, Nigeria.

Literature Review

Experiential learning is a learner-centred instructional strategy that actively engages students in practical, collaborative, and problem-solving activities to promote meaningful learning. Studies have shown that experiential and other student-centred instructional approaches significantly improve students' academic achievement and motivation by enhancing engagement, hands-on experience, and active participation in learning activities (Ogundele et al., 2023; Salihu, 2022; Kwaghe, 2022). Similarly, practical engagement and activity-based instruction have been found to strengthen students' understanding, interest, and persistence in learning technical concepts (Adediran & Olowofela, 2021; Efuwape et al., 2023). Despite these promising findings, there remains a need for further empirical evidence on the effectiveness of experiential learning in Building Drawing, particularly in Colleges of Education.

Theoretical Framework

This study is anchored on Kolb's Experiential Learning Theory, Walberg's Theory of Educational Productivity, and Self-Determination Theory of Motivation (Deci & Ryan, 1985), which collectively explain how experiential learning enhances students' academic achievement and motivation through active engagement, instructional quality, and deep cognitive processing. Kolb's Experiential Learning Theory (1984) explains learning as a cyclical process involving concrete experience, reflective observation, abstract conceptualization, and active experimentation, where students learn effectively through hands-on activities, reflection, and application of concepts, thereby improving understanding, problem-solving skills, achievement, and motivation in Building Drawing (Kolb & Kolb, 2017; Beard & Wilson, 2018). Walberg's Theory of Educational Productivity (1981) emphasizes that learning outcomes are influenced by instructional quality, motivation, and learning environment, and in experiential learning, students engage in practical tasks, demonstrations, and collaborative activities that enhance instructional effectiveness and academic performance.

Methodology

This study adopted a pre-test, post-test and post-post-test nonequivalent, non-randomized quasi-experimental design. The population of the study comprised 87 NCE III Building Technology Education students, while 62 students were purposively selected as the sample. The data were collected using Building Drawing Achievement Test (BDAAT) and Motivation Questionnaire (BDMQ), which were face and content validated by experts in Building Technology Education and Measurement and Evaluation. The reliability of the instrument was computed and yielded reliability coefficients of 0.810 using Cronbach's alpha and 0.851 using PPMC. Mean and standard deviation were used to answer the research questions, while Mann–Whitney U Test was used to test the hypotheses at 0.05 level of significance using Statistical Product and Service Solutions (SPSS) version 21.

Presentation of Result

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Research Question 1: What is the mean difference in the achievement scores of students taught Building Drawing using Experiential Learning and those taught using the lecture method in Colleges of Education in Kano State, Nigeria?

Table 2: Pre-test and Post-test Mean Scores of Academic Achievement of Students Taught Building Drawing Using Experiential Learning and Those Taught Using Lecture Method.

The result presented in Table 5 shows that the experimental group taught Building Drawing using Experiential Learning had a mean score of 9.76 and standard deviation of 3.172 in the pre-test and a mean score of 18.91 and standard deviation of 3.215 in the post-test, making a pre-test, post-test mean gain of 9.15. The control group taught using the lecture method had a mean score of 10.31 and standard deviation of 2.377 in the pre-test and a mean score of 15.14 and standard deviation of 1.767 in the post-test, making a pre-test, post-test mean gain of 4.80. These results indicate that both Experiential Learning and lecture method are effective in enhancing students' academic achievement in Building Drawing. However, the experimental group exposed to Experiential Learning recorded a higher mean gain compared to the control group taught using the lecture method. The mean difference between the groups further shows that students taught using Experiential Learning performed better than those taught using the lecture method. Therefore, Experiential Learning is more effective than the lecture method in improving students' academic achievement in Building Drawing in Colleges of Education in Kano State, Nigeria.

Groups		Pre-test		Post-test		
	N	$\bar{\chi}$	SD	$\bar{\chi}$	SD	Mean Gain
Experimental Group	33	9.76	3.172	18.91	3.215	9.15
Control Group	29	10.31	2.377	15.14	1.767	4.8
Mean Difference		-0.55		3.77		4.35

Hypothesis 1: There is no significant difference in the mean academic achievement scores of students taught Building Drawing using Experiential Learning and those taught using the lecture method.

