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EDITORIAL NOTE

I have the delight and privilege to write as Editor-in-chief of the *Rima International Journal of Education (RIJE)*, an official research publication of the Faculty of Education, Sokoto State University. This edition (Volume 5: No. 1) of the *RIJE* has Fifteen (15) articles from distinguished scholars and educators, poised to report cut-edge research findings and discourse on contemporary educational issues with implications for pedagogy, national and global development.

The dictum of “publish or perish” is in vogue in any worthwhile research-based institutions, hence strict adherence to publications in any reputable and recognized Journal, as such *RIJE* is recognized as complimentary to contemporary dissemination and propagation of knowledge. Therefore, the Editorial Board of *RIJE* wishes to use this medium to solicit well researched articles for publication from teeming population of academics and researchers globally. The Journal would always be subjected to thorough peer review and proper editorial vetting.

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Digital Literacy and Institutional Support as Determinants of AI Usability among Social Studies Pre-Service Teachers in Colleges of Education in Oyo State

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Abstract

This study investigates the predictive roles of digital literacy and institutional support in AI usability among social studies pre-service teachers in Colleges of Education in Oyo State. A correlational survey research design adopted, involving 310 randomly selected pre-service teachers from two public Colleges of Education. Three instruments—Pre-service Teachers' Digital Literacy Scale (PTDLS), Institutional Support Scale (PTISS), and AI Usability Scale (PTAIS)—were used, with reliability coefficients of 0.82, 0.79, and 0.84, respectively. Data analysis employed descriptive statistics, Pearson correlation, and multiple regression. Findings showed a significant positive relationship between digital literacy and AI usability ($r = 0.438, p < 0.05$) and between institutional support and AI usability ($r = 0.462, p < 0.05$). Both variables jointly accounted for 57% of the variance in AI usability ($R^2 = 0.57, F = 58.72, p < 0.01$). Digital literacy ($\beta = 0.49, p < 0.01$) had a slightly stronger predictive influence than institutional support ($\beta = 0.44, p < 0.01$). The study underscores the need for enhanced digital literacy training and institutional support to improve AI usability in teacher education. It recommends targeted training and policies to strengthen digital competencies and institutional frameworks for AI integration in Colleges of Education.

Keywords: Digital literacy, Institutional support, AI usability, Pre-service teachers

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Introduction

The integration of artificial intelligence (AI) in education has transformed teaching and learning methodologies, offering innovative solutions to enhance instructional delivery and student engagement. AI applications, such as adaptive learning systems, automated assessment tools, and intelligent tutoring systems, are increasingly being incorporated into teacher education to improve pedagogical outcomes. In the context of pre-service teacher training, AI has the potential to personalise learning, facilitate digital resource management, and enhance instructional design. However, while AI adoption is gaining momentum globally, its usability among social studies pre-service teachers remains largely underexplored. Social studies as a discipline plays a fundamental role in fostering civic consciousness, social responsibility, and critical thinking skills, making AI integration particularly relevant. Despite these advantages, the extent to which social studies pre-service teachers can effectively engage with AI tools is influenced by multiple factors, including their level of digital literacy and the support they receive from their institutions.

A critical determinant of AI usability in teacher education is digital literacy, which encompasses the ability to access, evaluate, and utilise digital technologies effectively. Digital literacy is fundamental to AI adoption, as it enables pre-service teachers to interact with AI-powered educational tools and integrate them into their teaching practices (Hinojo-Lucena *et al.*, 2019). Research has shown that pre-service teachers with high levels of digital literacy are more likely to explore AI-based instructional strategies, thereby enhancing their pedagogical competencies (Redecker & Punie, 2017). Conversely, those with low digital literacy often face challenges in navigating AI tools, which limits their engagement with technology-driven teaching methodologies (Crompton *et al.*, 2021). While previous studies have focused on general digital competence among educators (Tondeur *et al.*, 2018), there is a scarcity of research that specifically examines how digital literacy influences AI usability among social studies pre-service teachers, highlighting the need for targeted investigations in this area.

Beyond individual competence, institutional support plays a crucial role in fostering AI adoption in teacher education. Institutional support includes access to technological infrastructure, professional development programmes,

and policy frameworks that facilitate the integration of AI in teaching and learning (Zhao *et al.*, 2021). Studies have established that educational institutions that prioritise digital transformation by providing AI training workshops, funding for technology acquisition, and supportive learning environments enhance pre-service teachers' confidence and willingness to engage with AI tools (García-Peñalvo *et al.*, 2021). In contrast, inadequate institutional support, such as a lack of digital resources and insufficient AI-focused training, hinders technology adoption among pre-service teachers (Ifenthaler & Schumacher, 2020). While these findings underscore the importance of institutional support in digital education, existing literature has not sufficiently addressed its impact on AI usability among social studies pre-service teachers in Nigerian Colleges of Education. This gap necessitates further empirical inquiry into how institutional factors shape AI adoption in social studies education.

Despite the increasing emphasis on AI-driven education, there remains a significant research gap regarding its usability among social studies pre-service teachers in Nigeria. Most studies on AI adoption in education have focused on science, technology, engineering, and mathematics (STEM) disciplines (Hinojo-Lucena *et al.*, 2019), with limited attention given to social sciences education. Furthermore, while existing research has examined digital literacy and institutional support as individual predictors of technology adoption, their combined influence on AI usability remains underexplored (Mousavizadeh *et al.*, 2021). Addressing this gap is essential for developing comprehensive strategies to enhance AI integration in teacher education, particularly in non-STEM disciplines where digital transformation efforts have been relatively slow.

By examining digital literacy and institutional support as determinants of AI usability, this study contributes to the growing discourse on digital transformation in higher education. It provides empirical insights into how these factors collectively influence pre-service teachers' ability to integrate AI into their pedagogical practices. Unlike previous studies that have treated digital literacy and institutional support in isolation, this research adopts a holistic approach to understanding AI usability in teacher education. The findings will be instrumental in informing policymakers, educators, and curriculum developers on strategies to enhance AI adoption in Colleges of

Education, ultimately improving the quality of teacher preparation and instructional delivery in social studies.

Statement of the Problem

The integration of artificial intelligence (AI) in teacher education has become increasingly important for enhancing pedagogical practices and student engagement. However, the usability of AI tools among social studies pre-service teachers in Colleges of Education in Oyo State remains limited. Despite the transformative potential of AI, many pre-service teachers lack the digital literacy required to effectively utilise AI technologies, and institutional support in terms of infrastructure, training, and policy remains inadequate. While existing studies have examined digital literacy and institutional support separately in the context of technology adoption, there is a paucity of research exploring how these factors jointly influence AI usability in non-STEM disciplines such as social studies. This gap presents a challenge to effective AI integration in teacher education, thereby hindering efforts to improve the quality of social studies instruction through digital innovation.

Objectives

The aim of this study is to investigate the influence of digital literacy and institutional support on AI usability among social studies pre-service teachers in Colleges of Education in Oyo State. The specific objectives are to:

- I. Determine the impact of digital literacy on AI usability among social studies pre-service teachers in Colleges of Education in Oyo State.
- II. Examine the effect of institutional support on AI usability among social studies pre-service teachers in Colleges of Education in Oyo State.
- III. Assess the combined influence of digital literacy and institutional support on AI usability among social studies pre-service teachers in Colleges of Education in Oyo State.

Hypotheses

The following null hypotheses will be tested in this study:

- I. There is no significant relationship between digital literacy and AI usability among social studies pre-service teachers in Colleges of Education in Oyo State.
- II. There is no significant relationship between institutional support and AI usability among social studies pre-service teachers in Colleges of Education in Oyo State.
- III. There is no significant combined influence of digital literacy and institutional support on AI usability among social studies pre-service teachers in Colleges of Education in Oyo State.

Methodology

This study adopted the survey research design of the correlational type to investigate the predictive roles of digital literacy and institutional support on AI usability among social studies pre-service teachers in Colleges of Education in Oyo State. The research aimed to understand how digital literacy and institutional support contribute to pre-service teachers' ability to effectively engage with AI tools in their academic activities.

The population for the study comprised all social studies pre-service teachers in two public Colleges of Education in Oyo State. All public Colleges of Education in the state were purposively selected to ensure comprehensive coverage and allow for a large sample of respondents. A simple random sampling technique was used to select all year-three social studies pre-service teachers, considering their exposure to technology-based learning and AI applications. A total of 310 pre-service teachers participated in the study, distributed across two Colleges of Education in the state: College of Education, Lanlate (79) and Federal College of Education (Special), Oyo (231).

Three self-designed instruments were used for data collection in this study:

- I. Pre-service Teachers' Digital Literacy Scale (PTDLS)
- II. Pre-service Teachers' Institutional Support Scale (PTISS)
- III. Pre-service Teachers' AI Usability Scale (PTAIS)

The PTDLs was a self-designed instrument containing 12 items to assess digital literacy among pre-service teachers. It consisted of two sections: Section A, which collected demographic details such as Name of College and Sex, and Section B, which included 10 Likert-type items on a 4-point scale: Strongly Agree (SA), Agree (A), Disagree (D), and Strongly Disagree (SD). Positive statements were scored 4, 3, 2, and 1, respectively, while the scoring was reversed for negative statements. The instrument underwent peer and expert review to establish its content validity.

The PTISS was also developed by the researcher to assess institutional support for AI usability among pre-service teachers. This scale comprised two sections: Section A, containing demographic information, and Section B, which included 10 Likert-type items with the same scoring pattern as the PTDLs. Positive statements were scored 4, 3, 2, and 1, while negative statements were scored in reverse. The instrument was also validated by peers and experts.

The PTAIS was a self-designed instrument with 10 items aimed at measuring the level of AI usability among pre-service teachers. The scale consisted of two sections: Section A, which included demographic details, and Section B, consisting of 10 Likert-type items designed to assess the knowledge, attitudes, and behaviours essential for AI usability. The scoring followed the same 4-point Likert scale pattern as the previous instruments.

To ensure reliability, a pilot study was conducted with 30 pre-service teachers who were not part of the main study sample. The internal consistency of the instruments was determined using Cronbach's alpha coefficient. The PTDLs yielded a reliability coefficient of 0.82, the PTISS had a reliability coefficient of 0.79, and the PTAIS had a reliability coefficient of 0.84. These values indicated that the instruments were reliable for measuring digital literacy, institutional support, and AI usability. In addition to reliability, the validity of the instruments was established through expert review. The instruments were subjected to face and content validation by specialists in educational technology and measurement and evaluation, who examined the items for clarity, relevance, and appropriateness in measuring the intended constructs. Their suggestions and corrections were incorporated before the final administration of the instruments.

The data for the study were collected through the administration of structured questionnaires to the selected pre-service teachers. Copies of the questionnaire

were distributed personally by the researcher with the assistance of trained research aides, and respondents were given adequate time to complete them. All completed questionnaires were retrieved immediately to ensure a high response rate. The data collected from the administered instruments were analyzed using both descriptive and inferential statistics. Descriptive statistics, including frequency counts and percentages, were used to present the characteristics and responses of the participants. Inferential statistics, such as Pearson Product-Moment Correlation Coefficient and Multiple Regression Analysis, were employed to determine the relationships between the independent variables (digital literacy and institutional support) and the dependent variable (AI usability). All hypotheses were tested at a 0.05 level of significance.

Result

Hypothesis 1: There is no significant relationship between digital literacy and AI usability among social studies pre-service teachers in Colleges of Education in Oyo State.

Table 1: Summary of Pearson Product Moment Correlation on the Relationship Between Digital Literacy and AI Usability Among Social Studies Pre-service Teachers in Colleges of Education in Oyo State

Variable	N	Mean	SD	DF	R	Sig.	Remark
Digital Literacy	310	3.18	0.95	308	0.438*	0.000	Significant
AI Usability	310	3.12	0.92				

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

Table 1 presents the Pearson correlation between digital literacy and AI usability among social studies pre-service teachers in Oyo State. The positive correlation ($r = 0.438$, $p < 0.05$) indicates a significant relationship, suggesting that higher digital literacy enhances AI usability. Thus, the null hypothesis is rejected.

Hypothesis 2: There is no significant relationship between institutional support and AI usability among social studies pre-service teachers in Colleges of Education in Oyo State.

Table 2: Summary of Pearson Product Moment Correlation on the Relationship Between Institutional Support and AI Usability Among Social Studies Pre-service Teachers in Colleges of Education in Oyo State

Variable	N	Mean	SD	DF	R	Sig.	Remark
Institutional Support	310	3.22	0.93	308	0.462*	0.000	Significant
AI Usability	310	3.12	0.92				

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

Table 2 presents the Pearson correlation between institutional support and AI usability among social studies pre-service teachers in Oyo State. The positive correlation ($r = 0.462$, $p < 0.05$) indicates a significant relationship, suggesting that greater institutional support enhances AI usability. Thus, the null hypothesis is rejected.

Hypothesis 3: There is no significant combined influence of digital literacy and institutional support on AI usability among social studies pre-service teachers in Colleges of Education in Oyo State.

Table 3: Joint Multiple Regression Model Summary

Model Statistic	Value
R ²	0.57
Adjusted R ²	0.56
F-Statistic	58.72
p-value (F-Test)	< 0.01

Table 3 presents the multiple regression model on digital literacy, institutional support, and AI usability among social studies pre-service teachers in Oyo State. The R² value of 0.57 indicates that these predictors explain 57% of the variance in AI usability. The model is statistically significant ($F = 58.72$, $p < 0.01$), confirming their substantial influence.

Table 4: Regression Coefficients of Predictors for AI Usability

Predictor Variable	Unstandardised Coefficient (B)	Standardised Coefficient (β)	t-value	p-value	Decision
Digital Literacy	0.42	0.49	7.86	< 0.01	Significant
Institutional Support	0.38	0.44	6.92	< 0.01	Significant

Table 4 presents the regression coefficients of the predictors. Digital literacy ($\beta = 0.49$, $B = 0.42$) significantly contributes to AI usability, with a one-unit increase leading to a 0.42-unit rise ($t = 7.86$, $p < 0.01$). Institutional support ($\beta = 0.44$, $B = 0.38$) also has a significant impact, with a one-unit increase resulting in a 0.38-unit rise ($t = 6.92$, $p < 0.01$). Together, these factors explain 57% of the variance in AI usability, with digital literacy having a slightly stronger influence. The null hypothesis is rejected, confirming their significant combined effect on AI usability among social studies pre-service teachers in Oyo State.

Discussion

This study demonstrated that digital literacy and institutional support are significant determinants of AI usability among social studies pre-service teachers in Colleges of Education in Oyo State. The significant relationship between digital literacy and AI usability suggests that pre-service teachers who can access, evaluate, and apply digital tools are more likely to interact confidently and effectively with AI-powered applications. This finding aligns with the view that digital literacy forms the foundational competence needed for engaging with advanced educational technologies (Hinojo-Lucena *et al.*, 2019). It also supports the evidence that pre-service teachers with stronger digital competence show higher readiness to integrate digital resources into instructional practice (Redecker & Punie, 2017). In a similar direction, empirical studies have shown that limited digital skills often reduce teachers' willingness to engage with emerging technologies, especially where tools appear complex or unfamiliar (Crompton *et al.*, 2021). The implication is that digital literacy is not merely a general technology skill but a practical enabler that determines whether pre-service teachers can meaningfully use AI tools for learning and teaching.

Beyond the general digital competence literature, the present finding resonates with recent Nigerian-based evidence suggesting that digital-related competencies shape educational engagement and outcomes among pre-service teachers. For instance, Emmanuel and Oyewole (2025) established that media literacy a closely related competence to digital literacy significantly supports democratic sustainability outcomes among pre-service teachers. Although the outcome focus differs, their conclusion reinforces an important point that competence in digital/media environments strengthens learners' capacity to interact responsibly and effectively with modern information systems. In the context of the present study, digital literacy similarly strengthens pre-service teachers' ability to engage with AI platforms, assess outputs critically, and apply tools in pedagogically meaningful ways. Taken together, these findings suggest that digital competence and literacy (including media literacy) represent cross-cutting skills that support both academic usability and broader civic-educational outcomes in teacher education.

The significant influence of institutional support on AI usability also confirms that AI adoption is not solely dependent on individual competence; it also requires supportive conditions provided by teacher-training institutions. This

supports evidence that institutions that provide stable internet access, functional ICT infrastructure, learning platforms, and structured training opportunities tend to improve the uptake of educational technologies (Zhao et al., 2021). Similarly, studies have indicated that institutional investments in infrastructure and training significantly shape teachers' confidence and readiness to use digital tools (García-Peñalvo et al., 2021). Conversely, the present finding also reflects the reality that where institutional support is weak through limited access to devices, unstable connectivity, or absence of AI-focused policies technology adoption becomes difficult and inconsistent, as noted in related research (Ifenthaler & Schumacher, 2020). Therefore, institutional support should be interpreted as a practical “enabling environment” that can either accelerate or constrain AI usability among teacher trainees.

Importantly, the finding that digital literacy and institutional support jointly explained 57% of the variance in AI usability indicates a strong combined predictive effect. This aligns with the argument that technology adoption in education is better explained through interaction between personal capacity and contextual support than through single-factor models (Mousavizadeh et al., 2021). The results suggest that even digitally skilled pre-service teachers may underutilize AI tools if their institutions do not provide resources, training, or a supportive policy environment. Likewise, institutions may provide infrastructure, but if learners lack digital competence, AI usability remains limited. This strengthens the case for a holistic strategy, where teacher education programmes simultaneously develop learners' competencies and strengthen institutional readiness for AI integration.

The regression results further revealed that digital literacy had a slightly stronger predictive influence ($\beta = 0.49$) than institutional support ($\beta = 0.44$), implying that personal competence plays a more immediate role in determining whether pre-service teachers can actually use AI tools. This is consistent with technology use research suggesting that competence and confidence often drive engagement even when conditions are challenging (Redecker & Punie, 2017). The pattern also aligns with Nigerian evidence demonstrating that technology-related self-beliefs and competencies are powerful predictors of AI-related outcomes. For example, Oyewole and Jatau (2025) reported that technological self-efficacy and online database access significantly predict AI usability for research among social sciences lecturers in Oyo State, Nigeria (Oyewole & Jatau, 2025). Their findings reinforce the

present result by showing that competence-related variables (skills, self-efficacy, ability to access online resources) strongly determine AI usability. This suggests that for both lecturers and pre-service teachers, digital competence and technology-related confidence are central mechanisms through which AI tools become usable in academic and professional practice.

Finally, the present study's outcomes can be situated within broader empirical patterns in Nigerian teacher education that emphasize the role of digital interaction, technology proficiency, and collaboration in strengthening modern educational outcomes. Abiodun and Oyewole (2025), showed that social media usage and cultural exchange predict global economic awareness among pre-service economics teachers, indicating that digital engagement channels shape learners' awareness and educational development. Similarly, Ogundipe and Oyewole (2025) found that technological proficiency and virtual collaboration predict global adaptability among social studies pre-service teachers in Oyo State. These findings complement the present study by reinforcing that competence in digital environments and supportive engagement structures (including collaboration and institutional support) shape modern learning capacities. In sum, AI usability among pre-service teachers should be understood as part of a wider digital transformation process in teacher education, where skills (digital literacy and technology proficiency), psychological readiness (self-efficacy), and institutional systems (support structures) jointly determine successful adoption and meaningful use of emerging technologies.

Conclusion

This study highlights the crucial roles of digital literacy and institutional support in AI usability among social studies pre-service teachers in Oyo State. Strong digital skills are essential for engaging with AI tools, while institutional support—through resources, training, and policies—facilitates adoption. The combined influence of both factors underscores the need for a holistic approach, including curriculum enhancements, capacity-building, and policy reforms. Strengthening digital literacy and institutional support will improve AI integration, enhancing teacher education and equipping future educators to effectively use AI in social studies instruction.

Recommendations

Colleges of Education should integrate digital literacy training into their curricula, including specialised AI courses, to equip pre-service teachers with essential skills. Institutions must prioritise AI adoption by providing technological infrastructure, access to AI tools, and supportive policies. Regular workshops should enhance AI usability in social studies instruction, while faculty members need training to effectively guide students in AI integration. Policymakers should establish clear guidelines for AI adoption, ensuring funding and equitable access. Collaboration with EdTech companies and AI experts can provide hands-on experience, while continuous evaluation should identify challenges and improve AI usability in teacher education.

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Teachers' Technological Skills as a Predictor of Improved Senior Secondary School Students' Academic Engagement in South-West, Nigeria

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Abstract

Information and Communication Technology (ICT) has transformed various sectors, including education, by providing innovative tools that enhance teaching and learning processes. Teachers are central to the teaching and learning process, as they play a crucial role in shaping students' cognitive, social, and emotional development. This study therefore assessed the influence of teachers' technological skills on senior secondary school students' academic engagement. The study was a descriptive survey which involves the 6 states of the South-West, Nigeria. Purposive and Simple random sampling techniques were used to select 60 senior secondary schools and 1800 teachers who participated. Percentage, mean and mean deviation were used to answer the 3 research questions and t-test used to analysed the 2 null hypotheses. The finding of this study revealed that majority of the respondents identified the main secondary school students' academic engagements as: Attendance in Class; Participation in Class Discussions; Completion of Assignments; Interest in Extra-Curricular Academic Activities; and Use of Educational Technology. Majority of the respondents also agreed that, teachers' technological skills in secondary education will not only promote student engagement in academics but improve learning outcomes by creating interactive and engaging lessons which cater for different learning styles and preferences. Conclusively, as digital transformation continues to shape the global education landscape, it is imperative that teachers acquire and apply technological skills to enhance student engagement in secondary schools. Equipping teachers with technological competencies can significantly impact students' academic engagement by making learning more interactive, accessible, and student-centered. Based on the findings, its recommended that stakeholders must continuously adapt to changing student needs, embrace innovative instructional methods, and foster a culture of curiosity and lifelong learning. Specifically, Schools should implement programs that foster positive peer interactions and parental involvement to sustain student engagement.

Keywords: Technological, Skills, Engagement, Assessment, Predictor

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Introduction

Education serves as the bedrock of societal advancement, providing individuals with the necessary skills, knowledge, and competencies required for personal and national development. It is to be noted that for a nation to achieve her aims, goals and objectives in education, the pivotal and diverse role of Information and Communications Technologies (ICT) in communicating, creating, disseminating, storing and managing information cannot be overemphasized. Teachers' technological skills play a crucial role in enhancing secondary school students' academic engagement. In today's digital era, students are increasingly exposed to technology in their daily lives, making it essential for educators to integrate digital tools into teaching and learning.

Adebayo *et al.* (2020) observed that, education in Nigeria is categorized into different levels: early childhood education, primary education, secondary education, and tertiary education. Among these, secondary education plays a pivotal role as it serves as a transitional stage between basic education and higher education, equipping students with foundational knowledge and cognitive abilities required for further learning. Ogunlade and Ibrahim (2021) assert that secondary schools in Nigeria contribute significantly to human capital development by fostering critical thinking, problem-solving skills, and social competencies among students. However, despite its significance, secondary education in Nigeria faces challenges such as outdated teaching methodologies, inadequate infrastructure, and a lack of technological integration, which hinder its overall effectiveness (Okeke, 2019). Therefore, there is a growing need to explore how modern teaching strategies, particularly through technological integration, can enhance the quality of teaching and learning in secondary schools.

Eze *et al.* (2022) describe ICT as the integration of digital tools, including computers, the internet, and multimedia resources, to facilitate communication, information dissemination, and knowledge acquisition. In the education sector, ICT plays a crucial role in improving instructional delivery, enabling personalized learning, and fostering student-centered pedagogies (Okeke, 2019). In secondary schools, the use of ICT tools such as interactive whiteboards, educational software, and virtual learning platforms has been linked to improved student engagement and academic performance (Lawal &

Ekong, 2021). Despite its significance, the level of ICT adoption in Nigerian secondary schools remains relatively low due to infrastructural deficits, teachers' lack of technological expertise, and insufficient government support (Ajayi & Oyekanmi, 2022). This underscores the importance of equipping teachers with relevant technological skills to effectively integrate ICT into classroom instruction and maximize its potential for student learning.

Teachers' technological skills refer to their ability to effectively utilize digital tools, applications, and platforms to facilitate teaching and learning. Afolabi *et al.* (2022) explain that these skills encompass a wide range of competencies, including digital literacy, the use of multimedia resources, data analysis, and online content creation. The Technological Pedagogical Content Knowledge (TPACK) framework, as highlighted by Mishra and Koehler (2016), emphasizes that teachers must integrate technological knowledge with pedagogical and content knowledge to enhance instructional effectiveness. In the context of secondary schools, Ogunleye and Danjuma (2021) categorize teachers' technological skills into basic digital skills (such as using word processors and presentation software), interactive teaching skills (such as employing smartboards and virtual simulations), and advanced technological competencies (such as coding and using artificial intelligence in education). However, studies suggest that many secondary school teachers in Nigeria struggle with technological integration due to limited professional development opportunities and inadequate infrastructure (Adebayo & Salisu, 2020).

The relevance of teachers' technological skills in secondary education cannot be overemphasized, as they enhance instructional delivery, promote student engagement, and improve learning outcomes. Nwachukwu (2021) argues that teachers who possess strong technological skills can create interactive and engaging lessons, catering to different learning styles and preferences. Similarly, Ajayi and Oyekanmi (2022) assert that the integration of technology in teaching helps to bridge learning gaps, foster collaboration, and provide students with real-world applications of theoretical concepts.

Students' academic engagement refers to the level of attention, interest, and effort that learners invest in their studies and school-related activities. Okeke *et al.* (2022) define academic engagement as a multidimensional construct encompassing behavioral, emotional, and cognitive aspects of students' participation in learning. In secondary schools, engagement is reflected in

students' classroom participation, motivation to learn, completion of assignments, and overall academic performance (Akinwande & Salami, 2021). Olawale and Eze (2020) highlight that factors influencing academic engagement include teaching strategies, school environment, peer relationships, and the use of technology in education. When teachers incorporate interactive and technology-driven instructional methods, students are more likely to be actively involved in the learning process, leading to improved academic outcomes (Johnson & Adeyemi, 2019).

Teachers' technological skills play a crucial role in shaping secondary school students' academic engagement in Nigeria. Adediran *et al.* (2021) assert that teachers with strong technological competencies can create interactive and engaging learning environments that promote student participation and motivation. Afolabi and Eze (2020) argue that when teachers effectively integrate technology into instruction—such as using digital simulations, online assessments, and virtual collaboration platforms—students are more likely to develop critical thinking skills and maintain sustained academic interest. In contrast, Ogunleye and Salawu (2019) observe that many Nigerian secondary school teachers still rely on traditional, teacher-centered instructional methods, which often result in passive learning and disengagement among students.

Gender and school type (public or private) are key factors influencing teachers' technological skills in secondary schools. Adebisi and Okonkwo (2022) assert that gender disparities exist in teachers' access to and utilization of technology, with male teachers often exhibiting higher technological proficiency than their female counterparts due to early exposure and socialization patterns. Similarly, Oluwaseun and Eze (2020) report that female teachers in Nigeria tend to exhibit more apprehension towards digital technologies compared to their male counterparts, thereby limiting their effectiveness in integrating ICT tools in teaching. In terms of school type, Akinwande & Salami (2021), note that private secondary schools in Nigeria tend to invest more in teacher training and technological infrastructure than public schools, leading to a significant gap in teachers' digital competencies.

Okon and Adepoju (2021) further explain that public school teachers often face challenges such as inadequate ICT facilities, lack of internet access, and limited professional development opportunities, which hinder their ability to effectively use technology in instruction. These disparities necessitate further

research to understand how gender and school type influence teachers' technological skills and identify strategies for addressing existing gaps.

This study was descriptive research. It covered selected Senior Secondary Schools from the 6 states of the South-West. The respondents for the study were Senior Secondary School teachers within the selected schools. The population of the study consisted of all the SSS teachers in the 6 states of the South-West. 60 schools were purposely selected across the 6 states of the south-west (Lagos, Ogun, Oyo, Osun, Ondo and Ekiti States). Again, 30 SSS teachers were selected from each school (using the simple random sampling technique). This brought the total sample size to 1,180 teachers across the 6 states.

The instrument used for the study was a researcher-designed questionnaire. To establish the content and face validity of the questionnaire, the instrument was reviewed by the experts and their observations and recommendations guided the refinement of the questionnaire to ensure that it measures the intended variables effectively and comprehensively. Also, for the reliability of the instrument, a pilot test was conducted using a group of teachers who was not part of the actual sample. The responses from the pilot study were analyzed using the Cronbach Alpha method to compute the internal consistency of the questionnaire. A reliability coefficient of 0.68 or higher was considered acceptable for the study. Data obtained from the study were analyzed using both descriptive and inferential statistical tools. Specifically, frequency counts, percentages and mean were used to analyse the demographic data and answer the research questions. Inferential statistics such as t-test was used to test the hypotheses at a 0.05 level of significance.

Statement of the Problem

The rapid advancement of technology in education has necessitated the need for teachers to possess strong technological skills to enhance students' academic engagement. In Nigeria, the integration of Information and Communication Technology (ICT) in secondary education has been emphasized in various policy documents, including the National Policy on Education (Federal Republic of Nigeria, 2019). However, despite these policy directives, many secondary school teachers still struggle with technological adoption in teaching.

Adebisi and Ogunyemi (2021) argue that inadequate teacher training, limited access to digital tools, and resistance to change contribute to this gap. Similarly, Nwachukwu *et al.* (2020) observe that many Nigerian teachers rely on traditional instructional methods, which fail to captivate students' interest and engagement in learning. This study, therefore, seeks to assess teachers' technological skills and their impact on students' academic engagement, particularly in South-West, Nigeria where digital literacy among teachers remains under-explored.

The increasing disengagement of students in secondary schools has become a pressing concern in the Nigerian education system. Ajayi and Oyekanmi (2022) report that student participation in learning activities is declining, with many learners exhibiting low motivation and poor retention of lessons due to outdated teaching methods. In addition, Akinwande & Salami (2021) highlight that the digital divide between technologically proficient teachers and those with minimal ICT skills is widening, leading to unequal learning experiences across schools. In many public secondary schools, teachers' inability to integrate technology into instructional practices has been linked to reduced classroom interaction, student absenteeism, and poor academic performance (Oladimeji & Chukwuma, 2019). Given these challenges, there is an urgent need to investigate the relationship between teachers' technological competencies and students' academic engagement to provide evidence-based recommendations for improving instructional quality in secondary schools.

Several studies have explored ICT integration in Nigerian secondary education, but gaps remain in understanding teachers' technological competencies and their direct impact on students' engagement. Adebisi and Ogunyemi (2021), in their study on "Teachers' Digital Literacy and Classroom Effectiveness in Southwest Nigeria," found that teachers who received ICT training were more effective in engaging students. However, they did not assess whether these digital competencies varied based on school type, gender, or years of experience. This study addressed these gaps by comprehensively assessing teachers' technological skills and their impact on secondary school students' academic engagement in South-West, Nigeria.

Purpose of the Study

The main purpose of this study was to conduct an Assessment on Teachers' technological skills as a predictor of improved Senior Secondary School (SSS)

students' Academic Engagement in South-West, Nigeria. Specifically, this study seeks to:

- I. examine the level of senior secondary school students' academic engagement in South-West
- II. assess the level of Teachers' technological skills in the senior secondary schools at the south-west.
- III. determine the influence of Teachers' technological skills on senior secondary school students' academic engagement in the south-west.
- IV. investigate the influence of Teachers' technological skills on students' academic engagement in the south-west based on gender
- V. examine the influence of Teachers' technological skills on students' academic engagement in the south-west based on school type

Research Questions

The following research questions were answered in this study:

- I. What is the level of senior secondary school students' academic engagement in South-West?
- II. What is the level of Teachers' technological skills in the senior secondary schools at the south-west?
- III. How do teachers' teachers' technological skills influence senior secondary school students' academic engagement in south-west, Nigeria?
- IV. Is there any significant difference in the level of teachers' technological skills on students' academic engagement in South-West, Nigeria based on gender?
- V. Is there any significant difference in the level of teachers' technological skills on students' academic engagement in South-West Nigeria based on school type?

Research Hypotheses

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

H₀₁: There is no significant difference in the level of teachers' technological skills on students' academic engagement in South-West, Nigeria based on gender

H₀₂: There is no significant difference in the level of teachers' technological skills on students' academic engagement in South-West, Nigeria based on school type

Results

This unit examined the collected data and interpretations of findings. The demographic data were analyzed using the percentage. Item-by-item analysis using mean ratings and standard deviation were used in answering research questions 1-3, while t-test was used to analyse their corresponding hypotheses. It's to be noted that only 1782 questionnaires (out of 1800) properly filled and returned were used for analysis.

Table 1: Distribution of respondents by gender

Gender	Frequency	Percentage
Male	966	54.21
Female	816	45.79
Total	1782	100

Table 1 shows that out of 1782 teachers sampled for the study, 966 (54.21%) were male teachers while 816 (45.79%) were female. This invariably implies that majority of the respondents across the local government were male teachers.

Table 2 : Distribution of respondents based on School Type

School Type	Frequency	Percentage
Private	759	42.59
Public	1023	57.41
Total	1782	100

Table 2 shows that out of 1782 teachers sampled for the study, 759 (42.59%) were in private schools, while 1023 (57.41%) were in public schools. This invariably implies that majority of the respondents across the local government were teaching in government schools.

Answering of Research Questions

Mean and rank order were used to answer the research questions 1-3 raised for this study.

Research Question 1: What is the level of Teachers' technological skills in the senior secondary schools at the south-west?

Table 3: Secondary school students' academic engagements in the south-west

S/N	Items	Mean	Rating	Decision
1.	Participation in Class Discussions	2.84	2nd	Agreed
2.	Completion of Assignments	2.72	3rd	Agreed
3.	Effort in Learning	1.26	7th	Disagreed
4.	Use of Educational Technology	1.62	5th	Agreed
5.	Attendance in Class	3.02	1st	Agreed
6.	Engagement During Practical Sessions	1.30	6th	Disagreed
7.	Seeking Clarification	2.12	8th	Disagreed
8.	Interaction with Teachers	1.36	9th	Disagreed
9.	Involvement in Group Activities	1.08	10th	Disagreed
10	Interest in Extra-Curricular Academic Activities	2.68	4th	Agreed

Table 3 shows the main secondary school students' academic engagements in south-west. With an average weighted mean of 2.0, five of the ten items have been prioritized as main secondary school students' academic engagements. These are: Attendance in Class; Participation in Class Discussions; Completion of Assignments; Interest in Extra-Curricular Academic Activities; and Use of Educational Technology. It is to be noted that, while above five items were considered to be of high importance as the main secondary school students' academic engagements, the other five items were considered as moderate academic engagements for secondary schools.

Research Question 2: What is the level of Teachers' technological skills in the senior secondary schools at the south-west?

Table 4: Level of Teachers' technological skills in the senior secondary schools at the south-west

S/N	Items	Mean	Rank	Decision
1.	Proficiency in Using Educational Software	2.14	3 rd	Agreed
2.	Familiarity with Online Learning Platforms	2.72	2nd	Agreed
3.	Ability to Integrate Technology into Lesson Plans	2.95	1st	Agreed
4.	Use of Interactive Whiteboards	1.80	7th	Disagreed
5.	Knowledge of Virtual Classroom Management Tools	1.77	8th	Disagreed
6.	Competence in Digital Assessments and Grading	1.40	10th	Disagreed
7.	Familiarity with Educational Apps and Resources	1.48	9th	Disagreed
8.	Comfort in Using Multimedia for Teaching	1.96	4th	Disagreed
9.	Capacity to Troubleshoot Basic Technological Issues	1.86	6th	Disagreed
10	Engagement with Professional Development on Educational Technology	1.92	5th	Disagreed

Table 4 shows the Level of Teachers' technological skills in south-west, Nigeria. With an average weighted mean of 2.0, only three of the ten items were prioritized as the level of teachers' technological skills. These are: Ability to Integrate Technology into Lesson Plans; Familiarity with Online Learning Platforms; and Proficiency in Using Educational Software. It is to be noted that, while majority of the respondents considered only three items as highly important Level of Teachers' technological skills in south-west SSS, the other seven items were considered as moderately important.

Research Question 3 How do teachers' technological skills influence senior secondary school students' academic engagement in south-west, Nigeria?

Table 5: Influence of Teachers' technological skills on Senior Secondary school students' Academic Engagement in south-west, Nigeria.

S/N	Items	Mean	Rating	Decision
1.	Teachers' proficiency in using educational software has a positive impact on students' interest in learning.	1.94	7th	Disagreed
2.	The use of interactive whiteboards by teachers enhances students' attention and participation in class activities.	1.32	9th	Disagreed
3.	Teachers' ability to integrate technology into their lesson plans encourages students to engage more in the subject matter.	3.24	1st	Agreed

4.	The familiarity of teachers with online learning platforms increases students' access to educational resources, fostering greater academic involvement.	0.76	10th	Disagreed
5.	Teachers who are skilled in using multimedia tools help make lessons more engaging, which improves students' focus during lessons.	2.32	4th	Disagreed
6	Teachers' competence in conducting digital assessments encourages students to be more proactive in preparing for exams and assignments.	1.68	6th	Disagreed
7	The ability of teachers to troubleshoot technological issues ensures a smoother learning experience, which positively affects students' academic engagement.	1.60	8th	Disagreed
8	Teachers' familiarity with educational apps provides students with alternative learning methods, enhancing their overall academic participation.	2.68	2nd	Agreed
9	Teachers' use of virtual classroom management tools has been shown to improve students' engagement by creating a structured and interactive learning environment.	2.40	3rd	Agreed
10	Teachers who continue to improve their technological skills through professional development positively influence students' attitudes towards technology-enhanced learning.	2.06	5th	Agreed

Table 5 shows the Influence of Teachers' technological skills on Senior Secondary school students' Academic Engagement in South-West, Nigeria. With a bench mark of 2.0, only five of the ten items were prioritized as the Influence of Teachers' technological skills on Senior Secondary school students' Academic Engagement. It is to be noted that, while majority of the respondents considered only five items as highly important as the Influence of Teachers' technological skills on Senior Secondary school students' Academic engagement. The other five items were considered as moderately important.

Hypotheses Testing

In this study, two null hypotheses were formulated and tested at 0.05 alpha levels. To test these hypotheses, the t-test statistics was used and significant difference was observed.

Hypothesis 1: There is no significant difference in the level of teachers' technological skills on students' academic engagement in South-West, Nigeria based on gender

Table 6: t-test showing differences in the level of teachers' technological skills on students' academic engagement in South-West, Nigeria based on gender

Gender	N	Mean	S D	Df	T	Sig	Decision
Male	966	89.06	7.24	1780	-4.18	0.00	Rejected
Female	816	83.02	6.07				

From the result shown in Table 6 above, male teachers had higher mean (89.06 ± 7.24) than female teachers (83.02 ± 6.07) in their perceived level of teachers' technological skills in South-West SSS. It revealed a significant difference of $t(1780) = -4.18$, $p = 0.00$, with male teachers having a higher perception. Therefore, the null hypothesis 1 is rejected. This means that significant difference existed in the identified level of teachers' technological skills in the South-West SSS by male and female teachers, with male teachers having a significantly higher perception.

Hypothesis 2: There is no significant difference in the level of teachers' technological skills on students' academic engagement in South-West, Nigeria based on school type

Table 7: t-test showing differences in the level of teachers' technological skills on students' academic engagement in South-West, Nigeria based on school type

School Type	N	X	SD	Df	T	Sig.	Decision
Private	759	82.861	5.066	1780	-1.89	0.06	Accepted
Public	1023	94.600	6.140				

Table 7 reveals that there was no significant difference between public and private teachers' perceptions on the level of teachers' technological skills in South-West, Nigeria. The teachers in public schools had a higher mean (94.60 ± 6.14) than teachers in private schools (82.86 ± 5.07) in their perceived level of teachers' technological skills which revealed a non-significant difference of $t(1780) = -1.89$, $p = 0.06$, in favour of teachers in public schools. Therefore, the hypothesis which states that there is no significant difference in the level of teachers' technological skills in South-West, Nigeria based on school type is hereby upheld.

Discussion

The finding of this study revealed that majority of the respondents identified the main secondary school students' academic engagements as: Attendance in

Class; Participation in Class Discussions; Completion of Assignments; Interest in Extra-Curricular Academic Activities; and Use of Educational Technology. Fredricks, et al. (2021) aligned with this finding by observing that academic engagement refers to the level of interest, participation, and commitment that students demonstrate towards their learning experiences. It encompasses cognitive, emotional, and behavioral involvement in educational activities that contribute to academic success. To them, academically engaged students are actively involved in classroom discussions, complete assignments diligently, and seek opportunities to deepen their understanding. This concept is crucial in education because it directly influences students' academic performance, retention rates, and overall learning experiences.

Oladimeji & Chukwuma (2019), also noted that, teacher-student relationships strongly influence academic engagement. Teachers who demonstrate enthusiasm, offer constructive feedback, and foster open communication can positively impact students' willingness to participate in learning activities. When students perceive their teachers as supportive and approachable, they are more likely to engage actively in academic tasks. In contrast, a lack of teacher support can lead to disengagement, decreased motivation, and poor academic performance. Parents who provide academic support, encouragement, and a conducive learning environment at home help reinforce positive learning behaviors (Okeke *et al.* 2022). Additionally, peer interactions play a role in shaping students' attitudes towards learning. Positive peer relationships encourage collaboration, motivation, and a sense of belonging, which can lead to increased academic engagement.

Three items were prioritized as the level of teachers' technological skills in South-west, Nigeria. These are: Ability to Integrate Technology into Lesson Plans; Familiarity with Online Learning Platforms; and Proficiency in Using Educational Software. Nwachukwu (2021), in agreement with this finding observed that the relevance of teachers' technological skills in secondary education cannot be overemphasized, as they enhance instructional delivery, promote student engagement, and improve learning outcomes. He argued that teachers who possess strong technological skills can create interactive and engaging lessons, catering to different learning styles and preferences.

Similarly, Ajayi and Oyekanmi (2022) asserted that the integration of technology in teaching helps to bridge learning gaps, foster collaboration, and provide students with real-world applications of theoretical concepts. Despite

these benefits, Ajibola and Olawale (2019) observed that many teachers in Nigeria still exhibit resistance to adopting technology in their classrooms due to lack of training and institutional support. However, as digital transformation continues to shape the global education landscape, it is imperative that teachers acquire and apply technological skills to enhance students' engagement in secondary schools.

In this regard, equipping teachers with technological competencies can significantly impact students' academic engagement by making learning more interactive, accessible, and student-centered. The relevance of teachers' technological skills in secondary education cannot be overemphasized, as they enhance instructional delivery, promote student engagement, and improve learning outcomes. Nwachukwu (2021) argues that teachers who possess strong technological skills can create interactive and engaging lessons, catering to different learning styles and preferences.

The identified factors influencing teachers' technological skills on senior secondary school students' academic engagement in South-West SSS were: Teachers' ability to integrate technology into their lesson plans; Teachers' familiarity with educational apps provides students with alternative learning methods, enhancing their overall academic participation; Teachers' use of virtual classroom management tools has been shown to improve students' engagement by creating a structured and interactive learning environment; Teachers who are skilled in using multimedia tools help make lessons more engaging, which improves students' focus during lessons; and Teachers who continue to improve their technological skills through professional development positively influence students' attitudes towards technology-enhanced learning.

Adegbite & Olatunji (2023) in agreement with the finding observed that teachers' technological skills have a profound impact on secondary school students' academic engagement. By incorporating digital tools into teaching, educators create interactive and personalized learning experiences that keep students motivated and actively involved in their studies. Technology facilitates collaboration, critical thinking, problem-solving. Oladimeji & Chukwuma, (2019) also confirmed that another significant impact of teachers' technological skills is the enhancement of students' critical thinking and problem-solving abilities. Digital tools such as simulation software, coding

platforms, and interactive games encourage students to analyze problems, explore multiple solutions, and apply knowledge creatively.

A significant difference existed in the identified level of teachers' technological skills in South-west by male and female teachers, with female teachers having a significantly higher perception. In support of this finding, Alele-williams (1987) revealed that another form of violence promoted over the years by both the masculine and the feminine gender is gender stereotyping. She described gender stereotyping as the 'hidden curriculum,' which sends messages to girls to conform to role expectations. Similarly, the societal social and educational conditioning of the female gender is not helping matters.

There was no significant difference between public and private schools teachers' perceptions on the level of teachers' technological skills in South-West, Nigeria on students' academic engagements. Okunloye (2001) observed that the public-private differentiation of ownership provides a framework for the interpretation of the frequently observed differences between the managers of the two sectors. It was therefore amazing finding no significant difference in the perceptions of teachers across the two lines. It was ordinarily expected that teachers in the public schools would have a better perception on the influence of teachers' technological skills on students' academic engagements because most of them are well qualified, experienced and motivated as well as having better established structures than their counterparts in private schools.

Conclusions & Recommendations

In conclusion, academic engagement is a multidimensional concept that encompasses behavioral, cognitive, and emotional aspects. It is influenced by various factors, including teacher-student relationships, parental support, peer influence, and technological integration. Ensuring high levels of engagement requires collaborative efforts from educators, parents, and policymakers. By adopting student-centered teaching approaches and leveraging technology, schools can create learning environments that promote sustained academic engagement and improved learning outcomes.

Based on the findings of the study, its recommended that: Government should provide necessary infrastructure and training for the integration of ICTs in the secondary school system. 1988 enacted policy on computer education in schools should be restructured and fully implemented; and Professional

development programs should be provided to equip teachers with strategies to enhance students' engagement and also encourage mentorship programs where students receive guidance and encouragement from experienced educators and peers.

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Motivation as a Correlate of Lecturers' Job Performance in State-owned Colleges of Education, North-central Nigeria

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Abstract

This study examined motivation as a correlate of lecturers' job performance in state-owned Colleges of Education, North-central Nigeria. It adopted descriptive research design of correlational type. The population of the study comprised 2,011 lecturers in all the state-owned Colleges of Education in North-central Nigeria. Random sampling technique was used to select three states, all the six state-owned Colleges of Education in the sampled states were selected purposively. Proportionate sampling technique was used to select 289 lecturers out of the 1,144 in the six institutions. 'Motivation Questionnaire' and 'Lecturers' Job Performance Questionnaire' were used to collect data. Validity of the instruments was ensured and their reliability test yielded 0.83 and 0.79 for MQ and LJPQ respectively. The findings of the study revealed that there was a significant relationship motivation and lecturers' job performance in state-owned COEs, North-central Nigeria. The study concluded that motivation is a very factor which determines job performance of lecturers in state-owned COEs, North-central Nigeria. It recommended that state governments should sincerely prioritise provision of motivation to lecturers in COEs, North-central Nigeria by paying them adequate salary, showing unwavering commitment to their capacity building, and provision of fringe benefits, to enhance their effective job performance.

Keywords: Correlate, Job Performance, Lecturers, Motivation, Colleges of Education

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Introduction

Colleges of Education in Nigeria are saddled with the responsibility of producing competent and qualified teachers for the basic schools. To achieve this goal, the institutions need lecturers among other resources. For lecturers to effectively discharge their duties, there is need for the management to provide adequate motivation for them. Motivation refers to the driving mechanism that is used to achieve effective services delivery of lecturers in educational institutions, to enhance actualisation of the established goals. It covers salary, promotion, capacity building, working conditions and fringe benefits. The manner in which motivation is handled in tertiary institutions could determine the lecturers' job performance. Owan *et al.* (2020) maintained that job performance is a concept that is observed as the extent to which a combination of duties (such as teaching, research and community service) is performed by academic staff of tertiary institutions. Oladejo (2022) explained job performance as how lecturers in higher institutions of learning carry out the tasks given to them, considering the mandate of the institutions. The performance is measured based on teaching, research and community service. Hassan (2021) viewed job performance as the attitudes exhibited by lecturers to the tasks before them in the institutions. This is seen in a tripartite (teaching, community service and research). Obinna *et al.* (2022) observed that job performance of lecturers is determined by using their behaviour to teaching, community service and research.

Alani (2022) posited that with adequate provision of motivation to employees in the aspects of salary, fringe benefits, capacity building, job security and the likes, job performance of lecturers could be enhanced. Abdulmumin (2021) stated that lecturers in Colleges of Education are important assets. This necessitates the reason they need to be well motivation to enhance production of quality teachers for the basic schools in Nigeria. Munyengabe *et al.* (2017) noted that the factors which give motivation to lecturers include adequate salary, promotion, conducive lecture room and incentives. Hussaini *et al.* (2020) stressed that with the ongoing dynamism in the knowledge globally, it is advisable that the managements of tertiary institutions in Nigeria design attractive motivating mechanisms, which would retain and trigger lecturers to discharge their duties effectively. The aspects of motivation which this study focuses on are salary, promotion, capacity building and fringe benefits. According to Rachmawati (2018), salary, among other motivating factors,

attracts people to join an organisation and they attach much importance to it. This is the reason many deadlocks between the employers and employees in organisations usually revolve around salary. Oladejo (2022) argued that issues bothering on salaries could be one of the factors responsible for poor lecturers' job performance in tertiary institutions in Nigeria. Not only that, this might be the reason Nigerian tertiary institutions keep losing lecturers to the foreign ones, where better pay is offered. To give empirical support to the importance of motivation to lecturers' job performance, the finding of the study conducted by Calvin (2017) revealed that there was a significant impact of salary on the performance of employees in Abdul Gusau Polytechnic, Talata-mafara and State College of Education Maru, Zamfara State, Nigeria. Monday (2021) argued that if tertiary institutions prioritise capacity building of lecturers, it could enhance their job performance. Karim *et al.* (2019) emphasised that capacity building is an academic activity aims at providing particular skills and knowledge, leading to effective job performance of lecturers. Capacity building cannot be ruled out of the ways of motivating employees for effective discharge of their duties. Ajadi and Omotayo (2023) submitted that the managements of tertiary institutions in Nigeria need to intensify efforts in providing capacity building for lecturers, to enhance their job performance. This is because lecturers are likely to perform their duties effectively, if they are given the opportunity to participate in different capacity building programmes.

Fringe benefits also play key roles in enhancing job performance of lecturers. Oladejo (2022) posited that apart from salary and promotion, another area which Nigerian government needs to focus on more in motivating lecturers in tertiary institutions is fringe benefits such as health insurance scheme, festive packages, car loan, housing loan and recognition. If fringe benefits are adequately provided for lecturers, their job performance could be more effective. Fringe benefits, just like other aspects of motivation, help in enhancing effective job performance of lecturers. Failure to pay attention to the provision of fringe benefits could cause ineffective job performance. Saliu (2019) asserted that poor provision of fringe benefits to lecturers, among other factors, could be one of the factors responsible for ineffective job performance. Zubair (2020) found that fringe benefits have a significant influence on lecturers' job performance. Hence, government needs to prioritise it for lecturers, to boost their job performance. It is against this background that this study aims at examining job motivation as a correlate of lecturers' job performance in Kwara State Colleges of Education, Nigeria.

Lecturers in tertiary institutions in Nigeria are saddled with three statutory responsibilities (teaching, research and community service), which are meant to enhance effectiveness of the institutions. However, information derived by the researchers through interaction with some students, lecturers, and heads of department in Kwara State Colleges of Education show that job performance of some lecturers in the areas of teaching, research, and community service has not been effective. For instance, as expressed by the students, some lecturers do not go for lectures regularly and punctually, while the commitment of some lecturers to imparting knowledge to students is not encouraging. Apart from this, lecturers are expected to regularly conduct researches that would help proffer solutions to series of problem in education, but it seems that the commitment of some lecturers in the institutions to conducting cut-edging researches is not appealing. The situation seems to be the same in the aspect of community service. However, this might be due to inadequate motivation.

Some researchers have conducted studies related to this present study. For instance, Onabanjo (2020) examined the impacts of salary on lecturers' job performance in Colleges of Education in Kogi State. Oladejo (2022) investigated the impacts of compensation on academic staff's job performance in polytechnics in Lagos State, Nigeria. Abdulsalam and Mawoli (2014) conducted a research on motivation and job performance of academic staff of state universities in Nigeria: The case of Ibrahim Badamasi Babangida. Peter (2020), Monday (2021), Alani (2022) and Salami (2023) also carried out researches related to motivation. However, none of the afore-mentioned studies focused on motivation as a correlate of lecturers' job performance in state-owned COEs, North-central Nigeria; hence, this is the gap which this study filled. The study:

- I. examined the relationship between job motivation and lecturers' job performance in state-owned COEs, North-central Nigeria;
- II. investigated the relationship between salary and lecturers' job performance in state-owned COEs, North-central Nigeria;
- III. assessed the relationship between capacity building and lecturers' job performance in state-owned COEs, North-central Nigeria; and

- IV. found out the relationship between fringe benefits and lecturers' job performance in state-owned COEs, North-central Nigeria.

The following research hypotheses were formulated in the study.

H01: There is no significant relationship between motivation and lecturers' job performance in state-owned COEs, North-central Nigeria.

H02: There is no significant relationship between salary and lecturers' job performance in state-owned COEs, North-central Nigeria.

H03: There is no significant relationship between capacity building and lecturers' job performance in state-owned COEs, North-central Nigeria.

H04: There is no significant relationship between fringe benefits and lecturers' job performance in state-owned COEs, North-central Nigeria.

Methodology

Descriptive research design of correlational type was used to carry out the study. This was because the researchers were interested in determining the relationship between motivation and lecturers' job motivation. The population of the study consisted of 2,011 lecturers in all the state-owned Colleges of Education in North-central Nigeria. Random sampling technique was used to select three states (Kwara, Kogi and Nigeria) out of the seven in the area including Federal Capital Territory, while all the six state-owned Colleges of Education in the states sampled were selected purposively. Proportionate sampling technique was used to select 289 lecturers out of the 1,144, using Krejcie and Morgan (1970) table for sample size determination. See table 1.

Table 1: Population and Sample of the Study

S/N	Institution	Population	Sample
1.	Kogi State College of Education, Ankpa	196	50
2.	Kogi State College of Education, Kabba	98	25
3.	Kwara State College of Education, Ilorin	178	45
4.	Kwara State College of Education, Oro	115	29
5.	Kwara State College of Education (Technical) Lafiagi	105	26
6.	Niger State College of Education, Minna	452	114
Total		1,144	289

The researchers used self-designed questionnaires entitled ‘Motivation Questionnaire (MQ) and Lecturers’ Job Performance Questionnaire’ (LJPQ) to collect data for the study. The questionnaires were divided into two sections (A & B). Section A was used to collect information from the respondents based on salary, capacity building and fringe benefits; while Section B was used to collect data on Teaching, Community Service and Research. MQ and LJPQ were close-ended and each had 15 items. MQ and LJPQ were presented to three experts for validation. Thirty copies of the questionnaire were administered to some lecturers in a state-owned Colleges of Education, outside the ones that were used for the study. Cronbach’s Alpha was used to analyse the data gathered and reliability index of 0.83 and 0.79 was realised for MQ and LJPQ respectively. Pearson Product-Moment Correlation was used to test hypotheses formulated at 0.05 level of significance. All the analyses were done with the use of Statistical Package for Social Sciences (SPSS).

Results

H₀₁: There is no significant relationship between motivation and lecturers’ job performance in state-owned COEs, North-central Nigeria

Table 2: Correlational Analysis of the Relationship between Motivation and Lecturers’ Job Performance in state-owned COEs, North-central Nigeria

Variable	N	X	SD	Cal. r-value	p-value	Decision
Motivation	275	2.45	.69	.662	.001	H ₀₁ Rejected
Lecturers’ Job Performance	275	2.56	0.65			

Table 2 shows the calculated r-value (.662) and the p-value (.001) which is less than the significance level (0.05). Hence, hypothesis one is rejected. This signifies that there was a significant relationship between motivation and lecturers’ job performance in state-owned COEs, North-central Nigeria.

H₀₂: There is no significant relationship between salary and lecturers’ job performance in state-owned COEs, North-central Nigeria

Table 3: Correlational Analysis of the Relationship between Salary and Lecturers' Job Performance in state-owned COEs, North-central Nigeria

Variable	N	X	SD	Cal. r-value	p-value	Decision
Salary	275	2.35	.64	.627	.003	Ho ₂ Rejected
Lecturers' Job Performance	275	2.82	0.91			

Table 3 shows the calculated r-value (.627) and the p-value (.002) which is less than the significance level (0.05). Hence, hypothesis two is rejected. This shows that there was a significant relationship between salary and lecturers' job performance in state-owned COEs, North-central Nigeria.

Ho₃: There is no significant relationship between capacity building and lecturers' job performance in state-owned COEs, North-central Nigeria

Table 4: Correlational Analysis of the Relationship between Capacity Building and Lecturers' Job Performance in State-owned COEs, North-central Nigeria

Variable	N	X	SD	Cal. r-value	p-value	Decision
Capacity Building	275	2.69	.87	.613	.001	Ho ₃ Rejected
Lecturers' Job Performance	275	2.82	0.91			

Table 4 shows the calculated r-value (.613) and the p-value (.001) which is less than the significance level (0.05). Hence, hypothesis two is rejected. This depicts that there was a significant relationship between capacity building and lecturers' job performance in state-owned COEs, North-central Nigeria.

Ho₄: There is no significant relationship between fringe benefits and lecturers' job performance in state-owned COEs, North-central Nigeria

Table 5: Correlational Analysis of the Relationship between Fringe Benefits and Lecturers' Job Performance in State-owned COEs, North-central Nigeria

Variable	N	X	SD	Cal. r-value	p-value	Decision
Fringe Benefits	275	2.30	.55	.640	.000	Ho ₄ Rejected
Lecturers' Job Performance	275	2.82	0.91			

Table 5 shows the calculated r-value (.640) and the p-value (.000) which is less than the significance level (0.05). Hence, hypothesis four is rejected. This means that there was a significant relationship between fringe benefits and lecturers' job performance in state-owned COEs, North-central Nigeria.

Discussion

The findings of the study revealed that there is a significant relationship between motivation and lecturers' job performance in state-owned COEs, North-central Nigeria. This finding supports the finding of Alani (2022) that there was a significant relationship between motivation and job performance of lecturers in universities in Kano State, Nigeria. This finding agrees with the finding of Peter (2020) that there was a significant relationship between lecturer motivation and job performance of lecturers in polytechnics in Lagos State, Nigeria.

The study found that there is a significant relationship between salary and lecturers' job performance in state-owned COEs, North-central Nigeria. This finding corroborates the finding of Monday (2021) that there was a significant relationship between adequate salary payment and job performance of academic staff in Colleges of Education in Kano State. This finding is in tandem with the finding of Salami (2023) that there was a significant relationship between salary and lecturers' job performance in Oyo State College of Education, Lanlate.