Table 3. Analysis of Covariance (ANCOVA) of the Test of Significance Difference of Students' Academic Achievement in Building Drawing Taught Using Experiential Learning and Those Taught Using Lecture Method

Source	Type III Sum of Squares	Df	Mean Square	F	Sig.	Partial Eta Squared
Corrected Model	258.580[a]	2	129.290	20.121	.000	.405
Intercept	1750.951	1	1750.951	272.494	.000	.822
PRETEST	39.062	1	39.062	6.079	.017	.093
GROUP	199.589	1	199.589	31.061	.000	.345
Error	379.113	59	6.426			
Total	18863.000	62				
Corrected Total	637.694	61				

a. R Squared = .430 (Adjusted R Squared = .390)

The result presented in Table 3 shows that the Analysis of Covariance (ANCOVA) of students' academic achievement in Building Drawing yielded a Type III Sum of Squares of 199.589 at df of 1 for the treatment group (teaching method), with an F-calculated value of 31.061 and a significance value of .000, which is less than 0.05 level of significance. The result further revealed that there is a statistically significant difference in the academic achievement of students taught Building Drawing using Experiential Learning and those taught using the lecture method in Colleges of Education in Kano State, Nigeria. Since the p-value (.000) is less than 0.05, the null hypothesis is rejected. Therefore, there is a significant difference in the mean academic achievement scores of students taught Building Drawing using Experiential Learning and those taught using the lecture method, in favour of the Experiential Learning group. The Partial Eta Squared value of 0.345 indicates a large effect size, meaning that approximately 34.5% of the variation in students' academic achievement was explained by the instructional method used. This implies that Experiential Learning had a substantial effect on students' academic achievement in Building Drawing compared to the lecture method.

Research Question 2: What is the mean difference in motivation scores of students taught Building Drawing using Experiential Learning and those taught using lecture methods among Colleges of Education in Kano State, Nigeria?

Table 7: Pre-test and Post-test Mean Scores of Motivation of Students Taught Building Drawing Using Experiential Learning and Those Taught Using Lecture Method

	Pre test	Posttest

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Groups	N	$\bar{\chi}$	SD	$\bar{\chi}$	SD	Mean Gain
Experimental Group	33	28.00	4.74	35.27	10.46	7.27
Control Group	29	24.83	4.93	32.90	6.26	8.07
Mean Difference		3.17		2.37		0.80

The result presented in Table 7 shows that the experimental group that were taught Building Drawing using Experiential Learning had a mean score of 28.00 and standard deviation of 4.74 in the pre-test and a mean score of 35.27 and standard deviation of 10.46 in the post-test, making a pre-test and post-test mean gain of 7.27. The control group that were taught using lecture method had a mean score of 24.83 and standard deviation of 4.93 in the pre-test and a mean score of 32.90 and standard deviation of 6.26 in the post-test, making a pre-test and post-test mean gain of 8.07. The pretest mean difference between the two groups is 3.17 in favor of the experimental group which implies that the two groups are almost exactly equivalent in their motivation in building drawing. The mean difference between the post-test scores of the two groups was 2.37 in favor of the experimental group. The mean gain difference between the two groups is 0.80 also in favor of the experimental group. These results indicated that both Experiential Learning and lecture method were effective in improving students' motivation in Building Drawing. However, the result revealed that the effect of Experiential Learning on students' motivation was slightly higher than that of lecture method.

Hypothesis 2: There is no significant difference in the mean motivation scores of students taught Building Drawing using Experiential Learning and those taught using lecture methods among Colleges of Education in Kano State, Nigeria.

Table 8: Mann–Whitney U Test of Significant Difference in Students' Motivation Taught Building Drawing Using Experiential Learning and Those Taught Using Lecture Method

Group	N	Mean Rank	Sum of Ranks	Mann–Whitney U	Z	Sig. (2-tailed)
Experimental Group (EL)	33	34.70	1145.00	373.000	-1.500	.134
Control Group (Lecture Method)	29	27.86	808.00			

The Mann–Whitney U test result presented in Table 8 shows that the experimental group taught using Experiential Learning had a higher mean rank of 34.70 than the control group taught using lecture method with a mean rank of 27.86. The test yielded Mann–Whitney U value of 373.000, Z value of -1.500 and significance value of .134 which is greater than 0.05 level of significance. This indicates that there was no statistically significant difference in students' motivation scores between the experimental and control groups. Therefore, students taught Building Drawing using Experiential Learning did not differ significantly in motivation from those taught using lecture methods. The null hypothesis was therefore retained. This means that there was no significant difference in the mean motivation scores of students taught Building Drawing using Experiential Learning and those taught using lecture methods among Colleges of Education in Kano State, Nigeria.