The findings of the study revealed that there is a significant relationship between capacity building and lecturers' job performance in state-owned COEs, North-central Nigeria. This finding is in consonance with the finding of Hassan (2021) that there was significant relationship between capacity building and lecturers' job performance in Colleges of education in Rivers State, Nigeria. This finding confirms the finding of Abdulmumin (2021) that there was a significant impact of capacity building on lecturers' job performance in private universities in Kogi State, Nigeria.

The study found that there is a significant relationship between fringe benefits and lecturers' job performance in state-owned COEs, North-central Nigeria. This finding agrees with the finding of Peter (2020) that there was a significant relationship between fringe benefits and job performance of lecturers in polytechnics in Lagos State, Nigeria. This finding supports the

finding of Alani (2022) that there was a significant relationship between fringe benefits and job performance of lecturers in universities in Kano State,

Conclusion

The study concluded that motivation is a very factor which determines job performance of lecturers in state-owned COEs, North-central Nigeria. Adequate payment of salary is a veritable tool for achieving effective job performance of lecturers. Capacity building contributes significantly to the effective job performance of lecturers. Fringe benefits also help in enhancing job performance of lecturers.

Recommendations

The following recommendations were made:

- i. State governments should sincerely prioritise provision of motivation to lecturers in COEs, North-central Nigeria by paying them adequate salary, showing unwavering commitment to their capacity building, and provision of fringe benefits, to enhance their effective job performance.
- ii. There is need for the government to review salary of lecturers and add significant amount to it due to inflation in the country, to meaningfully increase their monthly take-home and consequently boost their morale in job performance.
- iii. Consistent provision of periodic capacity building to lecturers via workshops, seminars, conferences, and lecturers need to be given a sincere attention, to help lecturers acquire more knowledge, skills, and techniques that would help enhance their job performance.
- iv. Governments should prioritise provision of fringe benefits such as car loan, housing loan, festive packages, health insurance scheme and a host of others to lecturers, to boost their morale and consequently enhance job performance.

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The Need for the Development and Validation of 21st-Century Digital Skills Competence Assessment Framework for College of Education Lecturers in Nigeria

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Abstract

The rapid digitalization of global education has exposed significant "technological readiness deserts" within Nigeria's teacher education landscape. This study justifies the urgent need for the development and validation of a 21st-century digital skills competence assessment framework specifically for College of Education lecturers. Employing a qualitative exploratory design, the research utilized semi-structured interviews with twelve purposively selected experts in educational technology and assessment. Thematic analysis revealed critical systemic gaps: 85% of institutions lack standardized evaluation mechanisms, and only 18% have access to validated assessment tools. Findings indicate that lecturer digital deficiencies create a "cascading effect," leaving over 70% of pre-service teachers underprepared for modern classrooms. The study identifies four core themes: the urgency of systematic assessment, systemic preparedness gaps, the impact on graduate quality, and infrastructure constraints. To mitigate these challenges, the study recommends that the National Commission for Colleges of Education (NCCE) institutionalize a validated competence framework aligned with international standards like DigCompEdu and UNESCO's ICT-CFT. Furthermore, digital proficiency must be linked to career advancement and supported by state-funded minimum technology standards. A phased three-year implementation strategy is proposed to transform Nigerian Colleges of Education into centers of digital excellence.

Keywords: 21st-Century Digital Skills, Competence Assessment Framework, College of Education Lecturers

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Introduction

Higher education in the digital age demands more than disciplinary knowledge, it requires educators to possess and demonstrate technological competencies that prepare future teachers for an increasingly digital classroom environment (Kayyal, 2024). For lecturers in Nigeria's Colleges of Education, this challenge is particularly pressing. These educators must not only master their subject areas and pedagogical techniques but also be proficient in integrating digital technologies that enhance teaching effectiveness and prepare pre-service teachers for 21st-century learning contexts (Wordu & Isiah, 2020). Nigeria's teacher education system continues to face unprecedented technological transformation challenges, with Colleges of Education emerging as critical yet underequipped institutions in this transition (Onasanya & Fadeyibi, 2025). The crisis became evident during the COVID-19 pandemic when the abrupt shift to remote learning in March 2020 exposed severe digital competence gaps among education lecturers (Garcia et al., 2023). This disruption revealed that many institutions lacked both the infrastructure and the human capacity to deliver quality teacher preparation programs through digital platforms (Amoah, 2024).

Among the most affected areas is pedagogical technology integration, where lecturers struggled to translate traditional classroom methodologies into digital environments. Colleges across states like Lagos, Kaduna, and Enugu reported significant challenges in conducting practical teaching sessions, supervising teaching practice remotely, and assessing students' technological readiness for modern classrooms (Okagbue et al., 2023). The shift exposed a fundamental weakness: the absence of standardized frameworks for measuring and developing lecturers' digital competencies in teacher education contexts. The challenge extends beyond basic technology use to encompass critical 21st-century skills, including digital content creation, online collaboration, data literacy, cybersecurity awareness and adaptive learning technologies (Ndukwe & Daniel, 2020). Many lecturers who train future teachers lack systematic exposure to these competencies, creating a cascading effect where pre-service teachers graduate without the digital fluency required in secondary schools (Zeng et al., 2025). This skills gap threatens to perpetuate a cycle of technological under-preparedness across the entire education system.

The systematic neglect of digital competence development has created what experts now describe as "technological readiness deserts" in Nigeria's teacher education landscape, limiting institutional capacity to produce digitally competent graduates who can meet the demands of modern classrooms (Irele, 2021). The absence of validated assessment frameworks means institutions cannot accurately diagnose competence levels, design targeted interventions, or measure improvement over time. This situation highlights the urgent need for empirically validated tools that can systematically evaluate and enhance digital skills among College of Education lecturers (Perdomo & Morales, 2024). Education lecturers in Nigeria's Colleges of Education face unique vulnerabilities due to: (1) the rapid digitalization of educational delivery systems without corresponding professional development support, and (2) the lack of contextualized, validated assessment instruments that align with Nigerian teacher education requirements and technological realities (Ilori et al., 2023). Digital skills competence, defined as the ability to effectively use digital technologies for teaching, learning, assessment, professional development, and educational administration while demonstrating critical digital literacy and ethical technology use, has emerged as an essential requirement for contemporary teacher educators (Falloon, 2020; Bolaji & Adeoye, 2022).

Globally, evidence demonstrates the effectiveness of structured digital competence frameworks in educational settings. The European Digital Competence Framework for Educators (DigCompEdu) and UNESCO's ICT Competency Framework for Teachers have successfully guided professional development and assessment in diverse contexts (Ayoku & Okafor, 2015; Asagar, 2025). These frameworks emphasize technological pedagogy, digital content creation, and continuous professional learning components notably absent in Nigerian teacher educator preparation and evaluation systems (Ogbuabor *et al.*, 2024). In Nigeria's Colleges of Education, the challenges are compounded by systemic issues including inadequate digital infrastructure, limited internet connectivity, insufficient funding for technology acquisition, and minimal opportunities for sustained professional development in educational technology (Kola & Taiwo, 2022). An assessment revealed that 78% of College of Education lecturers lacked formal training in pedagogical technology integration, while 85% of institutions operated without comprehensive digital skills development programs or standardized assessment criteria (Eleje *et al.*, 2022). This preparedness gap leaves teacher

educators ill-equipped to model and teach the digital competencies their students will need in 21st-century classrooms.

This research is critically needed to address the glaring gap in digital skills assessment and development among College of Education lecturers in Nigeria's rapidly evolving educational technology landscape. While Nigeria's National Policy on Education (2014, Revised) and the National ICT Policy in Education (2019) provide general technology integration guidelines, they fail to deliver validated, context-specific assessment frameworks that measure lecturers' digital competencies against internationally recognized standards adapted to Nigerian realities, the predominant need facing teacher education institutions nationwide. The study's significance lies in its direct response to this institutional shortcoming. Through systematic examination of expert insights from educational technology, teacher education, assessment development, and curriculum design sectors, the main objective of this research is to justify the need for the development and validation of a 21st-century digital skills competence assessment framework specifically designed for College of Education lecturers. Thus, the research question to guide the study is: To what extent is it necessary to develop and validate a 21st-century digital skills competence assessment framework to enhance technological proficiency and pedagogical effectiveness among College of Education lecturers in Nigeria?

Literature Review

Digital skills competence assessment in teacher education has emerged as a critical area of focus, particularly in developing nations like Nigeria where technological integration faces systemic challenges. Effective digital competence assessment encompasses identification, measurement, and development strategies to evaluate educators' proficiency in pedagogical technology use, digital content creation, online communication, and information literacy (Ikwuka et al., 2020). For College of Education lecturers, who must prepare pre-service teachers for technology-enhanced classrooms, validated assessment frameworks are essential to ensure teaching quality and educational relevance in the digital age.

The importance of digital competence assessment frameworks is well-documented in educational technology research. Studies show that educators evaluated through structured digital competence frameworks demonstrate

greater confidence in technology integration, leading to improved pedagogical practices and more effective student learning outcomes (Okoye & Okwuogu, 2020). In resource-constrained environments, such as Nigeria, where teacher education institutions face persistent technological infrastructure deficits (Aliyu *et al.*, 2025), systematic competence assessment is not merely beneficial but a necessity. Lecturers evaluated through comprehensive frameworks aligned with international standards are better positioned to model digital fluency and prepare future teachers for 21st-century learning environments (UNESCO, 2018).

Globally, frameworks like the European Digital Competence Framework for Educators (DigCompEdu) and UNESCO's ICT Competency Framework for Teachers highlight the value of integrating standardized assessment into teacher educator professional development. These initiatives emphasize self-assessment tools, competence-based progression pathways, and context-specific adaptation strategies that have proven effective in enhancing institutional capacity for digital transformation (UNESCO, 2018). However, in Nigeria, despite the National ICT Policy in Education (2019) and integration goals outlined in the National Policy on Education, implementation remains weak, with most College of Education lecturers lacking access to validated assessment instruments that measure their digital competencies against recognized standards (Eze *et al.*, 2018). This gap is particularly acute in teacher education institutions, where lecturers must develop technological proficiency in pre-service teachers without standardized evaluation of their own digital capabilities. While existing studies address general ICT integration in education, few focus on developing and validating context-specific digital skills competence assessment frameworks for College of Education lecturers, creating a critical research gap. Thus, this study advances the discourse by analyzing expert perspectives to justify the need for a validated 21st-century digital skills competence assessment framework, offering evidence-based strategies to enhance lecturer competencies and strengthen institutional capacity for digital transformation in teacher education.

Methodology

This study employed a qualitative exploratory research design to investigate the critical need for a validated 21st-century digital skills competence assessment framework among College of Education lecturers in Nigeria, with particular emphasis on addressing the persistent gaps in technological

proficiency and pedagogical technology integration. The qualitative approach was deliberately selected for its capacity to generate rich, contextualized understandings of complex digital competence challenges through first-hand expert accounts (Creswell & Poth, 2018). This methodological choice aligns with the study's objectives of uncovering both the current deficiencies in digital skills assessment systems and potential framework development interventions, while accommodating the multifaceted nature of educational technology research in developing contexts (Unwin, 2009).

The research design incorporated purposive sampling to identify twelve key informants with specialized expertise in educational technology and teacher education assessment. As recommended by Palinkas et al. (2015) for policy-relevant qualitative research, the sample comprised six senior educational technology experts responsible for ICT integration and lecturer professional development in Colleges of Education across north-west geopolitical zone, and six curriculum and assessment experts and educational measurement specialists with direct experience in competence framework development and validation. All participants possessed a minimum of eight years' field experience in teacher education, technology integration or assessment instrument development in Nigeria, ensuring the data reflected deep practical knowledge of the subject matter (Patton, 2015). This balanced composition enabled methodological triangulation between educational technology and assessment development perspectives, enhancing the study's validity (Denzin, 2017).

Data collection was conducted through semi-structured interviews using a carefully designed protocol of eight open-ended questions. The interview guide was developed through extensive review of digital competence assessment literature (e.g., UNESCO, 2018; Falloon, 2020; Bolaji & Adeoye, 2022) and consultation with educational technology professionals, focusing specifically on: (1) current state of digital skills among College of Education lecturers, (2) existing assessment practices and their limitations, (3) institutional gaps in digital competence measurement and development, and (4) essential components for a contextualized 21st-century digital skills assessment framework. Following best practices for expert consultation in framework development research (Vogelsang et al., 2019), interviews were conducted through a combination of in-person sessions at participants' institutional offices and secure video conferencing platforms, with each

session lasting 60-75 minutes to allow comprehensive discussion while accommodating participants' professional schedules. All interviews were audio-recorded with informed consent and later transcribed verbatim for analysis.

The analytical process employed Braun and Clarke's (2006) framework for thematic analysis, implemented through five systematic phases: (1) repeated immersion in the interview transcripts, (2) systematic coding using NVivo 12 software, (3) identification of emergent digital competence-related themes, (4) iterative refinement of key findings through constant comparison, and (5) verification through member checking. This rigorous approach ensured the findings remained grounded in participants' actual experiences while identifying broader patterns relevant to framework development and validation (Nowell et al., 2017).

To enhance the study's trustworthiness, multiple validation strategies were employed. Peer debriefing sessions were conducted with independent educational technology researchers to scrutinize preliminary findings, while thick description of the Nigerian teacher education context was provided to enable assessment of findings' transferability (Lincoln & Guba, 1985). Methodological triangulation was achieved by comparing perspectives across educational technology and assessment development sectors, and detailed audit trails documented all analytical decisions (Baxter & Eyles, 1997).

Ethical considerations were paramount given the evaluative nature of competence assessment research. The study protocol received formal approval from the management of Yusuf Bala Usman College of Education and Legal Studies Daura, Katsina State. Informed consent procedures emphasized participants' right to anonymity and withdrawal, with all data anonymized through pseudonyms and stored securely in password-protected systems (Sieber, 1992). These precautions were particularly crucial given the sensitive nature of discussing institutional capacity and lecturer competence levels in professional contexts (Hammersley & Traianou, 2012).

Results and Discussion

The interview questions were designed to address the central research question: To what extent is it necessary to develop and validate a 21st-century digital skills competence assessment framework to enhance technological proficiency and pedagogical effectiveness among College of Education

lecturers in Nigeria? Thematic analysis of expert responses revealed four key themes: 1) Urgency of Digital Competence Assessment in Teacher Education 2) Systemic Gaps in Lecturer Digital Preparedness 3) Impact on Pre-Service Teacher Quality and 4) Resource and Infrastructure Constraints. These themes collectively highlight the critical need for a validated 21st-century digital skills competence assessment framework for College of Education lecturers in Nigeria.

Theme One: Urgency of Digital Competence Assessment in Teacher Education

Digital competence assessment is a fundamental determinant of institutional capacity and teaching quality in Nigerian Colleges of Education. It involves the systematic evaluation of an educator's ability to integrate technology into teaching, learning, and professional development to ensure educational relevance in a digital age. For lecturers, this is critical because they must model technological proficiency while preparing pre-service teachers for modern classrooms. Experts agree that validated assessment frameworks are non-negotiable for identifying skill gaps and transforming "technologically hesitant" educators into confident trainers. Currently, over 85% of colleges lack these evaluation mechanisms, leading to lecturers avoiding technology integration due to uncertainty regarding their proficiency levels.

1. Key components needed: Competence-specific indicators, localized international tools, and institutional integration into promotion criteria.

Theme Two: Systemic Gaps in Lecturer Preparedness for Digital Integration

The preparedness of Nigerian lecturers is hampered by inadequate training protocols, misconceptions about digital requirements, and severe resource constraints. Recent studies highlight significant digital skills deficits across these institutions. Many lecturers still view digital skills as optional "IT department" tasks rather than core pedagogical competencies, ignoring their role in modeling fluency for students. This mindset persists despite policies like the National ICT Policy in Education (2019).

1. Infrastructure Gaps: Only 18% of colleges have access to validated assessment instruments.

2. Environmental Factors: Inadequate bandwidth and limited device availability further hinder practical integration.

Theme Three: Impact on Pre-Service Teacher Quality

Lecturer digital deficiencies directly threaten the quality of graduating students. When lecturers are not evaluated through systematic frameworks, they struggle to model evidence-based practices like digital lesson planning and online assessment. This creates a "cascading effect" where over 70% of newly certified teachers report feeling underprepared for technology integration. Conversely, studies show that structured lecturer assessment can improve graduate readiness by 50%.

1. Proposed Solutions: Integrating digital evaluation into performance reviews and adopting international standards like DigCompEdu or UNESCO's ICT Framework .

Theme Four: Resource and Infrastructure Constraints

The absence of basic technological resources, such as reliable internet, sufficient computers, and Learning Management Systems (LMS), makes it nearly impossible for lecturers to demonstrate competence. Approximately 82% of Nigerian Colleges of Education report inadequate infrastructure for such development. Furthermore, current appraisal systems focus almost exclusively on research output and traditional lecture delivery, completely ignoring digital content creation or technology integration capabilities.

1. Expert Recommendations: Establishing minimum infrastructure standards, securing dedicated funding for validation, and creating phased implementation strategies to move colleges toward "digital excellence".

Conclusion

The 21st-century digital world necessitates a paradigm shift in teacher education within Nigeria, moving from passive technology exposure to a structured system of accountability and growth. This study concludes that the lack of a validated assessment framework for College of Education lecturers is a primary barrier to improving the quality of pre-service teacher preparation. Without systematic measurement of digital competencies, professional development remains untargeted and institutional digital transformation remains stalled. Implementing a contextualized, evidence-based assessment

framework aligned with international standards. Ultimately, the systematic evaluation of digital skills is not merely an administrative requirement but a fundamental necessity for ensuring that Nigeria's future teachers are equipped to thrive in and lead digitally-transformed learning environments.

Recommendations

1. The National Commission for Colleges of Education (NCCE) should institutionalize a validated digital skills competence framework that establishes baseline standards for pedagogical technology integration and digital content creation across all institutions.
2. Colleges of Education must explicitly link digital competence assessment results to recruitment processes, biennial performance reviews, and promotion criteria to create a tangible incentive for continuous technological skill development.
3. The Federal Ministry of Education should establish and fund minimum technology standards, including high-speed internet and learning management systems, to ensure lecturers have the necessary infrastructure to demonstrate the competencies being assessed.
4. Stakeholders should adopt a three-year phased implementation strategy, beginning with pilot validation and moving to nationwide rollout, supported by longitudinal research to monitor impact on graduate teaching quality.

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Problems and Prospects of Infusing Cultural Diversity and Inclusion in Social Studies and Civic Education Curriculum in North-Central Nigeria

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Abstract

Social Studies and Civic education curriculum is seen as a veritable tool for inculcating appropriate values, attitudes, skills and knowledge in citizens so that they can be functional and responsible. The study aims at assessing the problems and prospects of infusing cultural diversity and inclusion in social studies and civic education curriculum in North-Central, Nigeria. Through this, we would be able to examine the prevalence of cultural diversity and inclusion, the challenges being faced, benefits and strategies employed to explore these diversities. The research was a descriptive research design of survey type. The population for the study consisted of all basic social studies and civic education teachers across the seven states of the North-Central (Abuja inclusive). The target population was social studies and civic education teachers who were randomly selected across the seven states of the North-Central (including Abuja). The basic instrument was a researcher-designed questionnaire and it was subjected to content and face validity. From the findings, three main teachers' perceptions were acknowledged on the inclusion of cultural diversity in the Social Studies and Civic Education. The study concludes that, Social Studies and Civic Education as a multidisciplinary subject, is uniquely positioned to promote understanding and appreciation of diversity which prepare learners for a multicultural world. Based on the findings, This study recommends the use of collaborative learning strategies to enhance intercultural understanding and making concerted efforts to ensure that Social Studies and Civic Education curriculum reflect the region's rich cultural diversity

Keywords: Cultural Diversity, Inclusion, Infusion, Identity, Basic Curriculum, Civic Education

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Introduction

Education plays a pivotal role in shaping the socio-economic and cultural fabric of any society. In this context, Social Studies, as an interdisciplinary subject, seeks to inculcate in learners the knowledge, skills, values, and attitudes necessary for effective citizenship and societal development. In recent years, the emphasis on inclusive education-defined as the practice of educating all students, regardless of their abilities or disabilities in the same learning environment-has gained global prominence. Inclusion in the Social Studies and Civic Education curriculum is critical because it ensures that learners, irrespective of their background or abilities, have equitable access to educational opportunities.

The existence of several ethnic or cultural groups within a society is referred to as cultural diversity (Parekh, 2020). It includes linguistic, religious, cultural, and moral diversity, all of which add to a lively and dynamic atmosphere. In a globalized society where, cross-cultural interactions are frequent in communities, businesses, and educational institutions, the introduction of cultural variety has grown in importance (Hofstede, 2021). However, there are frequently difficulties in integrating cultural variety, such as misunderstandings, disagreements, and stereotyping. When handled well, it also offers chances to promote creativity, innovation, and understanding between people (Berry, 2019).

Cultural diversity and inclusion are increasingly becoming focal points in global education systems. With globalization, societies have become more interconnected, bringing together individuals from diverse cultural backgrounds (Gay, 2018). This reality necessitates the integration of cultural diversity and inclusion into educational curricula to foster understanding, respect, and collaboration among individuals from different cultural groups. Social Studies, as a subject that explores human relationships and societal dynamics, serves as a critical platform for addressing these issues (Nieto, & Bode, 2020). Infusing cultural diversity and inclusion into the Social Studies curriculum aligns with educational goals to prepare learners for a multicultural world. Through this integration, students can develop cultural competence, critical thinking skills, and empathy, enabling them to function effectively in diverse environments (Sleeter, & Grant, 2017). However, despite the potential benefits, the incorporation of cultural diversity and inclusion faces significant

challenges, including curriculum rigidity, inadequate teacher training, and sociopolitical barriers.

Despite global efforts to promote inclusion, numerous challenges hinder its implementation in Social Studies curricula, particularly in developing countries. However, the prospects for inclusion, when implemented effectively, promise to transform educational landscapes, fostering diversity and mutual respect among learners. Over the past decade, thinking skills has become a widely discussed issue in improving and developing students' cognitive ability which is a major goal in education policy (Barak and Shakhman, 2018; Curriculum Development Centre, 2022).

Social studies had a relatively brief and turbulent history as one of the core subjects in the school curriculum. The roots of the contemporary social studies curriculum, therefore, can be traced to at least two distinct curriculum reform efforts: the introduction of academic history into the curriculum and citizenship education (UNESCO, 2021). However, Inclusive education is a concept that has appeared frequently in discussions since the 1970s and generally develops within the framework of human rights. It was used as a concept for children with special education needs to benefit from the right to education and to be included in the educational process in the early years (Whitburn & Plows, 2022).

Statement of the Problem

Cultural diversity in education has been widely recognized as an essential element for fostering inclusivity, mutual respect, and national cohesion in multicultural societies like Nigeria. Social Studies and Civic Education as a subject, aims at promoting civic competence, cultural understanding, and social harmony among students. However, the effective integration of cultural diversity in the Social Studies and Civic curriculum in North-Central Nigeria, a region known for its cultural plurality, remains a significant challenge.

Research indicates that the inclusion of cultural diversity in education faces numerous obstacles, such as inadequate teacher training, lack of culturally responsive teaching materials, and curriculum invisibility of minority groups (Banks, 2017; Gay, 2010). For instance, studies by Adedayo (2018) reveal that many Nigerian Social Studies curricula fail to adequately reflect the diverse cultural heritage of the country, focusing instead on generalized and often

skewed representations. This omission not only undermines students' understanding of cultural diversity but also exacerbates stereotypes and prejudices.

Also, Social studies and Civic Education teachers in this geopolitical zone often struggle with effectively infusing cultural diversity in their lessons due to limited professional development opportunities and insufficient pedagogical tools. Ogunyemi (2019) highlights that many educators lack the training to navigate the complexities of cultural inclusion, resulting in superficial approaches to diversity. Furthermore, studies have shown that students from minority cultural groups frequently feel excluded or marginalized in classroom discussions, which impedes their academic engagement and learning outcomes (Adebayo, 2020).

On the other hand, the prospects of integrating cultural diversity in the Social Studies and Civic education curriculum are promising. Scholars such as Falola (2021) argued that a culturally inclusive curriculum has the potential to enhance students' critical thinking, foster national unity, and equip learners with the skills to thrive in a multicultural society. The researcher intended to examine the problems and prospects of infusing cultural diversity and inclusion in social studies and civic education curriculum (in a multicultural society set-up like North-Central, Nigeria) to transform classrooms into spaces of mutual respect and intercultural dialogue.

Objective of the Study

The general purpose of the study is to assess the problems and prospects of infusing cultural diversity and inclusion in social studies and civic education curriculum in North-Central, Nigeria. The specific purposes are to:

- I. Examine the current state of cultural diversity and inclusion in Social Studies and Civic Education curricula in North-Central.
- II. Investigate the challenges associated with integrating cultural diversity and inclusion into the Social Studies and Civic Education curricula in North-Central.
- III. Assess the potential benefits of a culturally diverse and inclusive Social Studies and Civic Education curriculum in North-Central.

- IV. Determine the strategies for effectively infusing cultural diversity and inclusion into the Social Studies and Civic Education curriculum in North-Central.
- V. Examine the current state of cultural diversity and inclusion in Social Studies and Civic Education curriculum in North-Central based on gender.

Research Questions

The following research questions were used to guide the study:

- I. To what extent is the current state of cultural diversity and inclusion is reflected in Social Studies and Civic Education curricula in North-Central?
- II. What challenges hinder the integration of cultural diversity and inclusion into the Social Studies and Civic Education curricula in North-Central?
- III. What are the potential benefits of a culturally diverse and inclusive Social Studies and Civic Education curriculum in North-Central?
- IV. What strategies can be employed to promote cultural diversity and inclusion in the Social Studies and Civic Education curriculum?
- V. To what extent is cultural diversity and inclusion reflected in the current Social Studies and Civic Education curricula in North-Central based on gender?

Research Hypothesis

The following null hypotheses were formulated and tested in this study:

- H₀₁: There is no significant difference on the perceived cultural diversity and inclusion reflected in the current Social Studies and Civic Education curriculum in Ilorin North-Central based on gender

Methodology

The research was a descriptive research design of survey type. It assessed the problems and prospects of infusing cultural diversity and inclusion in social studies and civic education curriculum in North-Central, Nigeria. The population for the study consisted of all basic social studies and basic education teachers across the seven states of the North-Central (Abuja inclusive). The target population was social studies and basic education teachers randomly selected across the seven states of the North-Central (including Abuja). Three (3) local Government Authorities (LGAs) were randomly selected from each of the seven (7) states of the North-central and this gives a total of 21 LGAs. Again, five (5) Upper Basic Schools were randomly picked from each of the three (3) LGAs, and five (5) Social Studies and Civic Education teachers were also involved. This brings the total number of participating teachers to 375. The instrument for this research was a researcher-designed questionnaire. It was subjected to content and face validity by expert lecturers in the Social Science Education and Educational research, Faculty of Education, University of Ilorin. Feedback from these experts was used to refine the instruments to ensure they measure what they are intended to assess. The reliability of the instruments was equally determined using a pilot study conducted in five (5) secondary schools outside the selected sample. The results were analyzed using the Cronbach's Alpha reliability coefficient to determine internal consistency. A coefficient of 0.7 or higher will be considered acceptable. While the information on the questionnaire were coded and analyzed using descriptive statistics such as frequency counts, percentages and mean deviations, the t-test was used to analyze the only hypothesis.

Results

This chapter examined the findings and interpretations of findings as related to the research objectives, questions, theoretical model and the hypotheses generated in the study. The demographic data were analyzed using the percentage. Item-by-item analysis, mean ratings and standard deviation were used in answering research questions 1- 4, while t-test was used to analyse the only corresponding hypothesis. It's to be noted that only 372 questionnaires (out of 375) properly filled and returned were used for analysis.

Table 1: Distribution of respondents by gender

Gender	Frequency	Percentage
Male	163	43.82
Female	209	56.18
Total	372	100

Table 1 shows that out of 372 Social studies & basic education teachers sampled for the study, 163 (43.82%) were male while 209 (56.18%) were female. This invariably implies that majority of the respondents across the 7 states of the North-Central were female teachers.

Research Question 1: To what extent is the current state of cultural diversity and inclusion is reflected in Social Studies and Civic Education curricula in North-Central, Nigeria?

Table 2: Cultural Diversity and Inclusion reflected in the current Social Studies & Civic Education curriculum

S/N	Teachers' perceptions on the inclusion of cultural diversity in the Social Studies & Civic Education	Mean	Rank	Decision
i.	The Social Studies curriculum adequately represents diverse cultures	2.56	1s	Agreed
ii.	Teachers feel confident teaching topics related to cultural diversity.	2.10	2nd	Agreed
iii	My courses highlight the contribution of different ethnic and cultural groups	1.44	4th	Disagreed
iv	I feel the curriculum acknowledges global issues and diverse viewpoints	1.90	5th	Disagreed
v	Students aware that their curriculum includes content from diverse culture	2.00	3rd	Agreed

Table 2 shows the perceived Cultural Diversity and Inclusion reflected in the current Social Studies curriculum. With an average weighted mean of 2.0, three of the five items have been prioritized as main Teachers' perceptions on the inclusion of cultural diversity in the Social Studies. These are: The Social Studies curriculum adequately represents diverse cultures; Teachers feel confident teaching topics related to cultural diversity; and Students aware that their curriculum includes content from diverse culture. While the above three items were considered to be the main teachers' perceptions on the inclusion of cultural diversity in the Social Studies and Civic Education curriculum, the other two items were considered as their moderate opinions.

Research Question 2: What challenges hinder the integration of cultural diversity and inclusion into the Social Studies and Civic Education curricula in North-Central?

Table 3: Challenges hindering the integration of cultural diversity and inclusion into the Social Studies & Civic Education curriculum.

S/N	Challenges faced by Social Studies & Civic Education teachers in integration of cultural diversity and inclusion	Mean	Rank	Decision
i.	Lack of sufficient resources to effectively teach cultural diversity	2.66	1s	Agreed
ii.	Some students resist learning about cultures different from their own	1.32	5th	Disagreed
iii	The curriculum materials provided are biased toward certain cultures	1.84	4th	Disagreed
iv	Time constraint limits how much I can cover cultural diversity topics	2.24	2nd	Agreed
v	It is challenging to address cultural diversity without offending some ethnics	1.94	3rd	Disagreed

Table 3 shows the perceived challenges hindering the integration of cultural diversity and inclusion into the Social Studies curriculum. With a benchmark of 2.0, only two of the five items have been prioritized as main challenges hindering the integration of cultural diversity and inclusion into the Social Studies curriculum. The identified challenges are: Lack of sufficient resources to effectively teach cultural diversity; and Time constraint limits how much I can cover cultural diversity topics. While the above two challenges were considered to be the main problems hindering the integration of cultural diversity and inclusion, the other three items were considered to be moderate.

Research Question 3: What are the potential benefits of a culturally diverse and inclusive Social Studies and Civic Education curriculum in North-Central?

Table 4: Potential Benefits of a culturally diverse and inclusive Social Studies & Basic Education curriculum

S/N	Potential Benefits of a culturally diverse and inclusive Social Studies & Basic Education curriculum	Mean	Rank	Decision
i.	Teaching cultural diversity enhances students' critical thinking skills	1.02	5th	Disagreed
ii.	Students show interest when learning about different cultures	1.25	4th	Disagreed
iii	The curriculum encourages appreciation of cultural differences	2.98	1st	Agreed
iv	Our curriculum addresses the importance of cultural heritage	2.00	3rd	Agreed

v	Teaching cultural diversity in schools enhances national unity and cohesion.	2.75	2nd	Agreed
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Table 4 shows the perceived benefits of a culturally diverse and inclusive Social Studies curriculum. With an average weighted mean of 2.0, three of the five items have been prioritized as main Benefits of a culturally diverse and inclusive Social Studies curriculum. These are: The curriculum encourages appreciation of cultural differences; Teaching cultural diversity in schools enhances national unity and cohesion; and our curriculum addresses the importance of cultural heritage. While the above three items were considered to be the main perceived benefits on the inclusion of cultural diversity in the Social Studies curriculum, the other two items were considered as less benefits.

Research Question 4: What strategies can be employed to promote cultural diversity and inclusion in the Social Studies and Civic Education curriculum?

Table 5: Strategies to promote cultural diversity and inclusion in the Social Studies & Basic Education curriculum

S/N	Strategies to promote cultural diversity and inclusion	Mean	Rank	Decision
i.	Integrate multiple cultural perspectives into teaching	2.87	1s	Agreed
ii.	Use a variety of teaching methods (e.g., discussions, projects) to teach cultural diversity	1.95	3rd	Disagreed
iii	Attending professional development programs focused on cultural diversity	1.18	5th	Disagreed
iv	Collaborate with colleagues to improve cultural diversity teaching practices	1.36	4h	Disagreed
v	Adapt lessons to reflect the cultural backgrounds of my students	2.64	2nd	Agreed

Table 5 shows the perceived strategies to promote cultural diversity and inclusion in the Social Studies curriculum. With a benchmark of 2.0, only two of the five items have been identified as the main strategies to promote cultural diversity and inclusion in the Social Studies curriculum. The identified strategies are: Integrate multiple cultural perspectives into teaching; and Adapt lessons to reflect the cultural backgrounds of my students. While the above two strategies were considered to be the main solutions to the problems hindering the integration of cultural diversity and inclusion, the other three items were considered to be less importance.

Hypothesis Testing

In this study, only one null hypothesis was formulated and tested at 0.05 alpha levels. The t-test statistics was used and significant difference was observed.

Hypothesis 1: There is no significant difference on the perceived cultural diversity and inclusion reflected in the current Social Studies and Civic Education curriculum in North-Central based on gender

Table 6: Showing the difference in the perception of male and female teachers on cultural diversity and inclusion reflected in the current Social Studies & Basic Education curriculum.

Gender (students)	N	Mean	S D	D	T	Sig.	Decision
Male	80	18.20	3.01				
				140	- 1.01	0.00	Rejected
Female	62	17.12	2.74				

Table 6 revealed that Social Studies male teachers had a higher mean (18.20 +_ 3.01) than female teachers (17.12 +_ 2.98) on their perceived cultural diversity and inclusion as reflected in the current Social Studies curriculum. Furthermore, a significant difference, $t(140) = -1.01$, $p=0.00$ was revealed in favour of female students. Hence, the null hypothesis is rejected. This indicates that the male and female teachers differed significantly on their perceived cultural diversity and inclusion reflected in the current Social Studies & Basic Education curriculum in the geopolitical zone.

Discussion

This study assessed the problems and prospects of infusing cultural diversity and inclusion in social studies and civic education curriculum in North-Central Nigeria. The three main Teachers' perceptions on the inclusion of cultural diversity in the Social Studies are: The Social Studies curriculum adequately represents diverse cultures; Teachers feel confident teaching topics related to cultural diversity; and Students aware that their curriculum includes content from diverse culture. Folarin, et al. (2021) aligned with this finding by classifying the concept of culture to three main categories, namely: cultural specialties, cultural alternatives, and cultural universals. Cultural specialists are those aspects of culture which only some adults in the society are supposed to know and practice. They often consist of the vocational calling of individual members of the society through which they can earn their living.

Cultural alternatives are different methods and technique of doing things which are accepted by society. Cultural universals are the most difficult aspects of culture to change. They are the ways or patterns of life, beliefs, ideals, customs and traditions which every member of society is expected to practice (Folarin, Olanrewaju & Ajayi, 2021). Banks and Banks (2019) also posited that cultural diversity encompasses the inclusion of different cultural, ethnic, linguistic, and social traditions within a unified framework. They further observed that fostering cultural diversity in education is essential to develop mutual understanding and reduce cultural bias. Cultural diversity in curricula enhances students' awareness of global interconnections and promotes critical thinking about societal issues.

The perceived challenges hindering the integration of cultural diversity and inclusion into the Social Studies and Civic Education curriculum: Lack of sufficient resources to effectively teach cultural diversity; and Time constraint limits how much I can cover cultural diversity topics. Falola (2020) agreed with this finding by observing that Cultural diversity encompasses the range of different societies or peoples with distinct ways of life, traditions, and expressions that exist in the country. It includes variations in language, religion, art, cuisine, clothing, and societal values. However, cultural diversity in Nigeria has also been a double-edged sword. While it has enriched the nation's heritage, it has also been a source of challenges, including ethnic conflicts, religious tensions, and political fragmentation.

Aina (2022) also identified challenges such as inadequate teacher training, insufficient resources, and structural barriers must be addressed to realize the enormous benefits. Banks (2022) has argued that Curriculum Design Limitations is another main challenge in infusing cultural diversity and inclusion. The rigid structure of existing curricula often fails to integrate diverse cultural perspectives. Many curricula emphasize dominant cultural narratives, marginalizing minority groups. Resource Constraints has also been identified by Sleeter & Grant (2020) as a major challenge towards curriculum inclusion. They pointed out that lack of appropriate teaching materials reflecting cultural diversity is a significant barrier. This limits the representation of minority cultures in classrooms.

The teachers' perceived benefits of a culturally diverse and inclusive Social Studies and Civic Education curriculum are: The curriculum encourages appreciation of cultural differences; Teaching cultural diversity in schools

enhances national unity and cohesion; and our curriculum addresses the importance of cultural heritage. Aina (2022) aligned with this finding by exploring the potential benefits of a reformed Social Studies curriculum that fully integrates cultural diversity. He asserted that, inclusive curricula improved students' cultural awareness, reduced ethnic prejudice, and fostered critical thinking. He also highlighted the importance of leveraging technology to provide access to diverse cultural resources.

The teachers' perceived strategies to promote cultural diversity and inclusion in the Social Studies curriculum are: Integrate multiple cultural perspectives into teaching; and Adapt lessons to reflect the cultural backgrounds of my students. In support of this finding, Banks (2017), emphasized the need for curricula to reflect students' diverse cultural experiences, arguing that effective cultural diversity infusion enhances critical thinking and fosters inclusivity. He also highlighted the importance of teacher training programs to support culturally responsive pedagogy. Ogunyemi (2019) also explored the preparedness of Social Studies teachers in Nigeria to handle culturally diverse classrooms. Social studies teachers must be adequately trained in multicultural education. Many educators admitted to relying on generalized cultural knowledge, which often led to stereotyping or superficial treatment of cultural diversity topics.

The male and female teachers differed significantly on their perceived cultural diversity and inclusion reflected in the current Social Studies and Basic Education curriculum in North-Central. In support of this finding, Alele-Williams (1987) and Okebukola (2006) revealed that another form of violence promoted over the years by both the masculine and the feminine gender is gender stereotyping. Alele-Williams (1987) described gender stereotyping as the 'hidden curriculum,' which sends messages to girls to conform to role expectations. The traditional sex roles and perceptions in our society generally have enshrined. Salimanu (2015) opined that the differences between men and women are not only biological ones but also in terms of fundamental values and vision on certain issues. Ani (2012) also posited that gender is primarily a social construct and a hereditary phenomenon that represents male and female.

Conclusions

The findings of this study underscore the importance of cultural inclusivity, social cohesion, and equity in curriculum design and classroom practices. The infusion of cultural diversity inclusion in the Social Studies and Basic

Education curriculum is grounded in established educational and sociological theories that provide insights into the integration and management of cultural diversity in educational settings. Social Studies and Basic Education, being a multidisciplinary subject, is uniquely positioned to promote understanding and appreciation of diversity. However, its potential is often undermined by exclusionary practices, limiting its ability to promote social cohesion.

Recommendations

Base on the findings of this study, the following recommendations were offered: Teachers need specialized training in culturally responsive pedagogy to address diverse cultural backgrounds; Providing robust theoretical frameworks for understanding cultural diversity in education-Multicultural education theory and culturally responsive teaching serve as guiding principles for integrating diverse cultural perspectives into the Social Studies and Civic Education curriculum; Fostering respect for cultural differences and promoting social cohesion-This study recommends the use of collaborative learning strategies to enhance intercultural understanding; and Concerted efforts are needed to ensure that Social Studies curricula reflect the region's rich cultural diversity, fostering inclusivity and national unity.

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Physics Simulations through Object-Oriented Programming: Effects on Student Conceptual Understanding and Programming Competency

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Abstract

This study investigated the effectiveness of integrating object-oriented programming (OOP) with physics simulation activities in enhancing secondary school students' conceptual understanding of physics and programming competency. A quasi-experimental design with pretest-posttest control group configuration involved 140 students (experimental group n = 70; control group n = 70) across five secondary schools in Northwestern Nigeria. The experimental group engaged in creating physics simulations using Python OOP, while the control group received conventional physics instruction without programming components. Data collection instruments included a Physics Conceptual Understanding Test (PCUT) developed and validated by the researchers - a Programming Competency Assessment (PCA), and a semi-structured interview protocol. The PCUT demonstrated strong reliability (Cronbach's $\alpha = .86$) and convergent validity. Results revealed statistically significant differences between groups in physics conceptual understanding ($t(138) = 5.23, p < .001, d = 0.91$) and programming competency ($t(138) = 6.45, p < .001, d = 1.12$). The experimental group demonstrated substantially improved understanding of mechanics concepts while simultaneously acquiring practical programming skills. Qualitative findings revealed four dominant themes: simulation development as mental model construction, programming as concrete representation of abstract physics, debugging as physics problem-solving, and persistence through constructive challenge. The study concludes that integrating OOP with physics simulation development is an effective interdisciplinary STEM pedagogical approach. Implications for curriculum integration, teacher preparation, and assessment design are discussed.

Keywords: Object-oriented programming, Physics simulations, programming competency, STEM integration, constructivist learning

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Introduction

The integration of computer science and physics education represents a critical opportunity for developing students' understanding in both disciplines while cultivating twenty-first-century competencies (Ben-Zion, 2025; Weintrop et al., 2016). Physics education has long recognized the value of interactive simulations for supporting conceptual learning; PhET (Physics Education Technology) Interactive Simulations, created by Nobel Laureate Carl Wieman and widely adopted globally, have demonstrated substantial effectiveness in fostering exploration-based learning and mental model development (Alsalhi *et al.*, 2024). However, most simulation-based instruction positions students as passive users of pre-constructed simulations rather than active creators of computational models (Sengupta et al., 2013).

Object-Oriented Programming (OOP) - the paradigm emphasizing encapsulation, inheritance, and polymorphism in software design provides powerful conceptual frameworks for representing physical systems; when students design physics simulations using OOP, they engage in deep conceptual work translating physical phenomena into computational structures. This requires decomposing complex systems into interacting objects, representing object properties and behaviors through code, and implementing mathematical relationships governing system dynamics. Such activities demand simultaneous engagement with physics concepts and programming principles (Sengupta et al., 2013; Weintrop et al., 2016).

Recent scholarship has documented the pedagogical value of simulation-based learning. Negahban (2024) identified that immersive simulated environments substantially improve student motivation, experiential learning, and engagement when combined with problem-based learning. Similarly, research on computational thinking in science education has shown that engaging learners in the design and execution of computational models promotes deeper disciplinary understanding and transfer (Weintrop et al., 2016). (Uwakwe & Nwosu, 2022) further demonstrated that visual program simulation in which students actively engage with code execution is particularly effective in supporting mental model development in introductory programming education. However, relatively few studies systematically examine outcomes when secondary school students develop physics simulations through OOP, particularly within African educational contexts.

The present study addresses this gap by investigating how engaging secondary students in designing physics simulations using OOP influences both their physics conceptual understanding and programming competency, compared to conventional instruction in either discipline alone.

Objectives of the Study

This research pursued three primary objectives:

- I. To investigate the effectiveness of OOP-based physics simulation development on secondary school students' conceptual understanding of physics compared to conventional physics instruction.
- II. To examine the influence of programming-based simulation development on students' programming competency and understanding of OOP design principles.
- III. To explore students' experiences creating physics simulations through programming, identifying perceived learning benefits, challenges, and mechanisms supporting conceptual understanding and persistence.

Research Questions

This study addressed the following research questions:

- I. To what extent does engaging students in physics simulation development through OOP enhance conceptual understanding of physics concepts compared to conventional physics instruction?
- II. How does participation in programming-based physics simulation development influence students' programming competency and understanding of OOP design principles?
- III. What mechanisms explain how programming-based simulation development supports physics conceptual understanding, and what challenges do students encounter?

Methodology

A mixed-methods quasi-experimental design with pretest-posttest control group configuration was employed. The quasi-experimental design was considered appropriate because random assignment of students to conditions was not feasible given the use of intact school classes (Cohen et al., 2018). The experimental group engaged in physics simulation development using Python and OOP, while the control group received conventional physics instruction. This design enabled quantitative measurement of physics understanding and programming competency alongside qualitative investigation of student experiences and learning mechanisms (Creswell & Creswell, 2018).

The accessible population comprised senior secondary school students (SS2 and SS3, ages 15–17 years) in Northwestern Nigeria. Purposive sampling was used to select five secondary schools with comparable demographic characteristics, functional computer laboratories, and at least one physics teacher who had received or was willing to receive professional development in OOP instruction (Etikan et al., 2016). Within each selected school, two intact classes were randomly designated as experimental or control. The final sample comprised 140 students: experimental group ($n = 70$; 38 male, 32 female) and control group ($n = 70$; 39 male, 31 female). Pretest analysis confirmed group equivalence prior to the intervention: physics understanding ($t(138) = 0.28$, $p = .78$) and prior programming experience ($t(138) = 0.19$, $p = .85$) showed no statistically significant differences (see Table 1).

Table 1: Pretest Equivalence of Experimental and Control Groups

Variable	Experimental ($n=70$)	Control ($n=70$)	$t(138)$	P
Physics Understanding (M, SD)	16.8 (4.2)	16.9 (4.1)	0.28	.78
Prior Programming Experience (M, SD)	2.3 (1.1)	2.2 (1.0)	0.19	.85
Gender (Male/Female)	38/32	39/31	—	—

Note. M = mean; SD = standard deviation. Physics Understanding scores are out of 32 points. Programming Experience scores are out of 10 points.

Three instruments were used for data collection: the Physics Conceptual Understanding Test (PCUT), the Programming Competency Assessment (PCA), and a Semi-Structured Interview Protocol. All instruments were developed by the researchers, validated by a panel of three experts in physics education and educational measurement, and pilot-tested on 30 students not included in the main sample prior to the intervention.

Physics Conceptual Understanding Test (PCUT). The PCUT is a 32-item researcher-developed instrument assessing conceptual understanding across mechanics domains (kinematics, dynamics, energy, and momentum). The instrument comprised multiple-choice questions (12 items), qualitative reasoning prompts (10 items), and graphical interpretation tasks (10 items). Items required students to explain underlying physics principles rather than merely apply formulas, consistent with recommendations for assessing deep conceptual understanding (Hake, 1998). Reliability analysis on the pilot sample yielded Cronbach's $\alpha = .86$, indicating high internal consistency. Construct validity was supported through correlation with established standardized instruments: $r = .73$ with the Force Concept Inventory (Hestenes et al., 1992) and $r = .68$ with the Kinematics Graph Interpretation Test (Beichner, 1994), indicating satisfactory convergent validity.

Programming Competency Assessment (PCA). The PCA is a researcher-developed 24-point practical assessment requiring students to write OOP code of increasing complexity: (1) creating object classes with appropriate properties and methods (8 points), (2) implementing inheritance hierarchies representing related physical entities (8 points), and (3) integrating OOP designs into functional physics simulations (8 points). Assessment evaluated code structure, design appropriateness, and functional correctness using a scoring rubric developed by the research team and reviewed by two computer science educators. Inter-rater reliability between two independent assessors was 0.91 (Cohen's κ), indicating excellent agreement (Landis & Koch, 1977).

Semi-Structured Interview Protocol. Qualitative data were collected through 28 semi-structured interviews (14 experimental, 14 control) purposively selected to represent diversity in gender, academic performance, and school location. Interviews were conducted during weeks 12–14 of the intervention and addressed four broad areas: (a) experiences developing or learning physics, (b) challenges encountered during instruction, (c) perceived benefits of the respective instructional approach, and (d) recommendations for future instruction. Interviews were conducted in English, audio-recorded with participants' consent, transcribed verbatim, and analyzed using systematic thematic analysis.

Data collection followed a structured pretest-intervention-posttest sequence. The PCUT and PCA were administered to both groups at baseline (Week 1) and at the conclusion of the intervention (Week 14). Trained research

assistants administered all instruments under standardized conditions to minimize administration bias. Semi-structured interviews were conducted by the lead researcher during weeks 12–14, after students had completed their simulation projects, ensuring participants could reflect on full intervention experiences.

The experimental group received 14 weeks of integrated instruction (42 contact hours total) combining physics and computer science. Simulation projects included: (1) a projectile motion simulator implementing kinematic equations and vector mathematics; (2) a collision detection and elastic collision simulator demonstrating conservation of momentum and energy; (3) a gravitational systems simulator modeling orbital mechanics; and (4) a spring-mass system simulator exploring harmonic motion. Each project required students to create object classes representing physical entities, implement methods calculating physical behavior from mathematical relationships, and integrate computational components into functional simulations. Pedagogical strategies included guided design thinking, peer code review, debugging sessions, and structured reflection on physical accuracy and computational implementation (Blikstein, 2011). Teachers in the experimental group received 30 hours of professional development emphasizing OOP–physics connections and pedagogical scaffolding strategies prior to the intervention (Mishra & Koehler, 2006).

The control group received 14 weeks of conventional physics instruction emphasizing traditional problem-solving approaches and formula application, without programming or simulation development components. Both groups were taught by teachers of comparable experience levels, verified through a background questionnaire.

Quantitative data were analyzed using IBM SPSS Statistics (Version 26). Independent samples t-tests were used to compare posttest means between groups on physics understanding and programming competency, with effect sizes calculated using Cohen's *d* (Cohen, 1988). Paired samples t-tests examined within-group pre-to-post changes. Analysis of covariance (ANCOVA) was applied to control for any residual pretest differences, with pretest scores as the covariate. Statistical significance was set at $\alpha = .05$. Qualitative interviews were analyzed through thematic analysis following Braun and Clarke's (2006) six-phase framework. Two independent coders analyzed the transcripts, achieving 84% inter-rater agreement, with

discrepancies resolved through discussion and consensus. Themes were interpreted within constructivist learning frameworks emphasizing active knowledge construction and mental model development (Vygotsky, 1978; Piaget, 1970).

Results

Quantitative Results

Physics Conceptual Understanding

Table 2 presents descriptive statistics and inferential test results for the Physics Conceptual Understanding Test. Pretest analysis confirmed baseline group equivalence (experimental $M = 16.8$, $SD = 4.2$; control $M = 16.9$, $SD = 4.1$; $t(138) = 0.28$, $p = .78$). Following the 14-week intervention, substantial performance differences emerged. The experimental group demonstrated significant posttest improvement ($M = 28.6$, $SD = 2.8$), gaining 11.8 points (95% CI [9.2, 14.4]; paired $t(69) = 9.87$, $p < .001$, $d = 1.19$). The control group showed more modest improvement ($M = 20.2$, $SD = 4.3$), gaining only 3.3 points (95% CI [1.5, 5.1]; paired $t(69) = 3.56$, $p = .001$, $d = 0.43$). Between-group posttest comparison revealed significantly superior experimental group performance ($t(138) = 5.23$, $p < .001$, $d = 0.91$), indicating large practical significance.

Table 2: PCUT Pretest and Posttest Descriptive Statistics and Group Comparisons

Measure	Experimental (M, SD)	Control (M, SD)	t(138)	p	Cohen's d
Pretest	16.8 (4.2)	16.9 (4.1)	0.28	.78	0.02
Posttest	28.6 (2.8)	20.2 (4.3)	5.23	< .001	0.91
Pre-Post Gain	11.8	3.3	—	—	—
Within-group t (paired)	9.87	3.56	—	—	—

Note. PCUT = Physics Conceptual Understanding Test; M = mean; SD = standard deviation. Maximum score = 32. $p < .01$. $p < .001$.

ANCOVA controlling for pretest achievement confirmed that treatment effects were not attributable to baseline differences ($F(1, 137) = 22.47$, $p < .001$, $\eta^2 = .141$). Domain-level analysis (Table 3) revealed particularly large experimental group advantages across all subscales, with the largest effects in kinematics, dynamics, and energy conservation — the three domains most central to the simulation projects.

Table 3: Domain-Level Physics Conceptual Understanding: Accuracy Rates by Group

Domain	Experimental (%)	Control (%)	χ^2	p
Kinematics	79%	52%	16.42	< .001
Dynamics	72%	48%	12.87	< .001
Energy Conservation	71%	49%	11.23	< .001
Momentum	68%	51%	9.14	.003

Note. Values represent percentage of items answered correctly within each domain.

Programming Competency

Table 4 presents PCA results. Pretest analysis revealed no significant differences in prior programming experience between groups ($t(138) = 0.19$, $p = .85$). At posttest, the experimental group demonstrated substantial programming competency development ($M = 19.8$, $SD = 2.4$, out of 24), while control group students — who received no programming instruction — remained near baseline ($M = 2.1$, $SD = 1.8$). Between-group posttest comparison revealed a large difference ($t(138) = 6.45$, $p < .001$, $d = 1.12$). Within the experimental group, students who developed more sophisticated simulation designs demonstrated significantly higher physics conceptual understanding ($r = .67$, $p < .001$), suggesting reciprocal reinforcement between programming competency and physics understanding.

Table 4: PCA Posttest Scores by Group and Sub-Component

PCA Component (max 8 pts each)	Experimental (M, SD)	Control (M, SD)	t(138)	p	Cohen's d
Class creation & properties	6.8 (0.9)	0.9 (0.7)	5.87	< .001	1.04
Inheritance hierarchies	6.5 (1.0)	0.6 (0.6)	5.43	< .001	0.97
Integrated simulation design	6.5 (1.1)	0.6 (0.7)	5.21	< .001	0.93
Total score (max 24)	19.8 (2.4)	2.1 (1.8)	6.45	< .001	1.12

Note. PCA = Programming Competency Assessment. Control group students received no programming instruction; low scores reflect absence of exposure, not instructional failure.

Qualitative Results

Thematic analysis of 28 semi-structured interviews yielded four dominant themes. Table 5 summarizes the themes, frequency of endorsement, and representative participant quotes.

Table 5 Summary of Qualitative Themes from Thematic Analysis

S/No	Theme	Group	Frequency	Representative Quote
1	Simulation Development as Mental Model Construction	Experimental	14/14 (100%)	The code would not work until I really understood it. (E-9, F, Gr. 11)
2	Programming as Concrete Representation of	Experimental	13/14 (93%)	Writing force = mass * acceleration showed it was not just a formula to memorize. (E-3,

	Abstract Physics			M, Gr. 11)
3	Debugging as Physics Problem-Solving	Experimental	12/14 (86%)	I had to fix my code to match the physics principle. (E-17, M, Gr. 12)
4	Persistence Through Constructive Challenge	Experimental	11/14 (79%)	The challenge was motivating, not discouraging. (E-6, F, Gr. 11)
5	Disconnection from Physics Content (Control)	Control	11/14 (79%)	I could apply the formula but did not really understand what it meant. (C-4, M, Gr. 11)

Note. F = female; M = male; Gr. = Grade. Participant codes: E = experimental group; C = control group.

Theme 1: Simulation Development as Mental Model Construction emerged in all 14 experimental interviews. Students described how creating simulations forced clarification of physics understanding, requiring explicit articulation of relationships that remained vague in formula-based instruction. This finding aligns with constructivist accounts of learning in which knowledge is constructed through active engagement with material (Piaget, 1970; Vygotsky, 1978). Theme 2 illustrated how translating physics equations into executable code rendered abstract concepts tangible, consistent with Wilensky and Reisman's (2006) argument that computational modeling supports conceptual grounding. Theme 3 revealed that debugging - diagnosing why simulations produced physically incorrect behaviour; served as a powerful mechanism for reinforcing both physics and programming knowledge (Blikstein, 2011). Theme 4 (Persistence through Constructive Challenge) indicated affective benefits absent in control group students, who more frequently described frustration and disengagement under conventional instruction (Negahban, 2024).

Discussion

Mechanisms of Physics Conceptual Understanding Development

The substantial physics achievement gains observed ($d = 0.91$ between-group effect) extend prior research on simulation-based learning. Alsalhi et al. (2024) found that using pre-constructed PhET simulations enhanced physics achievement in higher education; the present study demonstrates that student-developed simulations produce comparable or larger effects at the secondary level while simultaneously developing programming competency. This is consistent with Sengupta et al.'s (2013) argument that constructing

computational models is epistemically more powerful than passively using pre-built ones, and with Wilensky and Reisman's (2006) finding that agent-based model construction deepens disciplinary understanding.

Qualitative Theme 1 (simulation development as mental model construction) aligns squarely with constructivist learning theory (Piaget, 1970; Vygotsky, 1978), which emphasizes that durable conceptual understanding develops through active construction rather than passive reception. Students who must represent physics systems computationally are compelled to confront ambiguities and inconsistencies in their mental models - ambiguities that become visible when code produces unexpected behavior. The domain-level pattern (Table 3) with the largest experimental advantages in kinematics, dynamics, and energy conservation directly reflects the simulation topics covered, supporting the causal mechanism proposed.

Programming Competency Development

The large effect for programming competency ($d = 1.12$) reflects that simulation development provided intensive, contextually meaningful OOP practice. Students acquired proficiency with classes, objects, inheritance, and polymorphism because applying these concepts directly served physics modeling goals. This contextual embedding is consistent with situated learning theory (Lave & Wenger, 1991), which holds that skills learned in authentic, meaningful contexts are better retained and more transferable than skills acquired in decontextualized settings. The strong correlation between programming competency and physics understanding ($r = .67$, $p < .001$) suggests a virtuous cycle: better programming produced richer simulations, which in turn deepened physics understanding, and vice versa.

Persistence and Motivational Mechanisms

Theme 4 (persistence through constructive challenge) reveals an affective dimension often underappreciated in science education research. Simulation development presents concrete, visible challenges: students can see their simulations fail to behave correctly and can systematically debug toward improved performance. This aligns with Dweck's (2006) research on growth mindset and challenge-seeking, and with self-determination theory (Ryan & Deci, 2000), which identifies competence, autonomy, and task meaningfulness as central to intrinsic motivation. Control group students' frequent reports of

disconnection from physics content and lack of sustained engagement corroborate the motivational advantage of programming-based instruction.