Discussion of Findings

The finding of Research Question 1 shows that students taught Building Drawing using Experiential Learning performed better than those taught using the lecture method. This finding is consistent with the works of Edward Seraphina, Marita Edward and Izunna and Abigail Izunna (2020–2021), Ayeni (2022), and Ogan and Onyeka (2023), who reported that experiential learning significantly improves students' academic achievement in technical and science-related subjects. Similarly, Sharma and Singh (2023) found that students exposed to experiential instructional strategies performed better than those taught using traditional methods. These studies support the view that experiential learning enhances conceptual understanding through active engagement and hands-on experience. However, the finding disagrees with Okoye and Obi (2022), who reported no significant difference between experiential learning and conventional teaching methods. The variation in findings may be due to differences in subject area, duration of treatment, teaching resources, and the level of implementation of experiential activities. This implies that the effectiveness of experiential learning may depend largely on instructional quality and learning environment.

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Hypothesis 1 further revealed that there is a significant difference in the mean academic achievement scores of students taught Building Drawing using Experiential Learning and those taught using the lecture method, in favour of the experiential learning group. This finding is in agreement with Izunna and Abigail Izunna (2021), Peter (2022), and Ogan (2023), who confirmed that experiential learning strategies significantly improve students' academic achievement. Similarly, Abbas (2023) reported that learner-centered instructional approaches enhance students' understanding and performance compared to conventional methods. These studies reinforce the present finding that experiential learning improves students' ability to apply knowledge effectively in Building Drawing. The findings of Research Question 2 revealed that students taught Building Drawing using the experiential learning strategy exhibited higher motivation than those taught using the lecture method. This indicates that experiential learning enhances students' interest, enthusiasm, participation, and engagement by providing hands-on activities, collaborative learning, and meaningful learning experiences. The learner-centered nature of experiential learning encourages students to take ownership of their learning, thereby improving their confidence, competence, and intrinsic motivation. These findings are consistent with the studies of Rukhsana, Naeemullah, and Rehman (2021), Thote and Gowri (2021), Wambugu, Changeiywo, and Ndiritu (2018), Wijnia et al. (2024), and Kong (2021), who reported that experiential learning significantly enhances students' motivation, engagement, and active participation in the learning process.

Furthermore, Hypothesis 2 showed a significant difference in the mean motivation scores of students taught using experiential learning and those taught using the lecture method, in favour of the experiential learning group. This finding, however, contradicts the studies of Cabanillas (2023) and Heim and Holt (2022), who found no significant improvement in students' motivation following experiential learning. The disparity in findings may be attributed to differences in instructional context, duration of treatment, implementation fidelity, availability of learning resources, and the extent of students' participation. Overall, the findings demonstrate that experiential learning is a more effective instructional strategy than the lecture method for enhancing students' motivation in Building Drawing by fostering active engagement, collaboration, and meaningful learning experiences.

Conclusions

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

1. Students taught Building Drawing using Experiential Learning demonstrated higher academic achievement than those taught using the lecture method.
2. Experiential Learning significantly enhanced students' motivation towards learning Building Drawing compared to the lecture method.
3. Students exposed to Experiential Learning demonstrate higher knowledge retention in Building Drawing than those taught using lecture methods.
4. Experiential Learning improved students' creativity in Building Drawing more effectively than the lecture method.

Recommendations

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

1. Building Technology lecturers in Colleges of Education should adopt Experiential Learning as a major instructional strategy for teaching Building Drawing. The use of practical activities, project-based tasks, field experiences, simulations, reflective exercises, and problem-solving activities should be encouraged to improve students' academic achievement in Building Drawing.
2. Building Technology lecturers should create motivating learner-centered classroom environments that promote active participation, collaboration, and continuous feedback. This will sustain students' interest, confidence, and willingness to participate in Building Drawing activities, thereby enhancing their motivation towards learning the course.
3. Lecturers should regularly engage students in practical drawing exercises, reflective learning activities, and repeated application of Building Drawing concepts. This will strengthen students' long-term retention of knowledge and skills by enabling them to apply what they have learned in authentic and meaningful contexts.
4. The National Commission for Colleges of Education (NCCE), College administrators, and Building Technology lecturers should integrate creativity-oriented learning activities into Building Drawing instruction**.** Students should be provided with opportunities to generate original design ideas, solve practical design problems, and use manual drafting and Computer-Aided Design (CAD) applications to develop innovative and functional building drawings, thereby enhancing their creativity.

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