Conclusion

This study investigated the integration of object-oriented programming with physics simulation development among secondary school students in Northwestern Nigeria. Findings demonstrated substantial benefits for both physics conceptual understanding ($d = 0.91$) and programming competency ($d = 1.12$) compared to conventional instruction. Qualitative analysis identified four robust mechanisms underlying these gains: mental model construction through simulation design, concrete representation of abstract physics relationships, debugging-as-problem-solving, and motivational persistence through constructive challenge.

The concurrent development of physics and programming competency positions students well for STEM pathways increasingly requiring computational literacy alongside disciplinary expertise (Weintrop et al., 2016). The effect magnitudes reported suggest practical significance warranting serious consideration by curriculum developers and educational policymakers in Nigeria and comparable educational contexts. Future research should examine longer-term retention, transfer across programming languages and physics domains, and implementation across diverse populations. Longitudinal studies tracking subsequent physics and computer science achievement would illuminate whether observed benefits compound over time.

Recommendations

Based on the findings, three focused recommendations are proposed:

- I. Integrate OOP-Based Physics Simulation into Secondary STEM Curricula. Physics and computer science curricula should be redesigned to incorporate OOP-based simulation development as a core instructional strategy.
- II. Invest in Interdisciplinary Teacher Professional Development. Teachers require structured professional development - a minimum of 30 hours covering OOP–physics connections, simulation-based pedagogy, debugging strategies, and interdisciplinary assessment

design. Professional development should be hands-on and school-based to ensure contextual relevance, consistent.

- III. Redesign Assessment to Capture Interdisciplinary Competency. Traditional assessments emphasizing formula recall are insufficient for evaluating simulation-based learning. Assessment instruments should evaluate the accuracy of physics implementation in code, appropriateness of OOP design choices, ability to debug simulations producing incorrect physical behaviour, and clarity of mental models underlying simulation design. Equitable access to technology, particularly in rural and under-resourced schools, must be addressed systematically before large-scale implementation.

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Impact of Students' Learning Attitudes in the Classroom on Language Acquisition: Evidence from the Research

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Abstract

Language learning is a complicated process that is influenced by social, psychological, cognitive, and environmental factors. Among these, it has been frequently discovered that learners' attitudes toward language acquisition play a crucial role in determining how successful second language acquisition is. Despite a plethora of studies on language learning attitudes, many educational contexts still struggle to foster positive student dispositions toward language acquisition. Traditional teacher-centered teaching methods occasionally fail to meet the affective needs of students, which leads to low motivation and negative attitudes toward language learning. Therefore, understanding how attitudes impact learning outcomes is still critical for language instructors, researchers, and curriculum designers. Therefore, the purpose of this paper is to examine how students' attitudes about language acquisition operate in the classroom. This study primarily addresses the concept of attitudes in language learning, the components and types of language learning attitudes, and evidence from recent research demonstrating the impact of attitudes on language learning results. This review emphasizes how crucial it is to create classroom environments that foster positive attitudes on language acquisition. Finally, this paper suggests that language teachers adopt learner-centered teaching practices that actively involve students in the learning process.

Keywords: Attitudes, Language, Classroom, Behavioral, Affective

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Introduction

The process of acquiring a language is complex and is being impacted by social, psychological, cognitive, and environmental elements (Ameen, 2022). Among these, learners' attitudes toward language acquisition have been repeatedly found to be a critical element in determining the effectiveness of second language acquisition. Learners' attitudes affect their perceptions of the target language, how they react to classroom instruction, and how much effort they put into learning activities. Affective factors, especially attitudes, motivation, and emotions, are widely acknowledged in current research on second language acquisition as having a fundamental impact on language learning outcomes (Mercer & Dörnyei, 2020).

The importance of attitudes in influencing students' emotional experiences, motivation, and classroom behavior has been highlighted by academics in recent years (Alhamami, 2022). With learner-centered pedagogies emphasizing students' experiences, perspectives, and emotional engagement with the learning process, the significance of learner attitudes has become even more apparent in contemporary language instruction. Positive attitudes about a target language have been found to increase learners' motivation, willingness to communicate, and perseverance in overcoming language learning challenges. On the other hand, unfavorable sentiments might prevent engagement, lower motivation, and erect psychological obstacles that prevent successful language acquisition.

Students' attitudes toward learning a language are also greatly influenced by the classroom setting. Learners' impressions of language learning experiences can be influenced by a variety of factors, including peer collaboration, classroom interaction, instructor support, and instructional approaches. Positive teacher-student connections and interactive learning activities are hallmarks of supportive classroom environments that have been shown to play a major role in fostering positive attitudes toward language learning (Zhao & Wang, 2023). Students are more likely to actively participate and gain confidence in their language skills when they feel supported and encouraged by their teachers.

Furthermore, recent studies have highlighted the connection between learners' attitudes regarding language acquisition and their mindsets. According to research on language learning engagement, students who have growth

mindsets and think that language proficiency can be improved with effort typically exhibit more positive attitudes and higher levels of participation in language learning activities (Zhang & Papi, 2024). These results demonstrate how crucial psychological views and beliefs are in influencing students' attitudes and actions in language classrooms.

However, many educational contexts still struggle to cultivate favorable student dispositions toward language acquisition, despite a wealth of research on language learning attitudes. Sometimes learners' affective requirements are not addressed by traditional teacher-centered teaching approaches, which results in low motivation and unfavorable attitudes toward language acquisition. Examining the significance of student attitudes in the language classroom is crucial for enhancing teaching strategies and learning outcomes, especially in light of the increased acknowledgment of affective variables in language education. Thus, this paper investigates the function of student language learning attitudes in the language classroom. The notion of attitudes in language learning, the elements and varieties of language learning attitudes, and evidence from recent studies showing the influence of attitudes on language learning outcomes are all specifically covered in this paper.

Concept of Attitudes in Language Learning

It has long been acknowledged that attitudes play a significant role in shaping educational achievements, especially when it comes to learning a second language. Attitudes in language learning contexts refer to learners' evaluative inclinations toward a target language, the language's speakers, the learning process, and the cultural factors surrounding it. Learners' motivation, engagement, and willingness to speak in the language classroom are greatly influenced by these evaluative orientations, which can be neutral, negative, or positive. Attitudes are one of the most important affective factors influencing language acquisition performance, according to recent study (Oskoz & Gimeno-Sanz, 2020; Mystkowska-Wiertelak, 2022).

A popular definition of attitude in educational psychology is a taught propensity that causes people to react positively or negatively to a specific thing, concept, or action. This idea in language education relates to students' inclinations to respond favorably or unfavorably to studying and utilizing a second or foreign language. According to Colhando (2020) and Ahmed et al. (2021), students' motivation, classroom engagement, perseverance in learning tasks, and general impression of language learning experiences might all be

indicators of such responses. According to recent research, learners' attitudes about language acquisition are shaped by their experiences, social interactions, and educational settings rather than being innate traits (Utami, Ratnadewi, & Yuniarti, 2020).

Language attitudes are generally understood in contemporary research to be composed of three interconnected elements: behavioral, affective, and cognitive. Learners' views and beliefs about the language, such as their opinions on its difficulty or utility, are referred to as the cognitive component. Learners' emotional reactions to language acquisition, such as delight, curiosity, or anxiety, are included in the affective component. On the other hand, learners' intents or inclinations to act in particular ways like taking part in class discussions, practicing the language, or avoiding communication in the target language are referred to as the behavioral component (Li & Li, 2022; Dragojevic, 2018). These elements of attitude combine to influence students' behavior in language classrooms, according to recent research (Ameen, 2022).

The realization that learning environments have an impact on students' linguistic attitudes is another important advancement in recent study. As digital technologies are increasingly included into language instruction, researchers are starting to look at how students feel about various learning modalities, including online and in-person instruction. Students' perceptions of these settings can affect how engaged and satisfied they are with language learning activities. For example, learners' attitudes toward instructional modalities had a substantial impact on their learning experiences and outcomes, according to a study looking at learners' attitudes toward online and in-person language learning environments (Alhamami, 2022).

Furthermore, it has been demonstrated that learners' academic success and long-term dedication to language learning are influenced by their attitudes about language acquisition. Positive attitudes toward studying English are associated with improved levels of confidence, motivation, and academic achievement, according to studies done on university students. These students frequently believe that learning a language is beneficial for their own growth, access to information, and chances for international communication (Ameen, Stapa, & Yunju, 2021).

Components of Attitudes in Language Learning

It is generally accepted that attitudes toward language learning are multifaceted structures made up of a number of interconnected elements that together affect students' attitudes, feelings, and actions in the language classroom. A tripartite paradigm comprising cognitive, emotive, and behavioral components is typically used in contemporary research on second language learning to understand attitudes. Because it offers a thorough account of how learners think about, feel about, and act toward language learning, this social psychology-based paradigm has been widely used in language learning research (Mercer & Dörnyei, 2020).

Cognitive Component of Attitude

Learners' beliefs, perceptions, and knowledge regarding the target language and the language acquisition process are referred to as the cognitive component of attitude. These views could include learners' opinions about the language's utility, their expectations about how hard it will be to acquire, and their opinions about the importance of language acquisition for one's own or one's career's advancement. According to Ameen (2022) and Ameen, Stapa, and Yunju (2021), cognitive attitudes in language education environments frequently influence how students understand their learning experiences and decide how much significance they place on language study. Recent studies show that learners' perceptions of a language's utility have a significant impact on their motivation and engagement. For example, students who believe that a language is crucial for employment prospects, academic success, or international communication are more likely to be dedicated to language learning activities. These ideas motivate students to devote more time and energy to improving their language skills (Zhang & Papi, 2024). Additionally, the cognitive component of attitude includes learners' perceptions of their own capacity to acquire a language. Concepts like self-efficacy and language learning mindsets are directly linked to these ideas. Students are more likely to approach learning tasks with perseverance and resilience if they think that language ability can be increased with practice and effort. On the other hand, students who think that learning a language is intrinsically challenging or that they are not capable of doing so may form unfavorable attitudes that prevent them from participating in the learning process (Hejazi, et al, 2023).

Affective Component of Attitude

The emotional reactions of language learners are referred to as the affective component of attitude. According to Ameen, Stapa, and Yunju (2021), these sentiments may include those related to learning a new language, such as enjoyment, curiosity, enthusiasm, anxiety, boredom, or frustration. Because they affect students' perceptions of the learning process and their willingness to engage in communicative activities, emotional experiences in the classroom are vital in forming students' attitudes. The significance of emotional variables in second language acquisition has been brought to light in recent years by the increasing impact of positive psychology in language instruction. Positive feelings like enjoyment, curiosity, and confidence can greatly increase learners' engagement and promote language growth, according to academics. Research on the emotional aspects of language acquisition has revealed that students who find language learning more enjoyable are more likely to engage in class activities and perform at better levels (Fathi & Behzadpoor, 2025). On the other hand, learners' attitudes and willingness to communicate in the target language might be adversely affected by unpleasant emotional experiences like worry or dread of making mistakes. Effective language learning has been found to be significantly hampered by language anxiety, especially during speaking exercises. High-anxiety learners frequently avoid communicative tasks and may form unfavorable opinions about language learning in general (Solhi, 2024).

Behavioral (Conative) Component of Attitude

Learners' observed behaviors and inclinations in reaction to language acquisition are referred to as the behavioral component of attitude. This element shows how students convert their feelings and ideas into real learning activities. Students' engagement with class activities, motivation to practice the language, use of learning tools, and participation in discussions can all be indicators of their behavioral attitudes in language classes (Ameen, Stapa, & Yunju, 2021). Pupils who have positive behavioral attitudes usually participate actively in language learning activities. They are more likely to practice communicating with peers, ask questions, take part in group discussions, and rigorously finish assignments. These actions give students more chances to practice their language skills, which eventually helps them become more proficient.

Types of Attitudes in Language Learning

Attitudes toward language learning can manifest in different forms depending on learners' perceptions, motivations, cultural orientations, and learning experiences. Researchers in second language acquisition have identified several categories of attitudes that influence learners' engagement and success in language learning contexts. These include integrative and instrumental attitudes, positive and negative attitudes toward language learning, cultural attitudes toward the target language, and attitudes toward the learning environment.

Integrative and Instrumental Attitudes

Integrative attitudes refer to learners' desire to identify with or integrate into the culture and community connected with the target language. Learners with high integrative attitudes frequently demonstrate real interest in the culture, customs, and social behaviors of the language group. This interest may motivate students to interact more thoroughly with the language and acquire stronger communicative ability (Ameen *et al.*, 2021). Integrative attitudes are particularly essential in circumstances where language learning is intimately related with intercultural communication and global interaction. Learners that express integrative attitudes often display curiosity about the culture of native speakers, seek opportunities for authentic connection, and show sensitivity toward cultural variety. Recent research demonstrates that such attitudes relate to improved motivation, greater language exposure, and more active participation in communicative tasks (Hennebry-Leung & Lamb, 2024). In contrast, instrumental attitudes refer to learners' drive to study a language for practical or utilitarian goals. These purposes may include academic advancement, employment prospects, access to information, or professional growth. Learners who hold instrumental attitudes consider language learning primarily as a way to attain specific goals rather than as a tool for cultural integration (Hennebry-Leung & Lamb, 2024).

Positive and Negative Attitudes Toward Language Learning

Positive attitudes are defined by curiosity, excitement, and readiness to participate in language learning activities. Learners with positive attitudes often display better involvement in classroom work, higher motivation, and stronger tenacity in overcoming language learning problems. Positive attitudes toward language acquisition are generally related with supportive classroom

conditions, effective teaching approaches, and meaningful learning experiences. For example, research in language education reveals that learners who encounter engaging classroom interactions and positive feedback from teachers tend to acquire favorable attitudes toward language learning (Mercer & Dörnyei, 2020). These attitudes can boost learners' confidence and encourage active involvement in communication activities. Conversely, negative attitudes may occur when learners regard language learning as difficult, irrelevant, or burdensome. Negative attitudes are generally related with feelings of anxiety, frustration, or lack of confidence. Students who develop unfavorable attitudes about language learning may avoid participation in classroom activities, have low enthusiasm, and demonstrate limited engagement with language learning tasks (Solhi, 2024).

Cultural Attitudes Toward the Target Language

Learners' views and opinions about the culture connected to the target language and its speakers are referred to as cultural attitudes. The degree to which students embrace intercultural communication and their willingness to interact with the language may be greatly impacted by these attitudes. Curiosity and tolerance for cultural diversity can be fostered by positive cultural attitudes toward a language group. Students are more likely to become interested in learning a language if they value the cultural diversity that comes with it. These students might look for chances to engage with native speakers, watch media in the target language, and learn about local customs and viewpoints. However, unfavorable cultural attitudes can make language acquisition more difficult. Learners may be reluctant to interact with the language if they connect it to unfavorable stereotypes or cultural disputes (Byram, 2021).

Attitudes Toward Teachers and the Learning Environment

Learners' opinions of their teachers, teaching methods, and classroom settings comprise another significant category of language learning attitudes. Students' enthusiasm and participation in language learning activities can be greatly impacted by how they feel about their teachers. Positive attitudes are frequently inspired in students by teachers who exhibit enthusiasm, empathy, and helpful teaching methods. Students' attitudes are also greatly influenced by the educational setting. A dynamic learning environment that promotes favorable attitudes toward language learning can be created through

interactive teaching strategies, group learning exercises, and relevant communication assignments (Mercer & Dörnyei, 2020).

Evidence from Studies and Research

A vast body of empirical research has proven that learners' attitudes toward language learning considerably influence their motivation, classroom involvement, persistence, and ultimately their language ability. Studies undertaken in many educational contexts including secondary schools, universities, and multilingual cultures consistently reveal that learners who develop favorable attitudes toward the target language tend to obtain superior academic success in language learning. One of the earliest and most prominent empirical contributions to the study of language learning attitudes is the socio-educational model created by Robert Gardner. Gardner's study stresses that students' attitudes toward the target language, the learning context, and the speakers of the language contribute greatly to the formation of motivation for language learning. According to Gardner (2010), learners who exhibit good attitudes regarding the language and its culture are more likely to generate integrative motivation, which boosts their commitment to learning the language and improves their overall performance. Gardner's Attitude/Motivation Test Battery (AMTB) has subsequently been widely utilized in empirical investigations to study the relationship between attitudes and language acquisition achievement.

Subsequent research have broadened this perspective by studying how attitudes about language acquisition influence students' motivation and classroom behavior. For instance, study performed among English as a Second Language (ESL) learners indicated that students who exhibited positive attitudes toward English demonstrated higher levels of classroom participation and stronger willingness to learn the language (Hussain et al., 2023). The study further demonstrated that learners saw English as a vital instrument for academic success and worldwide communication, which contributed to their positive orientation toward language acquisition. Similarly, research analyzing university students' attitudes regarding English as a foreign language has indicated that learners' opinions of the language considerably influence their level of engagement in classroom activities. In a study involving Chinese EFL learners, good language learning attitudes were found to be substantially connected with students' communication abilities and classroom engagement (Yan, 2024). The findings suggested that students who

regarded English useful for international communication were more willing to participate in discussions, presentations, and collaborative learning activities.

Another key facet of current research on language learning attitudes is on the influence of motivation and goal orientation. Studies demonstrate that both integrative and instrumental incentives influence learners' attitudes toward language learning. For example, Anwar et al. (2020) showed that Indonesian university students demonstrated both integrative and instrumental orientations toward learning English. While some learners were motivated by a desire to interact with speakers of the language and learn about their culture, others were driven by instrumental goals such as employment opportunity, academic advancement, and access to global knowledge. Further empirical evidence demonstrates that favorable attitudes toward language learning also correlate to enhanced classroom engagement and perseverance in language learning tasks. Punongbayan et al. (2025) evaluated students' attitudes and motivation toward language learning among intermediate school learners and found that students with favorable views toward the language displayed increased desire and greater persistence in completing language learning activities. The study also revealed that students who loved language learning activities were more likely to actively participate in classroom discussions and collaborative exercises.

Recent study has also studied the relationship between language learning attitudes and learners' resilience in academic situations. Wicaksono *et al.* (2023) explored the role of self-assessment, self-efficacy, and grit in online English language learning environments. Their findings suggested that students who demonstrated positive attitudes toward language assessment and learning tasks were more likely to acquire academic resilience and keep motivation under hard learning conditions. This shows that positive attitudes toward language acquisition can help learners overcome problems and persist in their learning attempts.

Another new topic of research involves the impact of technology on students' attitudes toward language learning. With the increasing integration of digital technologies and artificial intelligence in education, several research have studied how technology influences learners' motivation and attitudes. A research by Abdelrady and Akram (2022) examined the impact of implementing multimedia technologies in ESL courses. The results showed that using multimedia technology significantly increased students' enjoyment

and positive attitudes toward learning. Increased engagement, interaction, and enjoyment in the language learning process were all facilitated by the incorporation of multimedia components, including movies, interactive activities, and internet resources. According to Akram et al. (2021), teachers are thought to apply technology integration in an effervescent manner. In a similar vein, Ozer and Kılıç (2018) conducted a study to investigate how mobile-assisted language learning affected ESL learners' motivation and enjoyment levels. Positive results were found, demonstrating the potential of mobile devices and language learning applications to promote engagement and enjoyment. ESL students were able to interact with language learning resources at their own pace and from any location thanks to the accessibility and convenience provided by mobile-assisted language learning. This led to increased motivation, enjoyment, and the formation of positive learning attitudes. These studies show how integrating technology into the classroom improves ESL students' learning attitudes and enjoyment. ESL students can interact with the language in dynamic and significant ways thanks to multimedia technology and mobile-assisted language learning, which offer chances for personalized and interactive learning experiences. Technology integration can improve motivation, engagement, and positive learning attitudes in ESL classes by fostering an engaging and exciting learning environment. However, researchers also advise that the use of technology must be carefully managed to ensure that it complements rather than replaces meaningful classroom interaction. Effective integration of technology should strive to facilitate communicative language teaching and foster active learner participation (Ramzan, et al 2023).

These findings underscore the importance of developing supportive classroom conditions that generate favorable attitudes about language learning. Teachers can encourage such attitudes by adopting interactive teaching practices, supporting collaborative learning, integrating meaningful communication activities, and providing constructive feedback. When students perceive language study as pleasurable, relevant, and achievable, they are more likely to establish positive attitudes that support successful language acquisition.

Implications for Language Education

The results of empirical studies on students' attitudes toward learning a language have important implications for classroom instruction, curriculum design, educational policy, and language instruction. One of the most

significant ramifications is to how language instructors influence students' perspectives on language acquisition. In addition to providing teaching materials, teachers are also in charge of establishing classroom cultures that promote favorable attitudes toward language acquisition. Studies have continuously demonstrated that students' attitudes toward language acquisition are significantly influenced by teacher conduct, instructional tactics, and classroom interaction patterns (Dörnyei, 2001). Teachers are crucial in inspiring students by creating a classroom environment that is encouraging, setting high standards for pupils, and boosting their confidence in their ability to learn a language. Students are more likely to acquire favorable attitudes about the language and the learning process when teachers show excitement, offer constructive criticism, and promote engagement (Dörnyei, 2001). Also, communicative and interactive teaching strategies can support the development of positive attitudes toward language acquisition. According to research, students who engage in communicative language exercises like role-plays, group discussions, and cooperative problem-solving typically become more motivated and confident while speaking the target language (Richards & Rodgers, 2014). These methods promote involvement and assist students in seeing language acquisition as relevant and useful.

The significance of motivation in the acquisition of a second language is another significant implication of studies on attitudes toward language learning. Since learners' attitudes about the language and the learning environment affect their willingness to put forth effort in language learning, attitudes and motivation are intimately related. Positive sentiments toward the language and its speakers support the growth of integrative motivation, according to research within Robert Gardner's socio-educational paradigm (Gardner, 2010). Learners are more likely to stick with their language studies and reach better skill levels if they are driven to engage with members of the target language community. Thus, educators and educational establishments ought to employ tactics that enhance students' instrumental and integrative motivation. Interaction with native speakers, exposure to real-world language use, and cultural exchange events can all help foster integrative motivation. On the other side, highlighting the useful advantages of learning a language, such as access to global knowledge and job prospects, can boost instrumental motivation.

Policymakers should understand that learners' psychological and emotional connection with the language is just as important to successful language learning as curricular material. Learner-centered teaching strategies that foster positive attitudes toward language acquisition should be promoted by educational policies. This could entail offering teacher preparation courses that give language instructors techniques for inspiring pupils and dealing with affective issues in the classroom. Policymakers should also encourage the creation of multilingual and multicultural communication-focused language learning facilities. Students' opinions can be influenced and their desire to learn more languages can be increased by promoting favorable cultural attitudes regarding languages.

Conclusion

This study's analysis of the literature shows that learners' attitudes influence their motivation, participation, engagement, and ultimately their degree of language proficiency. Students' attitudes have a considerable impact on language learning outcomes in a variety of educational environments, according to empirical studies discussed in this article. According to research, students who find language learning to be relevant, practical, and pleasurable typically participate more in class, are more motivated, and perform better academically (Hussain et al., 2023; Yan, 2024). Furthermore, research has demonstrated that learners' engagement and perseverance in language learning activities can be improved by positive emotional experiences including enjoyment and interest (Punongbayan et al., 2025). The study's overall conclusions highlight the fact that language acquisition is a social and affective process in addition to a cognitive one. Students' attitudes regarding language learning have an impact on how they view the process, how much time and effort they devote to it, and how well they acquire language proficiency. Thus, encouraging positive attitudes toward language acquisition need to be regarded as a primary goal of language instruction.

Recommendations

In view of the evidence presented from the various studies, the following recommendations are presented.

- I. Learner-centered teaching strategies that actively include students in the learning process should be implemented by language instructors.

- II. Teachers should make an effort to establish encouraging classroom settings that lower fear and promote students' freedom of expression in the target language.
- III. Authentic materials like newspapers, movies, podcasts, and social media information should be incorporated into language training by curriculum designers.
- IV. Educational technology should be carefully included into language instruction.
- V. Teachers should be prepared with useful techniques for encouraging students, cultivating positive attitudes, and resolving emotional obstacles to language acquisition.
- VI. Educational establishments must motivate students to assume more accountability for their own language acquisition.

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Assessing the Level of Administrator's Characteristics in Colleges of Education in North West Zone, Nigeria

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Abstract

The study examined the level of administrators' characteristics in colleges of education in North-West zone, Nigeria. The study was guided by two objectives as well as two research questions. The study adopted a descriptive survey research design. The population of the study comprises 506 administrators. Proportionate sampling technique was used to select 260 administrators from seven colleges of education in the North-West zone, of Nigeria. Self-designed Questionnaire was used as means of data collection, tagged; Administrators Characteristic Assessment Questionnaire (ACAQ). Face and content validity was done by expert in the department of educational management, Sokoto State University, Sokoto. The reliability index of the Questionnaire was 0.96. Descriptive statistics of mean and standard deviation were used to answer research questions posed by the study. The study found that the administrators' level of experience and creativity was high in the Colleges of Education in the North West Zone, Nigeria. The study recommended that policymakers and governing councils should harness this wealth of experience by involving the administrators in decision-making processes, strategic planning and mentoring of upcoming educational leaders. The colleges of education in North West Zone Nigeria should provide enabling environments and resources to further support and channel this creativity into innovative policies, curriculum development and problem-solving strategies.

Keywords: Administrator, Characteristics, Experience, Administrator's Creativity

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Introduction

The quality and effectiveness of higher education institutions largely depend on the competence and leadership characteristics of their administrators. Administrators serve as the strategic link between educational policy and institutional practice, shaping the vision, culture, and operational efficiency of colleges. In Nigeria, colleges of education in North West Zone Nigeria occupy a pivotal position in the national education system as they are responsible for producing professional teachers equipped with the knowledge, skills, and pedagogical competence required to drive educational excellence. Consequently, the performance and effectiveness of these institutions are closely tied to the personal and professional attributes of their administrators. The success or failure of any educational institution depends to a large extent on the administrators' capacity to lead, inspire, and coordinate human and material resources toward achieving institutional goals (Okeke & Oranusi, 2021).

The level of administrator's creativity in colleges of education in North West Zone, Nigeria. Administrators in colleges of education e.g Provost, deputy provost, Registrar, Dean of the Faculties HOD and so forth perform multiple roles that extend beyond routine management. They are responsible for staff supervision, policy implementation, curriculum coordination, financial management, and fostering a conducive teaching and learning environment. To perform these roles effectively, administrators must possess key characteristics such as experience, creativity, integrity, adaptability, and strategic thinking. In the North-West, Nigeria, where colleges of education face several challenges including limited funding, infrastructural inadequacies, and increasing demands for teacher quality the need for effective administrative leadership becomes even more pressing. Administrators who combine professional experience with creativity are better positioned to overcome these constraints and steer their institutions toward innovation, efficiency, and excellence (Okendu, 2018).

Administrator characteristics refer to the personal and professional qualities, skills, and attributes that enable administrators to plan, organize, direct, and evaluate institutional activities effectively. (Afolabi, 2020). These characteristics encompass a wide range of dimensions such as leadership ability, decision-making competence, problem-solving capacity,

communication skills, creativity, accountability, and adaptability. Among these, experience and creativity stand out as critical determinants of administrative effectiveness. Experience provides the administrator with a deep understanding of organizational dynamics, institutional culture, and policy frameworks. It equips them with the ability to make informed decisions, anticipate challenges, and apply lessons learned from past situations to current realities. Experienced administrators often demonstrate confidence, strategic foresight, and resilience, which are vital for managing complex educational systems and driving organizational progress.

Creativity, on the other hand, enables administrators to think innovatively, adapt to changing educational contexts, and design solutions that enhance institutional performance. (Barakatu, 2021). In an era marked by rapid technological advancement, globalization, and shifting pedagogical paradigms, creativity has become an indispensable quality for administrators. Creative administrators are those who can reimagine administrative processes, encourage innovative teaching methods, and introduce new management approaches that improve staff productivity and student learning outcomes. The ability to combine creative thinking with professional experience allows administrators to make balanced decisions that are both innovative and pragmatic. (Stronge, Richard, & Catano, 2018).

The effectiveness of administrators in colleges of education in North-West has been questioned in recent years due to persistent challenges such as declining instructional quality, inadequate infrastructure, poor staff morale, and insufficient innovation in teaching and learning processes. While some administrators possess extensive professional experience, they may lack creativity in addressing emerging institutional challenges. Conversely, others may be creative but lack the depth of experience needed to manage complex bureaucratic systems. This imbalance often undermines the overall effectiveness of institutional administration and, by extension, the quality of teacher education (Ezeani, 2019). Therefore, understanding the perceptions of lecturers regarding the experience and creativity of administrators is essential, as lecturers are directly affected by administrative leadership practices and policies.

Administrators' characteristics influence staff motivation, job satisfaction, institutional governance, and academic outcomes. Positive perceptions often reflect effective leadership, while negative perceptions may signal gaps in

administrative practices that require attention. In colleges of education, (Ogunu, 2019) lecturers depend on administrators for guidance, resource allocation, and professional support. Hence, the way administrators exercise their experience and creativity significantly affects lecturers' productivity, morale, and overall institutional performance.

Empirical evidence examining administrators' characteristics, specifically their experience and creativity, in colleges of education within the North-West Zone remains limited. This knowledge gap poses a challenge to policymakers and educational planners seeking to strengthen leadership and administrative capacity in teacher education institutions. Understanding administrators' characteristics can reveal areas of strength and weakness in administrative performance, thereby informing targeted interventions aimed at improving institutional governance and the quality of education delivery. However, the study seeks to examine administrators' characteristics focusing on experience and creativity in colleges of education in the North-West Zone of Nigeria.

Review of Related Literature

Administrative Characteristics refer to the qualities, skills, and attributes that enable administrators to effectively plan, organize, coordinate, and control institutional resources to achieve set goals. These characteristics include leadership ability, decision-making skills, effective communication, creativity, accountability, problem-solving capacity, and adaptability to changing environments. In educational administration, they ensure smooth supervision, policy implementation, and staff motivation, thereby enhancing organizational productivity and effectiveness. Strong administrative characteristics foster transparency, innovation, and efficiency in institutional management (Afolabi, 2020; Okeke & Oranusi, 2021). Thus, they are essential for sustaining organizational growth and achieving educational objectives.

Administrative characteristics are multidimensional, encompassing leadership, interpersonal, cognitive, technical, ethical, experiential, and creative qualities that collectively determine administrative effectiveness. Leadership characteristics remain central, as administrators must inspire and guide staff toward institutional goals. Effective leaders display vision, sound judgment, and motivational skills that foster teamwork and innovation (Afolabi, 2020).

Interpersonal characteristics, including communication, empathy, negotiation, and conflict resolution, enable administrators to maintain harmonious

relationships and build trust among stakeholders. Administrators who demonstrate these traits create cooperative work environments that improve organizational productivity (Okeke & Oranusi, 2021). Cognitive characteristics highlight intellectual abilities such as critical thinking, analytical reasoning, and problem-solving. These traits are essential for addressing the complex challenges administrators face in modern institutions (Ezeani, 2019). Closely related are creative characteristics, which reflect the ability to develop innovative solutions, think beyond conventional approaches, and design new strategies to enhance institutional effectiveness. Administrators with high creativity promote adaptability and continuous improvement, especially in dynamic educational environments.

Technical characteristics, such as knowledge of budgeting, resource allocation, record keeping, and information technology, ensure smooth operations and effective management of institutional resources (Nwankwo, 2020). In addition, administrators' experience plays a vital role. Experience provides practical wisdom, exposure to diverse challenges, and the ability to apply lessons learned in decision-making. Administrators with extensive experience are often better at anticipating problems, managing crises, and mentoring subordinates. Ethical and personal characteristics including integrity, accountability, and resilience strengthen credibility and organizational trust. Administrators who act transparently set a moral tone for their institutions (Ogunu, 2019).

Janice (2016) examined the relationship of the characteristics of colleges of education administrators of Malita, Davao del Sur between instructional management leadership and the characteristics that best predicts instructional management leadership. Results showed that characteristics of colleges of education administrators in terms of visionary, as a person, instructional manager, leader of an organization, manager and school-community facilitator had a descriptive rating of high level. On the level of instructional management leadership of colleges of education administrators, the indicators had an overall descriptive rating of high level. On the test of significant difference between the dependent and independent variable, the independent variable significantly predicted the dependent variable. It was established in the study that there was significant relationship between the characteristics of colleges of education administrators to the instructional management leadership. From the findings of the study, the indicators of characteristics of

colleges of education administrators were the potent factors that could predict the instructional management leadership.

Barakatu(2021) investigated the School administrators' working experience and students' academic performance in senior secondary schools in Bauchi, Dutse and Gombe states of Nigeria. The study adopted the descriptive research designed of the correlation type. Thirty (30) senior secondary schools administrators were selected and used as the respondents to this study, ten school administrators from each state. The instruments used to collect relevant data were school administrators' working experience check list and a self-designed questionnaire developed by the researcher; it was titled School Administrators' Working Experience and Students' Academic Performance (SAWESAP). The questionnaire was validated by two experts, one in the area of educational administration and planning, one in the measurement and evaluation both from Faculty of Education, Federal University, Kashere, Gombe State. Their suggestions and recommendations were incorporated into the final version and the reliability coefficient index of 0.73 was obtained after test-re-test with two weeks interval. Data collected were analyzed using Statistical Package for Social Science (SPSS). One hypothesis was formulated and tested. Pearson Product Moment Correlation (r) Coefficient analysis procedure was used to test the hypothesis at 0.05 significant levels. The results of the analysis showed that, there was significant positive correlation between school administrators' working experiences and students' academic performance. Based on the findings, it was recommended among others that, school administrators' experience will be considered when it comes to placement and promotion of school administrators that would enable them perform maximally in managing and handling human and material resources.

Statement of the Problem

Institutional performance in Nigeria's colleges of education is the competence and leadership characteristics of their administrators. According to the Federal Ministry of Education (FME, 2022), effective educational leadership requires administrators who combine experience with creativity to enhance institutional productivity and ensure quality teacher preparation. However, the National Commission for Colleges of Education (NCCE, 2021) reports persistent weaknesses in administrative competence across colleges of education, including inadequate managerial experience, limited innovation, and poor decision-making capacity among administrators.

These deficiencies have contributed to low staff motivation, poor resource utilization, and reduced institutional performance. Empirical findings further indicate that while some administrators possess long years of service, they often lack creativity in problem-solving and innovation required to meet contemporary educational demands (Okeke & Oranusi, 2021). In the North-West Zone, where colleges face challenges such as insufficient funding, infrastructural decay, and staff shortages, the absence of creative and experienced administrative leadership may negatively affect college of education growth and lecturer productivity. Consequently, experience and creativity have become critical indicators of colleges of education effectiveness. This study, therefore, investigates level of administrators' characteristics (experience and creativity) in colleges of education in the North-West Zone, Nigeria.

Objective of the Study

The following are the objectives of this study:

- I. The level of administrator's experience in colleges of education in North West Zone, Nigeria.

Research Questions

The study is guided by the following research questions

- I. What is the level of administrator's experience in colleges of education in North West Zone, Nigeria?
- II. What is the level of administrator's creativity in colleges of education in North West Zone, Nigeria?

Methodology

The study employed descriptive survey research design to obtain data relevant to the study. The population consisted of 506 administrators drawn from colleges of education within the North-West Zone of Nigeria. The sample size of 370 participants was determined using the Research Advisors (2006) sample size determination table, and participants were selected through a proportionate sampling technique across the seven colleges of education in the zone. A structured questionnaire titled Administrators' Characteristics

Assessment Questionnaire (ACAQ) served as the instrument for data collection. The instrument underwent validation by experts from the Department of Educational Management, Sokoto State University, Sokoto, to establish its face and content validity. The reliability coefficient of the ACAQ was determined to be 0.96 using the test–retest method, indicating a high level of consistency. Data collected were analyzed using descriptive statistics, specifically mean and standard deviation, to answer the research questions guiding the study.

Result

This section presents the analysis of data collected for the study. The results are organized and presented based on the research questions that guided the study. Each research question is addressed using descriptive statistical tools such as frequency counts, percentages, means, and standard deviations to provide a clear understanding of the respondents’

Decision Rule: In this analysis the criterion mean is 3.00 by this definition, any descriptor statement for which a mean score of is higher than 3.00 is observed to be at high level, while moderate level is within 3.00 and lower level implies any descriptor statement for which mean score of less than 3.00 is observed.

Research Question One: What is the level of administrator’s experience in colleges of education in North West Zone, Nigeria?

This was presented and answered in Table 1 below:

Table 1: Level of Administrator’s Experience of Colleges of Education in North West Zone, Nigeria

S/N	Item	VHL	HL	ML	LL	VLL	Mean	SD	Decision
1	Administrators has served for many years in educational administrative positions within the college system	85	160	53	38	38	3.61	1.208	High Level
2	Administrators possesses relevant academic and professional qualifications in education and administration.	111	154	43	33	29	3.77	1.196	High Level

3	Regularly administrators attends professional development programmes such as workshops, seminars, and conferences on educational management.	104	214	30	10	10	4.07	0.846	High Level
4	Administrator has held various academic leadership positions (e.g., Head of Department, Dean, Deputy Provost) before attaining the current position.	87	178	43	38	24	3.72	1.127	High Level
5	The administrator demonstrates a sound understanding of the policies and operational guidelines of the National Commission for Colleges of Education (NCCE).	107	200	34	15	14	4.00	0.941	High Level
6	Administrator exhibits competence in decision-making and problem-solving in managing institutional and staff-related issues.	91	197	43	24	15	3.88	0.987	High Level
Total							3.17	1.050	High Level

Criterion Mean = 3.0

Key: Very Low level =1, Low level = 2, Moderate level =3, High level =4, Very High level = 5.

Table 1 presents data on the level of administrators' experience in colleges of education within the North West Zone, Nigeria. The findings showed that all six items assessing administrators' experience had mean values ranging from 3.61 to 4.07, with an overall mean of 3.17 (SD = 1.05), indicating a generally high level of administrative experience in colleges of education.

Administrators were rated highest on their attendance at professional development programmes such as workshops, seminars, and conferences on educational management (Mean = 4.07, SD = 0.846), and their understanding

of the policies and operational guidelines of the National Commission for Colleges of Education (NCCE) (Mean = 4.00, SD = 0.941). These suggest strong engagement in continuous professional learning and policy compliance.

Administrators demonstrated high levels in decision-making and problem-solving competence (Mean = 3.88), holding various leadership positions prior to current appointment (Mean = 3.72), and possession of relevant academic and professional qualifications (Mean = 3.77). The lowest mean value (3.61) still reflected a high level, showing that most administrators have served for several years in college administrative roles. In conclusion of the table results, it shows that administrators in colleges of education have high level experience.

Research Question Two: What is the level of administrator's creativity of colleges of education in North West zone, Nigeria?

This is presented in Table 2 below:

Table 2: Level of Administrator's Creativity of Colleges of Education in North West Zone, Nigeria

S/N	Item	VHL	HL	ML	LL	VLL	Mean	SD	Decision
1	Administrators generates innovative and effective solutions to institutional challenges in the college.	106	144	30	48	42	3.61	1.326	High Level
2	Administrators often initiates new academic and administrative programmes that promote institutional growth and effectiveness.	99	204	10	28	29	3.85	1.134	High Level
3	Administrators readily adapts to changes in educational policies, technologies, and institutional demands.	110	211	15	19	15	4.03	0.954	High Level

4	Administrators encourages staff to develop and implement creative ideas in teaching, research, and administration.	93	226	10	14	27	3.93	1.041	High Level
5	Administrators demonstrates resourcefulness in managing limited institutional resources to achieve desired goals.	97	205	20	34	14	3.91	1.010	High Level
6	Administrators effectively utilizes modern technologies and management practices to enhance administrative efficiency.	118	198	10	20	24	3.99	1.070	High Level
Total							3.80	1.089	HighLevel

Criterion Mean = 3.00

Key: Very Low level =1, Low level = 2, Moderate level =3, High level =4, Very High level = 5.

Table 2 shows level of administrator's creativity in colleges of education in North West Zone, Nigeria. Looking at the results, item 1 indicates a mean score of 3.61 which is greater than criterion mean of 3.00. Item 2 shows a mean score 3.85 which is greater than the criterion mean of 3.00. Whereas item 3 a mean score 4.03 which is greater than the criterion mean of 3.00. In the table, item 4 shows a mean of 3.93 which is greater than the criterion mean of 3.00. Item 5: was rated at high level that the administrator's support for creative instructional materials enhances student learning with a mean score of 3.91 which is greater than the criterion mean of 3.00. However, item 6: was rated at high level that a culture of creativity fostered by the administrator leads to higher student achievements with mean score 3.99 which is greater than the criterion mean of 3.00. This means that administrative recognition of creative effort, creativity in implementation of programmes, and openness to new ideas was found very high among administrators in colleges of education

Summary of Major Findings

The following were the findings of the study;

- I. There is high level of administrator's experience in colleges of education in North West zone, Nigeria.

Discussion

This study assessed the level of administrator's characteristics, in colleges of education in North-West, Nigeria. Results were discussed in accordance with the research questions and hypotheses as presented below;

Findings from table one reveals high level of administrator's experience in Colleges of Education in North West zone, Nigeria. This suggests that administrators who possess a wealth of professional experience measured by years of service, institutional exposure, and accumulated leadership responsibilities are better positioned to influence academic success positively. Experienced administrators typically demonstrate superior strategic planning capabilities, crisis management proficiency, interpersonal acumen, and a nuanced understanding of institutional operations. These competencies enable them to implement evidence-based policies, optimize resource utilization, and foster academic cultures that prioritize student learning and staff development. Supporting this view, Jun (2024) argue that sustained leadership experience contributes significantly to school effectiveness, especially in complex educational systems, as it enhances leaders' capacity to anticipate challenges and apply contextually appropriate solutions that improve academic performance. This finding aligns with the research conducted by Abubakar(2021) who contended that experienced educational leaders are crucial change agents who shape institutional direction and create enabling environments for learning. He emphasizes that administrative experience fosters resilience, reflective practice, and innovation key elements necessary for improving student outcomes. In the context of Colleges of Education, experienced administrators are often more adept at mentoring faculty, driving curriculum reforms, and maintaining high standards of academic accountability, all of which contribute to student achievement. The statistical significance of this relationship underscores the importance of experience not just as a temporal factor but as a developmental process that enhances leadership effectiveness.

The finding from table two indicates high level of administrator's creativity in colleges of education in North West zone, Nigeria. Creative administrators are

better able to design and implement policies that promote effective teaching, facilitate staff development, and ensure the availability of essential learning resources. This finding integrate the ideas of Akomolafe, Comfort, Fawziyah (2018) leadership skills, particularly in educational contexts, are foundational to creating structured and goal-oriented academic environments where learners are adequately supported to meet their learning outcomes. The findings, therefore, reinforce the argument that the presence of a skilful administrative team directly translates into better academic outcomes for students. This finding resonates with the empirical assertions of Ibrahim (2018) who emphasized that administrative skills, especially those related to effective supervision, decision-making, and communication, have a significant impact on the academic performance of students in tertiary institutions.

Conclusion

The study concluded that there is high level of administrator's experience and administrator's creativity in colleges of education in North West zone, Nigeria.

Recommendations

Based on the findings of this study, it was recommended that:

- I. The policy makers and governing councils should harness this wealth of experience by involving administrators in decision-making processes, strategic planning, and mentoring of upcoming educational leaders.
- II. Colleges of education should provide enabling environments and resources to further support and channel this creativity into innovative policies, curriculum development, and problem-solving strategies.

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Relationship among Quality Assurance Practices and Students' Academic Performance in Colleges of Education in North West Zone, Nigeria

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Abstract

The study assessed the relation among quality assurance practices and students' academic performance in Colleges of Education in North West Zone, Nigeria. The study employed correlational survey research design. The population of the study is 70 but since the researcher adopted purposive sampling the whole population was used as a sample size were used to select 70 quality assurance and 277 students from 7 purposely selected state-owned colleges of education in North-West Zone, Nigeria using research advisors (2006). Two researcher developed instruments were used as instrument for data collection: Quality Assurance Assessment Questionnaire (QAAQ) and Academic Performance Assessment Tool (APAT), which utilized the Grade Point Average (GPA) as a measurable indicator of academic performance. The face and contents validated were done by experts in the Department of Educational Management, Sokoto State University, with reliability indices of Quality Assurance Assessment Questionnaire (QAAC) at 0.97 and 0.05 respectively. However, the data was analyzed using Pearson Product Moment Correlation (PPMC), Coefficient at 0.05 level of significance to determine the relationship. The study revealed that there is a significant relationship between effective evaluation and students' academic performance in Colleges of Education in North-West, Nigeria; the study also showed a strong positive and statistically significant Relationship between programme planning and students' academic performance in North-West, Nigeria; the study also indicated a positive and statistically significant Relationship between resource control and students' academic performance in North-West, Nigeria. These results underscore that educational leadership and administrative practices are not peripheral, but central determinants of academic quality in tertiary institutions.

Keywords: Administrator, Characteristics, Experience, Administrator's Creativity

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Introduction

Quality assurance is fundamental to the functioning of Colleges of Education in Nigeria, especially in the North-West Zone where teacher education remains central to addressing educational disparities. The National Commission for Colleges of Education (NCCE) emphasizes that quality assurance practices such as proper reporting, effective evaluation, programme planning, and resource control are crucial for maintaining standards and improving student academic performance (NCCE, 2020). Despite efforts by regulatory agencies, persistent challenges such as inadequate funding, weak monitoring mechanisms, and insufficient institutional compliance undermine effective quality assurance implementation. As student performance increasingly becomes an indicator of institutional effectiveness, assessing the level of quality assurance practices in Colleges of Education in the North-West Zone is vital.

Proper reporting involves systematic documentation, communication, and feedback on academic and administrative processes in an institution. Effective reporting ensures transparency, accountability, and informed decision-making. In Colleges of Education, proper reporting includes timely submission of academic results, documentation of teaching activities, continuous assessment records, and internal audits (Okebukola, 2021). According to the Federal Ministry of Education (FME, 2021), institutions with strong reporting systems tend to maintain higher academic standards because decision-makers rely on accurate data to improve instructional delivery and student support systems.

Yusuf and Adedokun (2022) indicated that effective reporting mechanisms positively influence students' academic achievement by ensuring prompt identification of academic challenges and facilitating early interventions. In the North-West Zone, many Colleges of Education still struggle with manual and inconsistent reporting systems that delay academic processes (NCCE, 2020). Such lapses contribute to inefficiencies in teaching, assessment, and certification, which ultimately affect students' performance. Therefore, improving reporting structures is essential for ensuring academic reliability and enhancing learning outcomes.

Evaluation is a core component of quality assurance because it assesses the extent to which educational objectives are achieved. Effective evaluation includes internal and external supervision, classroom assessment, programme

accreditation, and performance appraisal. Evaluation activities identify strengths and weaknesses in teaching, curriculum implementation, and student learning processes (Creswell & Creswell, 2018). When evaluation systems are robust, institutions are better positioned to adjust teaching strategies, reform curricula, and enhance academic delivery. Continuous internal evaluation ensures that lecturers adhere to course specifications, assessment guidelines, and instructional standards (Umar & Abdullahi, 2021). The NCCE (2020) stresses that regular evaluation promotes accountability and ensures that instructional goals align with national benchmarks.

Effective programme planning ensures alignment between curriculum content, instructional methods, student needs, and national education goals (Obi & Nwosu, 2020). In Colleges of Education, programme planning incorporates curriculum review, workload management, timetable scheduling, practicum arrangements, and academic support services. Strong programme planning frameworks tend to produce students with higher academic performance because teaching and learning are well-coordinated (Afolabi & Loto, 2021). Poor planning, on the other hand, disrupts academic activities, causes timetable clashes, results in irregular instructional delivery, and reduces student engagement. In the North-West Zone, many Colleges of Education face planning challenges due to inadequate management capacity, insufficient academic resources, and poor stakeholder involvement (Yahaya & Haruna, 2022).

Quality assurance frameworks highlight resource control as a critical determinant of institutional performance because adequate resources support teaching, learning, and student development (World Bank, 2021). Colleges of Education require qualified lecturers, instructional materials, ICT facilities, laboratories, libraries, and adequate funding to deliver quality teacher education programmes. Empirical studies report that institutions with effective resource control exhibit improved student academic performance due to availability of learning materials and a conducive academic environment (Ogunyinka, 2019). However, Colleges of Education in the North-West Zone often face resource shortages, mismanagement, and weak financial accountability systems (FME, 2021).

Umar and Abdullahi (2021) conducted study on Influence of Instructional Supervision and Evaluation Mechanisms on Students' Academic Performance in Nigerian Tertiary Institutions. The findings of the study revealed that

evaluation mechanisms significantly and positively influence students' academic performance. Specifically, frequent instructional supervision and systematic classroom observation were found to enhance teachers' instructional delivery, which in turn improved students' learning outcomes and academic achievement. The study further established that regular assessment monitoring promotes accountability among lecturers and ensures alignment between instructional objectives and learning outcomes.

Aina and Akinyemi (2020) carried out a study in Colleges of Education in South-West Nigeria to examine the influence of continuous assessment practices and periodic appraisal of lecturers' performance on students' academic achievement. The population of the study consisted of lecturers and NCE students in selected public Colleges of Education within the Zone. The study adopted a descriptive survey research design, and data were collected using a structured questionnaire and students' academic records. The findings revealed a significant and positive relationship between continuous assessment practices, regular appraisal of lecturers' performance, and students' academic achievement. The study established that effective continuous assessment enhances students' engagement and feedback mechanisms, while periodic lecturer appraisal improves instructional commitment and teaching quality, which jointly contribute to improved student learning outcomes.

Afolabi and Loto (2021) conducted a study in teacher education institutions in South-West Nigeria to examine the influence of effective programme planning on students' academic engagement and performance. The population of the study comprised lecturers, teaching practice supervisors, and NCE students in selected Colleges of Education within the region. The study adopted a descriptive survey research design, and data were collected using a structured questionnaire and institutional programme planning documents, including academic calendars, teaching schedules, and practicum coordination records. The findings revealed that effective programme planning characterised by structured academic calendars, organised teaching schedules, and well-coordinated teaching practice programmes has a significant and positive influence on students' academic engagement and performance. The study further showed that timely implementation of academic activities and proper coordination of practicum experiences enhance students' learning continuity, instructional exposure, and overall academic achievement.

Obi and Nwosu (2020) conducted a study on curriculum planning and implementation in Colleges of Education in Nigeria, with particular emphasis on how programme structure and instructional alignment affect students' learning outcomes. The study was carried out in selected public Colleges of Education across South-East Nigeria. The population of the study comprised academic staff, curriculum officers, and NCE students in the sampled institutions. A descriptive survey research design was adopted, and data were collected using a structured questionnaire and curriculum implementation checklists. The findings revealed that clear programme structures, effective course sequencing, and proper alignment of instructional activities significantly enhance students' learning experiences and academic performance. The study further showed that coherence between curriculum objectives, course content, teaching strategies, and assessment practices improves instructional delivery and facilitates better comprehension among students.

Ogunyinka (2019) conducted an empirical study on the relationship between resource availability, management, and academic performance in teacher education institutions in Nigeria, with a focus on selected public Colleges of Education across South-West Nigeria. The population of the study comprised institutional administrators, lecturers, and NCE students in the sampled colleges. The study adopted a descriptive survey research design, and data were collected using a structured questionnaire and institutional resource inventory checklist covering instructional materials, classroom conditions, and physical infrastructure. The findings revealed that resource availability and effective resource management significantly predict students' academic performance in teacher education institutions. Specifically, adequate instructional materials, conducive classroom environments, and well-managed physical infrastructure were found to enhance students' comprehension, academic engagement, and overall performance. The study further indicated that poor maintenance and mismanagement of resources undermine instructional effectiveness and learning outcomes.

Umar and Abdullahi (2021) investigated the effect of instructional supervision and evaluation mechanisms on students' academic performance in Nigerian tertiary institutions. Adopting a descriptive survey design, data were collected from academic staff and students using structured questionnaires covering supervision, classroom observation, and assessment monitoring. The findings

showed that effective evaluation practices significantly enhance students' academic performance by improving lecturers' instructional delivery. Regular assessment monitoring also promoted accountability and alignment of instructional objectives, leading to improved learning outcomes.

Aina and Akinyemi (2020) examined the impact of continuous assessment and periodic lecturer appraisal on students' academic achievement in South-West Nigerian Colleges of Education. Using a descriptive survey design, data were collected via structured questionnaires and students' academic records and analysed with descriptive and inferential statistics. The study found that continuous assessment and lecturer appraisal positively influence academic performance by enhancing student engagement, feedback, and teaching quality. The authors recommended strengthening assessment policies, ensuring transparent appraisal systems, and providing ongoing professional development for lecturers.

Statement of the Problem

Quality assurance practices significantly influence student academic performance in Colleges of Education across the North-West Zone of Nigeria. Studies have shown that proper reporting, which includes accurate documentation of academic records, timely communication of assessment outcomes, and adherence to institutional reporting guidelines, enhances transparency and supports early academic intervention, thereby improving student achievement (Yusuf & Adedokun, 2022). Effective evaluation through continuous assessment, internal supervision, programme accreditation, and lecturer appraisal has been found to strengthen instructional effectiveness and positively impact student learning outcomes (Umar & Abdullahi, 2021).

Programme planning plays a decisive role in determining institutional effectiveness, as well-coordinated curriculum implementation, structured academic calendars, and proper practicum arrangements contribute to improved student engagement and academic performance (Afolabi & Loto, 2021). Moreover, resource control, particularly the efficient management of instructional materials, financial resources, and staffing, has been identified as a major predictor of student performance because adequate learning facilities and qualified personnel enhance teaching and learning processes (Ogunyinka, 2019; World Bank, 2021). National Commission for Colleges of Education (NCCE, 2020) show that Colleges of Education in the North-West Zone still face challenges such as inconsistent reporting practices, inadequate evaluation

mechanisms, weak programme planning structures, and poor resource management factors that collectively contribute to declining student academic performance.

The Theory

Two theories underpinned this research. Total Quality Management Theory in the form of statistical quality control, was invented by Walter A. Shewhart in 1930s. The theory assumes that customer focus, employee involvement, integrated system, process-centric approach, systematic flow, continual efforts, fact-based decision-making, and relationship management. An organization must understand them to achieve excellence in manufacturing processes. This theory found relevant to this research is total quality management (TQM). According to Bowen and Scudder (2016), the term Total Quality Management (TQM) is basically a theory (with several strands) which explains a set of practices that improve quality of products/services with emphasis on continuous process improvement. The various strands of TQM in the management and education literature include: Deming's Theory, Crosby's Theory and Joseph Juran's Theory. Brief explanation of each is presented below. Deming's Theory: In retrospect, total quality management (TQM) represented the innovative ideas of a vibrant American theorist, W. Edwards Deming who recommended TQM as a model for continuous improvement of quality of production of goods and services in the manufacturing companies. TQM was not taken serious until the Japanese adopted Deming's theory as a beneficial idea to Japan for re-engineering and re-constructing their bartered post-war businesses and industries in the 1950s. The adoption of TQM made Japan a dominant world economy with varieties of quality manufactured products/services (Mehrotra, 2020). According to Hashmi (2020), TQM as recommended by Demining is a commendable management practice that requires management and its well-trained employees to become innovatively and creatively involved in the process of production of goods and services using continuously improved methods and techniques that ensure organizational sustainability.

Walberg's (1981) theory of educational productivity, is one of the few empirically tested theories of school learning based on an extensive review and integration of over 3,000 studies (DiPerna, Volpe & Stephen, 2015). Walberg's assumes that, variables that effect student outcomes: student ability/prior achievement, motivation, age/developmental level, quantity of

instruction, quality of instruction, classroom climate, home environment, peer group, and exposure to mass media outside of school. Wang, Haertel and Walberg (2016) analyzed the content of 179 handbook chapters and reviews and 91 research syntheses and surveyed educational researchers in an effort to achieve some consensus regarding the most significant influences on learning (Greenberg *et al.*, 2016). Using a variety of methods, Wang et al. (2016) identified 28 categories of learning influence. Of the 11 most influential domains of variables, eight involved social-emotional influences: classroom management, parental support, student- teacher interactions, social- behavioral attributes, motivational- effective attributes, the peer group, school culture, and classroom climate (Greenberg et al., 2016). Distant background influences (e.g., state, district, or school policies, organizational characteristics, curriculum, and instruction) were less influential. Wang et al. (2016) concluded that "the direct intervention in the psychological determinants of learning promise the most effective avenues for reform" (p. 210).

Objectives of the Study

This study is aimed at find out:

- I. Relationship between effective evaluation and students' academic performance in Colleges of Education in North-West Zone, Nigeria.
- II. Relationship between programme planning and students' academic performance in Colleges of Education in North-West Zone, Nigeria.
- III. Relationship between resource control and students' academic performance in Colleges of Education in North-West Zone, Nigeria.

Research Hypotheses

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

- H₀₁: There is no significant relationship between effective evaluation and students' academic performance in Colleges of Education in North-west, Nigeria.

H0₂: There is no significant relationship between programme planning and students' academic performance in Colleges of Education in North-west, Nigeria.

H0₃: There is no significant relationship between resource control and students' academic performance in Colleges of Education in North-west, Nigeria.

Methodology

The study adopted correlational survey research design, the population is 70 and purposive sampling techniques were used to select quality assurance and 277 students from 7 purposely selected state-owned colleges of education in North-West Zone, Nigeria using research advisors (2006). Two researcher developed instruments were used as instruments for data collection; the instruments are a five-point rating scale namely: Quality Assurance Assessment Questionnaire (QAAQ) and Academic Performance Assessment Tool (APAT), which utilized the Grade Point Average (GPA) as a measurable indicator of academic performance. The instruments were 0.97 validated by experts in the Department of Educational Management, Sokoto State University. The instruments were administered to twenty participants in colleges of education outside the study population. The data were correlated using Pearson Product Moment Correlation (PPMC), with reliability indices of Quality Assurance Assessment Questionnaire (QAAC) at 0.97. However, the data was analyzed using Pearson Product Moment Correlation (PPMC), Coefficient at 0.05 level of significance to determine.

Results

Research Hypothesis One

There is no significant relationship between effective evaluation and students' academic performance in North-West, Nigeria. This hypothesis was tested using PPMC statistics as shown in Table 1.

Table 1: Relationship between Effective Evaluation and Students Academic Performance of Colleges of Education in North-West, Nigeria

Variables	N	Mean	S.D	Df	r-Cal	p-Value	Decision
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Effective Evaluation	68	3.45	1.333				
				.273	.000	H ₀ Rejected	
Students' Academic Performance	277	4.84	0.556	345			

Source: Fieldwork, 2025 Level of significance (α) = 0.05

The results presented in Table 1 indicated a significant relationship between effective evaluation and students' academic performance in colleges of education in North-West, Nigeria, with $r(343)=.273$, $p<.05$. This finding confirms the existence of a significant relationship, as the p -value falls below .05 level. Consequently, the null hypothesis H₀₁, which posited that there is no significant relationship between effective evaluation and students' academic performance of colleges of education in North-West, Nigeria, was rejected.

Research Hypothesis Two

There is no significant relationship between programme planning and students' academic performance in North-West Zone, Nigeria. This hypothesis was tested using PPMC statistics as shown in Table 2.

Table 2: Relationship between Programme Planning and Students Academic Performance of Colleges of Education in North-West, Nigeria

Variables	N	Mean	S.Deviation	Df	r-Cal	p-Value	Decision
Programme Planning	68	4.14	0.815				
				345	.152	.003	H ₀ Rejected
Students' Academic Performance	277	4.84	0.556				

Source: Fieldwork, 2025 Level of significance (α) = 0.05

The results presented in Table 2 shows a strong positive and statistically significant Relationship between programme planning and students' academic performance in North-West, Nigeria, with $r(343)=.152$, $p<.05$. This finding confirms the existence of a significant relationship, as the p -value falls below .05 level. Consequently, the null hypothesis (H₀₂), which posited that there is no significant relationship between programme planning and students' academic performance in North-West, Nigeria, was rejected.

Research Hypothesis Three

There is no significant relationship between resource control and students' academic performance in North-West, Nigeria. This hypothesis was tested using PPMC statistics as shown in Table 3.

Table 3: Relationship between Resource Control and Students Academic Performance of Colleges of Education in North-West, Nigeria

Variables	N	Mean	S.Deviation	Df	r-Cal	p-Value	Decision
Programme Planning	68	3.92	0.923	345			
Students' Academic Performance	277	4.84	0.556		.933	.004	H ₀ Rejected

Source: Fieldwork, 2025

Level of significance (α) = 0.05

The results presented in Table 3 indicated a positive and statistically significant Relationship between resource control and students' academic performance in North-West, Nigeria, with $r(343)=.933$, $p<.05$. This finding confirms the existence of a significant relationship, as the p -value falls below .05 level. Consequently, the null hypothesis (H_{03}), which posited that there is no significant relationship between resource control and students' academic performance in North-West, Nigeria, was rejected.

Discussion

The analysis presented in Table 1 shows a clear and statistically significant relationship between effective evaluation and students' academic performance in Colleges of Education in the North-West zone of Nigeria. The finding aligns with Umar and Abdullahi (2021) who reported that evaluation mechanisms such as instructional supervision, classroom observation, and regular assessment monitoring significantly improve students' performance in Nigerian tertiary institutions. Their study found that frequent evaluation leads to improved teaching delivery, which directly benefits student learning outcomes. Similarly, Aina and Akinyemi (2020) found that continuous assessment practices and the periodic appraisal of lecturers' performance in

Colleges of Education in South-West Nigeria had a direct and positive influence on students' academic achievement. Their correlation results, which also showed significant associations between evaluation and performance, support the conclusion that evaluation offers timely feedback that helps lecturers adjust teaching strategies to meet learners' needs.

Furthermore, Yahaya and Haruna (2022) demonstrated that evaluation practices such as curriculum review, assessment supervision, and quality monitoring visits are strong predictors of student success in higher educational institutions in northern Nigeria. Their study revealed that evaluation practices accounted for more than one-quarter of the variance in student academic performance, a result that is remarkably consistent with the correlation coefficient of .273 identified in the present study. They concluded that institutions with weak or irregular evaluation systems tend to struggle with poor instructional consistency and lower student outcomes, while those with strong evaluation frameworks achieve better academic results.

The results presented in Table 2 show a statistically significant relationship between programme planning and students' academic performance in Colleges of Education in the North-West zone of Nigeria. Which indicates that programme planning has a positive and meaningful influence on student academic outcomes, even though the magnitude of the relationship is modest. This finding is consistent Afolabi and Loto (2021) reported that effective programme planning in teacher education institutions characterised by structured academic calendars, organised teaching schedules, and well-coordinated practicum programmes significantly improves students' academic engagement and performance. Their study found that institutions with strong planning frameworks were more likely to record higher student achievement levels because structured planning reduces instructional disruptions and fosters stable learning conditions. This suggests that even moderate improvements in planning practices have measurable effects on academic outcomes.

Similarly, findings by Obi and Nwosu (2020) support the results of the present study. Their research on curriculum planning and implementation in Colleges of Education in Nigeria revealed that clear programme structures, effective course sequencing, and proper alignment of instructional activities significantly enhance students' learning experiences and performance. Additionally, Yahaya and Haruna (2022) found that programme planning, especially when it includes comprehensive curriculum review, stakeholder

involvement, and resource allocation planning, has a significant predictive effect on academic success in higher education institutions in northern Nigeria. Their structural equation modelling showed that programme planning accounted for a notable proportion of variance in student performance, emphasising that institutions with strong planning mechanisms perform better in national and internal assessments.

The results presented in Table 3 shows a strong and statistically significant relationship between resource control and students' academic performance in Colleges of Education within the North-West zone of Nigeria. These findings are consistent with Ogunyinka (2019) who found that resource availability and effective management significantly predict academic performance in teacher education institutions in Nigeria. According to the study, adequate instructional materials, conducive classroom environments, and well-managed physical infrastructure contribute directly to students' comprehension, engagement, and performance. Ogunyinka's findings support the exceptionally high correlation observed in Table 3, which suggests that resource control is one of the strongest determinants of student academic achievement in the Colleges of Education studied. Similarly, Adebayo and Akinyemi (2020) examined resource utilisation in public Colleges of Education and reported that institutions with well-coordinated resource control systems performed better in accreditation exercises and recorded higher student achievement scores. Their study highlighted that efficient allocation and monitoring of resources especially teaching aids, laboratory equipment, and library resources improve the teaching-learning process and subsequently enhance performance outcomes. This aligns with the results of the present study, where strong resource control is associated with high levels of academic achievement.

Additionally, Musa and Idris (2021) on resource management in northern Nigerian tertiary institutions found that effective financial control, qualified personnel deployment, and equitable distribution of instructional resources significantly improved institutional effectiveness and student performance. Their regression analysis showed that resource control accounted for a substantial proportion of the variance in students' academic success. This indicated that when Colleges of Education manage their resources efficiently, students benefit directly through improved academic outcomes.

Conclusion

Based on the findings of this study, it can be concluded that Colleges of Education in the North West Zone of Nigeria are characterized by a robust quality assurance mechanisms, and commendable student academic performance. The data affirm that institutional leadership in these colleges exhibits strong professional attributes ranging from administrative experience, gender representation, leadership skills, and creativity which significantly contribute to the academic success of students. Furthermore, the study establishes that critical administrative practices such as proper reporting, effective evaluation, programme planning, and strategic resource control are not only prevalent but also positively and significantly correlated with academic achievement. These results underscore that educational leadership and administrative practices are not peripheral, but central determinants of academic quality in tertiary institutions.

Recommendations

The following recommendations were made such that, the government and institutional administrators should:

- I. Institutionalise continuous evaluation and strengthen instructional supervision, with capacity-building for evaluators to improve teaching quality and student performance.
- II. Prioritise comprehensive programme planning, enforce academic calendar adherence, and enhance coordination of teaching practice through supervision, resources, and stakeholder collaboration.
- III. Ensure adequate funding, proper maintenance, and transparent management of instructional resources to enhance teaching quality and student academic outcomes

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Effects of Problem-Based Learning Strategy on Students' Ability and Interest in Solving Solid Geometry in Senior Secondary School in Sokoto State, Nigeria

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Abstract

This study investigated the effect of Problem-Based Learning Strategy on Students' Ability and Interest in Solving Solid Geometry in Senior Secondary Schools in Sokoto State, Nigeria. The study employed a quasi-experimental pre-test and post-test design; the experimental group was taught using problem-based learning strategy while the control group was taught using the conventional (Discussion and Demonstration) method. The population of the study consisted of all public senior Secondary School Students in Sokoto State, estimated to be 31,998 students. A sample of 94 SSI students was selected using a purposive sampling technique. Two Senior Secondary Schools were used for the study, and in each of the two schools, one intact class was used as either the experimental or control group. Two instruments were used for data collection, namely the Solid Geometry Ability Test (SGAT) and the Solid Geometry Interest Questionnaire (SGIQ). Two research questions were answered using mean and standard deviation, while the hypothesis was tested at 0.05 level of significance using an independent sample t-test. The Results showed that the problem-based learning strategy had higher ability scores in solid geometry and fostered greater interest compared to the conventional method among senior Secondary School Students in Sokoto State, Nigeria. The study recommended that Mathematics teachers should adopt a problem-based learning strategy in teaching solid Geometry so that teaching and learning of the concept will be student-centered. The Government, in collaboration with curriculum planners, should integrate problem-based learning as a teaching strategy in senior secondary schools in Sokoto State. Training and retraining of mathematics teachers on the effective use of PBL in their Schools

Keywords: Problem Based Learning, Students' Interest, Students' Ability, and Solid Geometry

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Introduction

Mathematics is a subject that is universally recognized as one of the major requirements for scientific, technological, and engineering advancement. In Nigeria, mathematics is a compulsory subject in the Senior Secondary School curriculum and relevant in all fields of study, particularly in the fields of science, medicine, engineering, and technology (Onoshakpokaiye & Avwiri, 2025). Despite its importance, students' performance in mathematics has remained persistently poor, as highlighted in annual reports released by the West African Examination Council (WAEC; 2023, 2024 & 2025). One of the areas where students experience difficulty is Solid Geometry which is the essential components of Geometry in the mathematics curriculum that involves the study of three-dimensional (3D) solid shapes and their real-life application (Bilolkhan, 2024).

Geometry is one of the branches of mathematics that deals with the nature and relationship of lines, angles, curves, and shapes, etc. (Ozochinanuife *et al.*, 2023). Geometry is included in the school curriculum around the world due to its benefits and applications in real life (Effiom & Abdullahi, 2021). Learning geometry is not an easy task as most of the students fail to develop an understanding of geometric concepts, geometric reasoning, and skills in solving geometric problems (Shu'iabu & Sidi, 2020). Thus, students need to develop skills in solving geometric problems (Hassan *et al.*, 2023). As such, Geometry holds significant position in the mathematics curriculum. Students acquire a wide range of knowledge and skills in many applications of geometry. They possess knowledge of geometric construction and engage in learning geometric shapes. Geometry facilitates the exploration and understanding of the features and attributes of various shapes.

Solid Geometry is a branch of geometry that deals with three-dimensional (3D) solid shapes (Bilolkhan, 2024). A Solid geometric is a figure or shape that has a three-dimensional structure. In simple words, they have volume, length, width, and height. However, solid geometry is divided into two major types, namely: Polyhedron and non-polyhedron or Curved Bodies (Asiamah & Fletcher, 2023). Polyhedron comprises solids that have multiple faces, all of which are flat. Each face is a polygon. Examples include cubes, prisms, pyramids, etc. While non -polyhedrons include solids with curved surfaces or a combination of curved and flat surfaces. Examples include sphere, cone,

cylinder, etc. The common examples of solid geometric figures are a cone, sphere, cube, and cuboids. The geometric solid cube has three dimensions: length, width, and height (Seabra *et al.*, 2021).

Student's Ability in solving solid geometry refers to the capacity of the students to understand, analyze, and apply principles in solving three-dimensional figures such as cubes, cuboids, cones, pyramids, spheres, and their properties which includes volume and surface area (Kusuma *et al.*, 2023). Developing Ability in this area required the following aspects. Spatial visualization, Analytical reasoning, problem-solving skills, geometric construction, abstract thinking, and measurement Skills (Herrera *et al.*, 2019).

Students' interest refers to the state of engaging students in learning solid geometry (Wong & Wong, 2019). This study considers students' interest as the state of being confident and free in interacting with teachers and colleagues in the learning process. More so, Emefa *et al.* (2020) viewed that interest as an interaction between a person and a specific subject or activity, including the process of willingness, attention, concentration, and positive feeling. In their study, Toli and Kallery (2021) provided the characteristics of interest that include increased attention, efforts, effects, and experience. The trend of poor ability in solving solid geometry problems is associated with students' low interest in learning mathematics in general and solid geometry in particular. Therefore, there is a need for an innovative strategy like problem-based learning PBL which emphasizes on students' collaboration, active engagement in solving real-life problems.

Problem-Based Learning (PBL) is a student-cantered instructional strategy where the teacher introduces students to a particular problem and offers students more opportunities to discover important concepts by themselves under the guidance of the teacher, who serves as a facilitator. PBL is a student-cantered approach in which students learn about a subject by attempting to find a solution to a problem (Ogunsola *et al.*, 2021). Problem-Based Learning is one of the teaching models that require students to be active, collaborative, and student-cantered, develop their problem-solving skills, and engage in independent learning in which the students work in groups to formulate problems that have been given (Folashade, 2023). Likewise, Gallagher (2015) stated that PBL could be trusted to help the development of creative thinking skills among students in various fields of education. The teacher guides students and facilitates learning, organizes learning assignments, mediates

problem formulation, and formulates hypotheses. Students work in groups to solve problems that have been given previously. One of the problems that can be used is an open-ended problem, which is a problem that has a variety of solutions or strategies (Tan, 2021).

Theoretical Foundations

The theoretical foundation of this study is based on two theories, which are considered relevant to the study, they are: Experiential learning theory (ELT) by David Kolb 1984 and social constructivist theory (SCT) by Lev Vygotsky 1968). The two theories were considered relevant to the study because both of the theories exhibit similar characteristics to problem-based learning. According to Kolb 1984, learning occurs through experience and comes up with four staged learning cycle which are Concrete experience, Reflective Experience, Abstract Conceptualization and Active Experimentation in these four stage cycle learners were exposed to real life solid geometry problem (Concrete Experience) in which they reflect and discuss the possible solution (Reflective Observation) and then develop geometric concepts (Abstract Conceptualization) and apply these concepts to real life problems (Active Experimentation). This shows that Experiential learning theory aligns with problem-based learning because students learn by doing, which enhances their ability in solving solid geometry. Likewise the Social Constructivist theory by Lev. Vygotsky 1968 emphasized that learning occurs through social interaction, Collaboration and teachers guidance (Facilitation) which aligns with PBL in improving students' interest through interaction and Collaboration. Figure 1 presents the pictorial representation of the theories that guide the study.

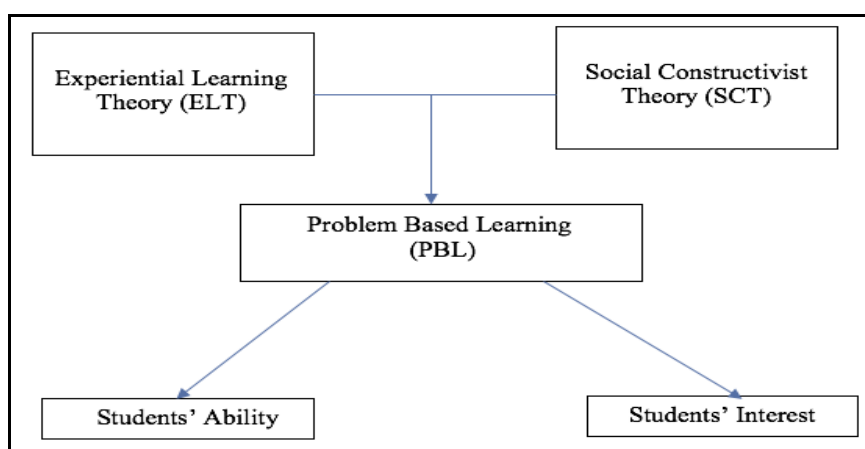


Figure 1: Theoretical Framework

Statement of the Problem

Solid geometry is a fundamental component of mathematics that is taught at the senior secondary school level. Ideally, the teaching and learning of solid geometry is expected to make students creative and develop the ability to solve real-life problems, and also develop positive interest in solving solid geometry concepts. Despite its importance, presently, students in senior secondary schools in Sokoto state are showing a lack of interest and ability in solving solid geometric problems. These trends can be attributed to several learners psychological factors like poor self-concept, poor self-esteem, teachers attitudes and above all in-adequate knowledge by the teachers of an innovative strategies like problem based learning PBL, which results to lack of interest and ability in solid geometry, furthermore, in many senior secondary schools in Sokoto state, teachers relies heavily on traditional method which is a teacher cantered with less emphasis on real-life application and students engagement.

Consequently, students' interest and ability in solid geometry remain poor as many students are faced with difficulties in visualizing three-dimensional objects, solving geometry problems, and applying their knowledge in practical forms. Therefore, there is a need to adopt an innovative strategy like problem-based learning PBL which emphasizes on students collaboration, active engagement in solving real-life problems. Several researches have been conducted, on improve students' ability and interest in solid geometry to enable them applies the knowledge in solving real-life practical problems. Often all the literature reviewed; there is no research study of such nature that is conducted in Sokoto state. These necessitated the researcher to conduct research to examine the effects of students' ability and interest in solving solid geometry using a problem-based learning strategy among senior secondary schools in Sokoto state, Nigeria.

Objectives of the Study

The main objective of the study is to determine the effects of a problem-based learning strategy on students' Ability and interest in solving Solid Geometry among senior secondary schools in Sokoto State, Nigeria, and the specific objectives are to:

- I. Determine the difference in the ability of students taught using a problem-based learning strategy and those taught using a conventional method in solving solid geometry among senior secondary schools in Sokoto State, Nigeria.
- II. Determine students' interest in solving solid geometry using a problem-based learning strategy among senior secondary schools in Sokoto State, Nigeria.

Research Questions

In line with the objectives of the study, the following research questions were raised in this study:

- I. What is the difference in the ability of students taught using a problem-based learning strategy and those taught using a conventional method in solving solid geometry among senior secondary schools in Sokoto state, Nigeria?
- II. What is the student's interest in solving solid geometry using a problem-based learning strategy among senior secondary schools in Sokoto State, Nigeria?

Null Hypotheses

On the basis of research questions, one null hypothesis was tested at 0.05 level of significance.

HO₁. There is no significant difference in the ability of students taught using a problem-based learning strategy and those taught using a conventional method in solving solid geometry among senior secondary schools in Sokoto State, Nigeria

Methodology

The study employed quasi experimental research design with a pre-test–post-test to investigate the effects of a problem-based learning strategy on students' ability and interest in solving solid Geometry. A sample of 94 SSI Students were purposefully selected from two senior secondary schools from the population of 31,998 SSI Students in Sokoto state, out of which 46 students were assigned to the experimental group who received instructions on

problem-based learning, and 48 were assigned to the control group that was taught using a conventional method. Two instruments were used for data collection, namely: Solid Geometry Ability Test (SGAT) and Solid Geometry Interest Questionnaire (SGIQ), which were validated by three experts. Reliability coefficients of 0.83 and 0.88 were obtained using Cronbach's alpha and the Pearson Product-Moment Correlation coefficient (PPMC), respectively. The data collected were analyzed using mean and standard deviation. Students in both groups received instruction for six weeks, after which a post-test was administered to determine the effect of PBL on students' Ability and Interest in solving Solid Geometry. The research design is illustrated in Figure 1 below.



Figure 1: Pre-Test and Post-Test Quasi-Experimental Design

Key: $P_1 = \text{Pre-test}$, $P_2 = \text{Post-test}$ and $X = \text{Intervention}$

Results

Based on the result obtained, the analysis and interpretation were done with the use of a table to provide a clear picture of the findings as follows:

Research Question One

What is the difference in the mean ability in solving solid geometry between students taught using a problem-based learning strategy and those taught using a conventional method among senior secondary schools in Sokoto State, Nigeria?

To answer this research question, scores obtained from 94 were used and analyzed using mean and standard deviation, as presented in Table 1 below.

Table 1: Summary of Mean and Standard Deviation of Students' Ability in Solving Solid Geometry between Experimental and Control groups.

Group	N	Mean	Std. Deviation	Mean Difference
Experimental Group	46	21.13	4.52	8.92
Control Group	48	12.21	6.78	

Total	94
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Table 1 shows the mean scores of 21.13 and a standard deviation of 4.52 for the Experimental Group and the mean scores of 12.21 and a standard deviation of 6.78 for the control group. The mean difference between the groups is 8.92. The results indicated that the experimental group had a higher mean score than the control group, which signifies that problem-based learning was effective in enhancing students' ability to solve problems in solid geometry among senior secondary schools in Sokoto State, Nigeria.

Research Question Two

What is the students' interest in solving solid geometry among senior secondary schools in Sokoto State, Nigeria?

To answer this question, responses obtained from the 94 students who were administered the Solid Geometry Interest Questionnaire were sorted and analyzed using mean and standard deviation, as presented in Table 2 below

Table 2: Summary of Students' interest in solving solid geometry

S/N	Item	N	Mean	STD
1	I feel confident when solving solid geometric problems	942.69	1.047	
2	I am more interested in spending my time in solid geometry than in any other topic in mathematics	942.75	1.019	
3	I find solving solid geometry interesting in class	942.69	1.013	
4	I enjoy visualizing three-dimensional objects in solid geometry	942.67	1.037	
5	My interest in solving solid geometry problems improves my solving ability in mathematics	942.67	1.015	
6	Solving a solid geometry problem is boring and time-consuming	942.74	.967	
7	The real-life application of solid geometry makes it interesting	942.65	1.012	
8	I received adequate attention from my teacher when solving solid geometry Problems	942.76	1.053	
9	I will work as long as necessary to solve solid geometry problems	942.64	1.000	
10	Solving Solid Geometry problems is not of my interest	942.67	1.023	
Total		9429.59	6.901	

Source: field work, 2025

The overall mean interest score is 29.59 with a standard deviation of 6.901, suggesting overall moderate interest levels in solid geometry among students. Interest appears moderate across various aspects like visualization, applications, and confidence. Contextual factors like teaching approaches and perceived relevance might influence these interest levels.

Research Hypotheses Testing

The null hypothesis was tested at 0.05 level of Significance using an Independent Sample t-test for the Experimental and Control groups.

Analysis of the Research Hypothesis One

H₀1: There is no significant difference in the ability of students taught using a problem-based learning strategy and those taught using a conventional method in solving solid geometry among senior secondary schools in Sokoto state, Nigeria. This null hypothesis is tested using an independent sample t-test for the experimental and control groups, as presented in Table 3.

Table 3: Independent Sample t-test on the Ability of Students in the Experimental and Control Groups

Test	N	Mean	Std. Deviation	Df	T	P-value	Decision
EG	46	21.13	4.52	92	3.59	.001	Null H ₀ Rejected
CG	48	12.21	6.78				
Total	94						

Source: Field work (2025)

Level of significance=0.05

Table 3 Shows the independent sample t-test comparing the mean score of the experimental and control groups. The experimental group had a high mean score (Mean=21.13; SD=4.52) compared to the control group (Mean= 12.21; SD= 6.78). The t-value of 3.59 with a p-value = .001, which is less than the 0.05 level of significance. Since $p < 0.05$, this signifies that a statistically significant difference exists in the ability of students taught using a problem-based learning strategy compared to conventional methods in solving solid geometry. This indicates that the hypothesis is rejected; indicating that solving solid geometry using problem-based learning has a greater effect on students' ability than the conventional method.

Summary of the major Findings

The following are the summary of the major findings of the study.

- I. Students taught with problem-based learning had higher ability scores than those taught using the conventional method among senior secondary schools in Sokoto State, Nigeria.

- II. There is a moderate level of students' interest in solid geometry using a problem-based learning strategy among senior secondary schools in Sokoto State, Nigeria.

Discussion

Findings revealed that students taught with problem-based learning showed higher ability scores than those taught using the conventional method, indicating Problem-Based Learning be a more effective approach for solid geometry. This aligns with research suggesting PBL enhances performance in mathematics and geometry. Ramli *et al.* (2020) found that PBL led to higher mathematical values among Malaysian students. Eneze *et al.* (2020) reported that PBL outperformed expository methods in geometry achievement in Nigerian schools. The outcome hints at PBL's potential superiority in teaching solid geometry in Sokoto State, Nigeria. PBL's emphasis on active problem-solving likely contributes to improved learning outcomes. The approach appears beneficial for developing solid geometry skills among senior secondary students. Findings support considering PBL as a viable strategy for teaching geometry, reflecting broader trends in educational research valuing active, problem-centric learning. Implementation aspects like teacher facilitation and adapting PBL to local contexts probably influence its effectiveness. Studies show PBL's benefits across settings, sometimes shaped by factors like prior math knowledge (Jamaan *et al.*, 2018). Overall, results suggest PBL could be an effective way to enhance solid geometry abilities, fitting with notions of PBL fostering deeper learning in mathematics.

The outcome also revealed that Problem-Based Learning had an impact on students' solid geometry abilities, likely reflecting improvement given the pre-post comparison context. The finding aligns with perspectives on PBL fostering skill development through active engagement. It indicates students' solid geometry solving abilities differed after experiencing PBL, consistent with studies highlighting PBL's positive geometry learning outcomes (Jamaan *et al.* 2018). PBL's problem-centric approach probably contributed to these ability changes. Implications include support for using PBL to enhance geometry problem-solving competencies. The significant difference hints at PBL's potential for improving solid geometry abilities, encouraging consideration of PBL strategies for mathematics teaching. Contextual factors like implementation quality, teacher support, and local educational conditions might shape PBL's impact. The direction of change likely indicates

improvement, fitting notions of PBL promoting active learning, beneficial for mathematics outcomes.

The findings of this study also reveal that PBL fostered greater interest in solid geometry. Interest increase supports PBL's potential for improving emotional engagement with the subject. Findings like Jimoh and Fatokun (2020) showed PBL improved interest in chemistry topics, resonating with this enhancement. PBL's interactive nature probably contributed to heightened interest. Implications include that increased interest could promote more effective learning of solid geometry.

Recommendations

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

- I. Mathematics teachers should adopt a problem-based learning strategy in teaching solid Geometry so that teaching and learning of solid geometry will be student-centered.
- II. The Government, in collaboration with curriculum planners, should integrate problem-based learning as a teaching strategy in senior secondary schools in Sokoto State. And also organize training and retraining of mathematics teachers on the effective use of PBL in teaching their students.

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Evaluating the Effectiveness of Van Hiele Model in Enhancing Geometric Thinking Levels among Secondary School Students' in Sokoto Metropolis, Nigeria

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Abstract

Geometry is a critical component of the mathematics curriculum, essential for developing spatial reasoning and foundational for numerous scientific fields. However, students in Nigeria persistently demonstrate low geometric thinking levels, a challenge this study addressed by investigating the effectiveness of the Van Hiele instructional model. Utilizing a quasi-experimental, non-randomized control group pretest-posttest design, the research involved 377 senior secondary students from Sokoto metropolis. An experimental group was taught using the Van Hiele Model, while a control group received conventional instruction. Data were collected using the Van Hiele Model Geometric Thinking Level Test (VHMGTLT). The findings revealed that the vast majority of students in both groups operated below the foundational Visualization (Level 1) stage. The results was analyzed using descriptive statistics and the Mann-Whitney U test, revealed a statistically significant improvement in the experimental group. All students in this group attained at least Level 1, with many progressing to Informal Deduction (Level 3). Conversely, the control group demonstrated no meaningful progress. The study concludes that the Van Hiele Model is a highly effective strategy for significantly enhancing students' geometric thinking levels and recommends its adoption by mathematics teachers and integration into the curriculum

Keywords: Van Hiele Model, Geometric Thinking Levels, Geometry, Secondary School, Conventional Approach

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Introduction

Geometry is recognized as a fundamental cornerstone within the mathematics curriculum, essential for understanding the relationships among geometric shapes (Hassan *et al.*, 2023). It encompasses the study of points, lines, surfaces, shapes, sizes, angles, and the properties of space (Mdyunus & Hock, 2019). Unlike other abstract mathematical disciplines such as Algebra, Zakariyya (2023) considers geometry as an important in mathematics that requires attention in the mathematics curriculum. Geometry plays a crucial role in both academic and real-world contexts, providing a framework for understanding spatial relationships, shapes, and structures, making it essential for various fields such as engineering, architecture, and design (Ozkan *et al.*, 2018).

Despite the significant importance of geometry, the difficulty in learning geometry continues to be a topical issue in mathematics education as difficult areas, not only in Nigeria (Hassan, 2021). Also, It is observed that basic students in Sokoto display low basic skills in geometry, lower skills in solving geometric problems contributed to the poor performance in mathematics (Hassan *et al.*, 2023). However, Van Hiele's Model is one of the best Model used to help students in achieving levels of geometric thinking and also provides an instructional model to achieve the geometric thinking levels (Hassan *et al.*, 2020). However, literature affirmed that teachers must understand the students' levels for better selection of materials in learning strategy. In view of this, Agnes (2023) investigated the problems of difficult concepts in the Senior Secondary School Mathematics curriculum in Nigeria. Some of the difficulties identified are problems based on the circle theorem, which include the angle at the Centre of the circle, the chord theorem, and angles, among others.

The Van Hiele Model describes five sequential levels of geometric thinking. At Level 1 (Visualization), students recognize shapes by their appearance. At Level 2 (Analysis), they identify properties of shapes. At Level 3 (Informal Deduction), they understand relationships between properties. At Level 4 (Formal Deduction), they can construct proofs and reason deductively. At Level 5(Rigor), they compare different axiomatic systems. Students must master each level sequentially, and instruction must align with their current level of thinking.

Different studies conducted indicated that students who received lessons using a conventional approach could not achieve the needed learning objectives as provided in the mathematics curriculum (Hassan, 2021). And that student who receives instruction using the Van Hiele approach consistently achieved higher levels of geometric thinking compared to those taught using conventional approach (Cho & Win 2020).

However, Sulistyorini (2018) indicates that, Van Hiele Model can help students to achieve a better understanding of geometry and serve as a framework to develop their geometric Thinking Levels (GTL) up to rigor. In view of this, the present research would use the Model with the hope of developing geometric thinking levels of students' in solving geometric problems in Sokoto metropolis.

Statement of the Problem

Geometry is a crucial component of mathematics education in Nigeria which is needed in various fields such as architecture, engineering, and the sciences, to boost students' spatial reasoning, problem solving skills and critical thinking. However, despite its importance, students in Sokoto continue to face significant challenges in solving geometry problem, exhibiting low levels of geometric thinking and persistent misconceptions. This is evident in their poor performance in mathematics examinations, particularly in Geometry related questions. particularly in areas such as circle geometry and plane geometry, as highlighted in WAEC chief examiners' reports as fluctuating from year by year.

Despite Government efforts to ameliorate the massive failure, several researches have shown that students' difficulties in geometry can be attributed to various factors, including inadequate teaching methods, lack of concrete materials, and students' cognitive unpreparedness. The Van Hiele Model, a theoretical framework that describes how students learn geometry, offers a structural approach to improving geometric thinking levels. The Model proposed that students' progress through levels of geometric thinking, from visualization to rigor, and that instruction should be tailored to their current level.

Objectives

The primary objective of this study was the effectiveness of Van Hiele Model on Student's Geometric Thinking Levels (GTL) among senior secondary school students in Sokoto metropolis. The specific objectives are to:

- I. Determine the Geometric Thinking Levels of students taught using Van Hiele Model before and after treatment in Senior Secondary School Students in Sokoto metropolis.
- II. Investigate the effectiveness of Van Hiele Model on Geometric Thinking Level scores in Senior Secondary School Students in Sokoto metropolis.
- III. Investigate the effectiveness of Van Hiele Model on Geometric Thinking Level scores of male and female Senior Secondary School Students in Sokoto metropolis.

Research Questions

Based on the stated objectives, the following research questions were used to guide the study.

- I. What are the Geometric Thinking Levels of students taught using Van Hiele Model and those taught using conventional approach before and after among Senior Secondary School in Sokoto metropolis?
- II. Is there any difference between the Geometric thinking test scores of students taught using Van Hiele Model and those taught using the conventional approach among Senior Secondary School in Sokoto metropolis?
- III. Is there any difference between the post-test scores of male and female students taught using Van Hiele Model in Senior Secondary School in Sokoto metropolis?

Hypotheses

The following null hypotheses were formulated and tested at $\alpha = 0.05$ level of significance.

H₀₁: There is no significant difference between the Geometric Thinking Levels mean scores of Senior Secondary School students taught using Van Hiele Model and those taught using conventional approach in Sokoto metropolis.

H₀₂: There is no significant difference between the Geometric Thinking Levels mean scores of male and female Senior Secondary School students taught using Van Hiele Model in Sokoto metropolis.

Methodology

The research employed a non-randomized control group pretest posttest quasi-experimental research design. Two groups were selected and assigned experimental and control treatments. Students geometric thinking levels were established. The population consisted of 16,488 students across 48 schools, from which four (4) schools were randomly selected using proportionate sampling to ensure gender and population representation. A total of 377 students were chosen through Krejcie and Morgan's (1970) table, with 225 assigned to the experimental group and 152 to the control group. The instruments used for data collection is Van Hiele Model Geometric Thinking Level Test (VHMGTLT) for measuring SS II Students' Geometric Thinking Levels and Scores, In this regard the test was adopted to measure the students' geometric thinking skills in Sokoto metropolis. The test contains 25-multiple choice questions the first five items represent level 1, second five items represent level 2, the third five items represent level 3, the fourth five items represent level 4, and the last five items represent level 5.

The instruments (VHMGTLT) was validated by expert in the department of science education Sokoto State University and one from the department of Mathematics Shehu Shagari College of Education, Sokoto. The reliability of the instruments Van Hiele Model Geometric Thinking Level Test (VHGTLT) was established using test retest method of testing reliability. The instrument was administered to 25 selected students in the pilot school and the result obtained was analyzed using Pearson product moment correlation coefficient using SPSS v20, and showed reliability coefficients of 0.69 (VHMGTLT). The collection of data in this research were firstly start with pre-test of Van Hiele's Model Geometric Thinking Level test to obtain the characteristics of students' Geometric Thinking Levels. After intervention, post-test were given to obtain the Thinking level of students. In the study, a 6-weeks instruction

was given to the experimental and control groups. Thus, an instruction based on the Van Hiele Model was carried out in the experimental group, and instruction using conventional method was used in the control group. Data were analyzed using descriptive statistics for research questions and the Mann-Whitney U test for hypotheses, with tables used to summarize scoring and grading criteria.

Table 1: Criteria for making and grading in van Hiele geometric thinking test

Marks	3 out 5 correct answer criteria	van Hiele Levels
1	1-5	1
2	6-10	2
4	11-15	3
8	16-20	4
16	21-25	5

Table Students achieve a certain level of thinking if they answer 3 out 5 questions correctly and that one mark is given in level one and two marks are given for answering 3 out 5 questions between 6-10 correctly in level two, to determine the van Hiele's levels of thinking, the weighted sum score is used as a reference as explained in (Usiskin, 1982). Table 2 provides the weighted sum score.

Table 2: The Weighted sum score for van Hiele levels

Forced van Hiele levels	Weighted Sum Score of VHL								
0	0	2	4	8	16	18	20	24	
1	1	5	9	17	21	25			
2	3	11	19	27					
3	6	7	22	23					
4	13	14	15	29	30				
5			31						
Not fit	10	12	26	28					

Source: (Usiskin, 1982)

Table 2 was developed based on the van Hiele's Model of geometric thinking, in which the levels are achieved sequentially in order for the students to move from lower to a higher level of thinking (Hassan,et al., 2023). For example, student who answers at least three or more questions in levels 1 and 3 will be given 1 and 4 marks. Adding up the score we have $1 + 4 = 5$ in reference to Table 2 he/she achieved level one of VHL of thinking.

Results

Based on the result obtained the analysis were done with the use of table to provide a clear picture of the finding as follows.

Research Question One

What are the Geometric Thinking Levels of students taught using Van Hiele model and those taught using conventional approach before and after among Senior Secondary School in Sokoto metropolis?

The Table 3 and 4, provides pretest and post test score summary of students' Van Hiele's Levels of geometric thinking for experimental and control groups.

Table 3: Distribution of pretest scores of experimental group students' Van Hiele's Levels of geometric thinking.

van Hiele's levels	Sum of scores	Levels					3 out of 5 Correct Answer Criteria	Total (%)
		1	2	3	4	5		
0	0						184	187(83.1%)
	4			*			3	
1	1	*					32	32(14.2%)
2	3	*	*				6	6(2.7%)
3	-	-	-	-	-	-	-	-
4	-	-	-	-	-	-	-	-
5	-	-	-	-	-	-	-	-
Total							225	100%

Table 3 shows the distributions of Van Hiele's Model Levels of students Geometric Thinking at the pretest in the experimental group. The result indicated that a total of 187 (83.1%) students in the pretest failed to achieve level 1 of thinking, however, three of the student's skipped levels 1 & 2 and obtained a sum score of 4 marks, thus based on the criteria they were assigned level 0 (pre-recognition) of thinking. Also 32(14.2%) out of 225 achieved 1 mark and were assigned level 1, and six students 6 (2.7%) achieved sum score of 3 marks and were assigned level 2 of Van Hiele's levels of thinking as mentioned in Van Hiele's Model level table.

Table 4: Distribution of students' Van Hiele's Model levels of geometric thinking at the pretest for the control group

van Hiele's levels	Sum of scores	Levels					3 out of 5 Correct Answer Criteria	Total (%)
		1	2	3	4	5		
0	0						129	129(84.9%)
1	1	*					18	18(11.8%)
2	3	*	*				5	5(3.3%)
3	-	-	-	-	-	-	-	-
4	-	-	-	-	-	-	-	-
5	-	-	-	-	-	-	-	-

Total	152	100%
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Table 4 shows the results of students' Van Hiele Levels of geometric thinking from the pretest scores. The result indicated that 129 (84.9%) students failed to achieve level 1 of thinking based on the criteria. Thus, 18 (11.8%) students' achieved 1 mark and they were assigned level 1 (visualization) and that 5(3.3%) students achieve level 1 & 2 with a sum of 3 marks and were assigned level 2 (analysis) of Van Hiele's level of thinking. However, none of the students achieved level 3, 4 and 5. Thus, analysis of students' level of thinking in posttest for both experimental and control group are provided in Table 5 and 6.

Table 5: The Distribution of students' Van Hiele's Model Levels of geometric thinking of experimental group in the posttest

Van Hiele's levels	Sum of scores	Levels					3 out of 5 Correct Answer Criteria	Total (%)
		1	2	3	4	5		
0	0							
1	1	*					153	157(69.8%)
	5						4	
2	3	*	*				49	49(21.8%)
3	7	*	*	*			19	19(8.4%)
4	-	-	-	-	-	-	-	-
5	-	-	-	-	-	-	-	-
Total							225	100%

Table 5 shows that none of the students failed to achieve level 1 (visualization). However, out of 157 (69.8%) students who achieved level 1 by scoring 1 mark four (4) of them, obtained sum scores of 5 marks for skipping level 2 and were assigned at level 1 based on the Van Hiele table. More so, 49 (21.8%) students obtained 3 marks and were assigned level 2. Also 19 (8.4%) of the students obtained 7 marks by answering at least three out of five questions in levels 1, 2 and 3 correctly and were assigned level 3 informal deduction.

Table 6: Distribution of students' van Hiele's levels of geometric thinking of control Group in the Posttest

van Hiele's levels	Sum of scores	Levels					3 out of 5 Correct Answer Criteria	Total (%)
		1	2	3	4	5		
0	0						23	23 (15.1%)
1	1	*					107	107(70.4%)
2	3	*	*				22	22(14.5%)
3	-	-	-	-	-	-	-	-

4	-	-	-	-	-	-	-	-
5	-	-	-	-	-	-	-	-
Total						152		100%

Table 6 shows a total of 23 (15.1%) students failed to achieve level 1 at the post test of Van Hiele Model Test of Geometric Thinking. 107 (70.4%) students achieved visualization level (level 1) where 1 mark was assigned based on Van Hiele's Level table. A total of 22 (14.5%) also achieved sum scores of 3 and assigned level 2 of Van Hiele's Levels.

Research Question Two

Is there any difference between the Geometric thinking test scores of students taught using Van Hiele Model and those taught using the conventional approach among Senior Secondary School in Sokoto metropolis? This research question was answered using the result of the analysis is provided in Table 7.

Table 7: Mean Rank of Students Levels of Geometric Thinking

Variable	N	Mean Rank	Difference
Experimental group	225	207.66	46,28
Control group	152	161.38	

Table 7 shows the difference in geometric thinking levels between the two groups, the posttest scores were subjected to a Mann-Whitney U test. The analysis revealed a higher mean rank for the experimental group (207.66) compared to the control group (161.38). This result confirms that students who received instruction through the Van Hiele Model developed higher geometric thinking levels than those who were taught using conventional methods.

Research Question Three

Is there any difference between the post-test scores of male and female students taught using Van Hiele Model in Senior Secondary School in Sokoto metropolis? This research question was answered using the result of the analysis provided in Table 8.

Table 8: Mean Rank of Students Levels of Geometric Thinking in Experimental Group

Variable	N	Mean Rank	Difference
Female	150	118.03	15.11

Male	75	102.92
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Table 8 shows the difference based on gender, the analysis shows that the sample of female students obtained higher mean rank (118.03) than the sample of male students with a mean rank of (102.93). This shows that the sample of female students have a higher geometric thinking level. The score was further subjected to test hypothesis,

Hypotheses Testing

This section presents the results of null hypotheses testing corresponding to the research questions. Mann-Whitney U test were employed to analyse the data observed between male, female, experimental and control groups are statistically significant. The null hypotheses were tested at $\alpha = 0.05$ level of significance.

Hypothesis One

H₀₁: There is no significant difference between the Geometric Thinking Levels mean scores of Senior Secondary School students taught using Van Hiele Model and those taught using conventional approach in Sokoto metropolis.

Table 9: Summary of Mann-Whitney U test Analysis for Experimental and Control Groups

Group	N	Mean Rank	Z	U	P-value
Experimental	225	207.66 -4.05		12,902,500	.001
Control	152	161.38			

Table 9 presents the analysis of students GTL based on the **H₀₁** whether if there are significant. The results reveal a statistically significant difference between the two independent groups, with $U = 12,902,500$, $Z = -4.05$ and a P-value of 0.001. Since the P-value is less than the 0.05 significance level, the null hypothesis is rejected. This leads to the conclusion that there is a significant difference in the test scores between the experimental and control groups, in favor of experimental group that were taught using Van Hiele Model.

Hypothesis Two

H₀₂: There is no significant difference between the Geometric Thinking Levels mean scores of male and female Senior Secondary School students taught using Van Hiele Model in Sokoto metropolis.

Table 10: Summary of Mann-Whitney U test Analysis for male and female in Experimental Group.

Group	N	Mean Rank	U	Z	P-value
Female	150	118.3	6,380,000	13,848,74	.046
Male	75	102.93			

Table 10 presents the analysis of students GTS based on the **H₀₂** whether if there are significant. The results reveal a statistically significant difference between male and female in the experimental group, with $U = 6,380,000$, $Z = 13,848,74$ and a P-value of 0.046. Since the P-value is less than the 0.05 significance level, the null hypothesis is rejected. This leads to the conclusion that there is a significant difference in the Van Hiele Levels of geometric thinking between male and female in the experimental group.

Discussion

The finding revealed that the vast majority of students in both experimental and control groups were functioning below Van Hiele Level 1 (Visualization), with only a minimal number reaching Level 1 or 2 and no student attaining higher levels. This outcome empirically confirms the longstanding challenge documented in the literature regarding students' low basic skills in geometry, particularly within the Nigerian context. Hassan (2021) and Hassan et al. (2023) have consistently reported that students in Sokoto display poor foundational geometry skills, which this finding substantiates. Cho & Win (2020) similarly observed that students like their global counterparts, struggle with basic geometric competencies. This low baseline is particularly concerning given that geometry serves as a fundamental cornerstone of the mathematics curriculum, essential for understanding spatial relationships and shapes (Hassan et al., 2023; Ozkan *et al.*, 2018). The absence of students at higher Van Hiele levels reflects the inadequacy of conventional instructional approaches, which Hassan (2020) confirms are not aligned with Van Hiele's Model in Nigerian classrooms.

The finding also demonstrated a striking contrast between the two groups: students taught using the Van Hiele Model achieved remarkable progress, with all reaching at least Level 1 and a significant portion advancing to Level 3 (Informal Deduction), while control group students taught conventionally remained largely below Level 1 with none progressing beyond Level 2. This differential outcome provides robust empirical support for the efficacy of the Van Hiele instructional framework. The experimental group's successful progression through sequential levels validates Hassan et al.'s (2020) assertion that Van Hiele's Model is one of the most effective approaches for helping students achieve geometric thinking levels. Their advancement to Level 3, where students begin to understand relationships between properties, demonstrates mastery of the sequential hierarchy that characterizes Van Hiele's Model. This finding aligns perfectly with Cho & Win (2020) concluded that students receiving Van Hiele-based instruction demonstrate superior understanding of geometric concepts compared to those taught conventionally. Conversely, the control group's stagnation confirms Hassan's (2021) finding that conventional teaching methods fail to achieve the learning objectives outlined in the mathematics curriculum. The differential results also support Sulistyorini's (2018) claim that the Van Hiele Model serves as an effective framework for developing geometric thinking up to higher levels of rigor. Furthermore, this outcome validates the literature's emphasis on the importance of aligning instruction with students' cognitive levels, as Hassan et al. (2023) stress that teachers must understand and teach according to students' current levels of geometric thinking for optimal learning outcomes.

Conclusion

The study conclude that Van Hiele instructional model is the most effective teaching strategy in enhancing geometric thinking levels in senior secondary school students in Sokoto metropolis, compared to conventional approach. Van Hiele model led to higher thinking level.

Recommendations

- I. Mathematics teachers in senior secondary schools should adopt the Van Hiele Model as an instructional strategy for teaching geometry, as it has proven significantly more effective than conventional methods in enhancing students' geometric thinking levels.

- II. Curriculum planners and educational policymakers should integrate the Van Hiele Model into the mainstream mathematics curriculum and provide instructional materials that support its implementation.

Suggestions for Further Studies

- I. A similar study should be conducted in other states and geopolitical zones across Nigeria to determine whether the effectiveness of the Van Hiele Model in enhancing geometric thinking is consistent across diverse cultural and educational contexts, thereby strengthening the generalizability of the findings.
- II. Further research should investigate the long-term retention of geometric thinking levels among students taught using the Van Hiele Model through longitudinal studies, examining whether the gains achieved are sustained over time and whether students continue to progress through higher Van Hiele levels in subsequent academic years.

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Perception of Parents, Teachers and Students on Impact of Insurgency on School Dropout among Secondary School Students in North East Geo-Political Zone, Nigeria

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Abstract

The study examined the perception of parents, teachers and students on impact of insurgency on school dropout among secondary school students in North East Geo-Political Zone, Nigeria. Three (3) research questions with their corresponding objectives and three (3) hypotheses were generated to guide the study. The study adopted cross-sectional survey research design. The population of the study comprised 369,797 (202,720 students, 14,562 teachers and 152,515 parents) from 696 public secondary schools in three states in the North East Geo-Political Zone, Nigeria. Multistage sampling procedure was employed to select the respondents from the three states. The sample size of the study consists of 6117 respondents. The instrument for data collection was a self-developed questionnaire titled Perception of Parents, Teachers and Students on Impact of Insurgency on Secondary School Students' Attainment Questionnaire (PPTSISSSQ). The questionnaire yielded 0.68 as the validity index and 0.75 as reliability index. Descriptive statistics of mean and standard deviation were used to answer the research questions while the independent t- test statistics was used to test all the hypotheses. The findings of the study revealed that there is a significant impact of insurgency on school dropout among secondary school students in North East Geo-Political Zone, Nigeria. The study concluded that there is increased rate of dropout, among secondary school students in North East Geo-Political Zone, Nigeria as a result of insurgency. The study recommended that since the insurgency has increased the rate of school dropout among senior secondary school students in North East Geo-Political Zone, the Federal Government of Nigeria should seek technical assistance from foreign countries such as the USA, Israel, among others to train the country's security agents how to curbed insurgency so that school dropout will be reduced.

Keywords: Insurgency, School dropout, Parent, Teachers, students

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Introduction

Insurgency is globally becoming a household word as there is no nation that is completely absolved from its effects (Alao & Atare, 2012). It has become a frightening phenomenon and a concern for many governments and citizens around the world which draws attention to the vulnerability of modern societies. Although, insurgents' tactics have been in use for a very long time, insurgents increasing use of sophisticated weaponry and the consequences in terms of increase potential for mass casualties have led scholars in social and conflict sciences to place high priority on understanding the causes of insurgency and the means by which it might be prevented (Isabelle, 2004) as in Abolurin (2018). Nations of the world suffering from insurgencies include Afghanistan, Iraq, Mali, Uganda, Kashmir, Yemen, Colombia, Sri-lanka, and Somalia, to mention but a few (Kaplan, 2015).

This study was designed to investigate perception of parents, teachers and students on impact of insurgency on school attainment among secondary school students in North East Zone, Nigeria. Insurgency is a one of the major factors that is inducing several destructions of many economic activities, including educational infrastructure in different locations in the North East of Nigeria. Education in the North East is confronted with the challenges of insurgency. This is because the insurgency has led to the destruction of many schools and caused the affected states to close down schools and colleges for a long period of time. It is assumed that school is the most important social institution where individual learns not only the academics but also acquire the norms and values of the society, and for the school to perform its statutory functions of training members of the society safe and secure conducive environment is required. In recent times in the region, insurgency has made the school environment and the entire school system insecure for effective teaching and learning. Most parents, teachers and students perceive school and its environs as a flash point of insurgency such as killings abduction, bombing and all forms of intimidating treatments. This seriously reduced school enrollment, school attendance, and also increase high rate of school dropout with negative impact on school development and attainment of secondary education in the North East Zone, Nigeria (Umar & Terhembra, 2014). By implication, insurgency activities seem to translate to war against western education in the North East.

In another development, school dropout which is affected by insurgency activities refers to the untimely withdrawal from school before the official period of graduation. Students who withdraw from school prematurely end up not obtaining any certificate of graduation. The issue of school dropout is a major problem confronting the education industry in the North East of Nigeria. School dropout is one of the most serious problems that have continued to bedevil the educational system since inception of insurgency activities in the North East of Nigeria. Dropping out of school is a phenomenon common in educational system. Udama (2017) defined dropout as students who cease to attend school either temporarily or permanently, before or without completing a given educational cycle. In the context of this study, dropout means students enrolled into schools but did not move through to completion or graduation alongside their cohorts. Dropout from school may occur due to incessant insurgency activities. Premature departures or dropping out from school by students is among the serious and notable obstacles to the progress of education in the North East of Nigeria.

Research Questions

The following research questions were raised to guide this study:

- I. What is the mean perception of parents on impact of insurgency on school dropout among secondary school students?
- II. What is the mean perception of teachers on impact of insurgency on school dropout among secondary school students?
- III. What is the mean perception of students on impact of insurgency on school dropout among secondary school students?

Objectives of the Study

- I. To assess the perception of parents on impact of insurgency on school dropout among secondary school students.
- II. To determine the perception of teachers on the impact of insurgency on school dropout among secondary school students.
- III. To explore the perception of students on impact of insurgency on school dropout among secondary school students.

Statement of Hypotheses

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

H₀₁: There is no significant difference in the mean perception of parents and teachers on impact of insurgency on school dropout among secondary students.

H₀₂: There is no significant difference in the mean perception of teachers and students on impact of insurgency on school dropout among secondary students.

H₀₃: There is no significant difference in the mean perception of parents and students on impact of insurgency on school dropout among secondary students.

Research Design

The study was guided by the cross-sectional survey research design. This design was considered suitable because it assisted the researcher to collect data for the purpose of determining the perception of parents, teachers and students on impact of insurgency on senior secondary school students' attainment among senior secondary school students in North East Geo-Political Zone, Nigeria.

Population of the Study

The population of this study consisted of all parents, teachers and students in senior secondary schools in North Eastern States of Nigeria. The study focused on only three states that are experiencing high rate of insurgency activities. The states are Adamawa, Borno and Yobe. The total population of the study consists of 369,797 (152,515 parents, 14,562 teachers and 202,720 students) drawn from 696 public senior secondary schools. The common characteristic of the population is that all of them are stakeholders in senior secondary schools where insurgency activities are occurring frequently. See table 1 below for detail of the distribution of the population of the study

Table 1: Distribution of Population of the Study by States, Students, Teachers and Parents

S/N	State	Schools	Students	Teachers	Parents
1.	Adamawa	274	115,497	5734	61,170
3.	Borno	311	151,263	6361	64,114

4.	Yobe	111	50,845	2467	27,231
Total		696	202,720	14,562	152,515
Grand Total					369,797

Source: Ministry of Education of the various States, 2022

Sample and Sampling Technique

The total sample size of the study consists of 6117 respondents. The sample size of schools was selected using 20%, parents 1%, teachers 10% and students 1% respectively. The use of the above different percentages to select the sample size of the study is supported by Nwogwu (2006) who asserted that the use of simple percentage for determining the sample size of a study must be proportionate to the total population. Multi-stage random sampling procedure was employed to select the respondents from the three states. In the first instance, a purposive sampling technique was employed to select the three states, that is, Adamawa, Borno and Yobe that are faced with the issues of insurgency activities. In the second stage, schools were selected while students and parents were selected in the third and fourth stages respectively. The total sample size of the study consists of 6117 respondents. The exercise was conducted using the lucky-dip method of simple random sampling technique. Serial numbers of the elements in the sampling frame were recorded on pieces of papers, folded and mixed thoroughly for the principals of all the selected schools to pick at once without replacement. This technique gave all the schools, students, teachers and parents equal opportunity of being selected to avoid the bias effect that would reduce the validity and reliability of the study. See Table 2 below for details of the distribution of sample of the study:

Table 2: Distribution of Sample of the Study by States, Students, Teachers and Parents

S/N	State	Schools 20%	Students 1%	Teachers 10%	Parents 1%
1.	Adamawa	54	1154	537	611
3.	Borno	62	1512	636	641
4.	Yobe	22	508	246	272
Total		138	3174	1419	1524
Grand Total					6117

Instrument

The researcher developed an instrument for data collection titled, Perception, Insurgency and School Dropout Questionnaire (PISDQ). The questionnaire contained three clusters (parents, teachers and students) and consisted of 15

items of each of the parents, teachers and students constructed based on a 4-point rating scale of measurement of Strongly Agree (SA), Agree (A), Disagree (D), Strongly Disagree (SD). The options of the items were weighted on the 4-point rating scale format with SA=4, A=3, D=2, SD=1.

Validity of Instrument

The instrument was subjected to experts' judgment for validation. Two experts from Measurement and Evaluation in Faculty of Education, Nasarawa State University, Keffi validated the instrument by checking for comprehensiveness, appropriateness and relevance of the items. The aim of the validation was to determine the logical validity index of the instrument. The logical consensus of the experts yielded 0.68 as index of rational validity.

Reliability of the Instrument

The instrument was pilot tested on a small portion of the population that was not part of the sample respondents. The instrument was trial tested on 75 parents, teachers and students in Gombe State. Cronbach alpha Statistic method was employed to compute the coefficient of internal consistency of the instrument. Cronbach Alpha is a method of estimating internal consistency for instruments with scales that elicit responses on a continuum of 'Strongly Agree, Agree, Strongly Disagree and Disagree. The instrument yielded 0.72 as coefficient of internal consistency.

Techniques for Data Analysis

Descriptive statistics of mean and standard deviation were used to answer the research questions. Kukwi and Amos (2014) maintained that descriptive statistics are passive because they merely describe the numerical properties of observable data. The scale means for classifying each of the items into 'agreed or disagreed' is 2.5 because the instrument was constructed based on 4-point validation scale. t- test statistics method was used to test all the hypotheses at 0.05 level of significance. It is a statistical tool for testing differences in the means of two or more groups.

Data Presentation

Research Question One: What is the mean perception of parents on the impact of insurgency on school dropout among secondary school students?

Table 3: Mean and Standard Deviation Analysis Showing the perception of Parents on the Impact of Insurgency on School Dropout Among Secondary School Students

S/N	ITEMS	SA	A	D	SD	$\bar{X}$	Std. σ
31.	Insurgency has contributed to school dropout of many students	755	559	110	100	2.81	1.96
32.	Insurgent threat of attacks on towns and villages has made some parents to abandon the responsibility of training their children in school.	710	555	155	90	2.88	2.01
33.	The labeling of western education by insurgents as being abominable has discouraged some parents from sending their children to school.	755	499	155	86	2.73	1.88
34.	Killing and abduction of students from school has weakened some parents interest in sending their children to school.	756	493	158	78	2.71	1.87
35.	Incessant killings and kidnapping of students by insurgents scared some parents from sending their children to school.	755	559	112	98	2.82	1.96
Cluster Mean						2.79	1.94
Scale Mean 2.50							

Table 10 shows that item 31 has the mean score of 2.81 and standard deviation of 1.96, item 32 has the mean score of 2.88 and standard deviation of 2.01, item 33 has the mean score of 2.73 and standard deviation of 1.88, item 34 has the mean score of 2.71 and standard deviation of 1.87 while item 35 has the mean score of 2.82 and standard deviation of 1.96. The details of the analysis indicated that the cluster mean of 2.79 is above the scale mean of 2.50, as a result, the respondents (parents) agreed that there is high impact of insurgency on school dropout among secondary school students in North East Geo-Political Zone, Nigeria.

Research Question Two: What is the mean perception of teachers on the impact of insurgency on school dropout among secondary school students?

Table 4: Mean and Standard Deviation Analysis Showing the perception of Teachers on the Impact of Insurgency on School Dropout among Secondary School Students

Perception of Parents, Teachers and Students on Impact of Insurgency on School Dropout among Secondary School Students in North East Geo-Political Zone, Nigeria

S/N	ITEMS	SA	A	D	SD	$\bar{X}$	Std. σ
36.	Insurgency attacks on schools has made some students to stay away from schools	705	509	109	96	2.80	1.95
37.	Constant bombing and attacks on schools has forced some students to run from schools	710	594	115	90	2.79	1.94
38.	Insurgency has forced our school to close down for a long period because of fear of unknown	720	494	120	86	2.77	1.92
39.	Insurgency has contributed to school dropout of many students.	726	488	128	78	2.76	1.91
40.	The labeling of western education by insurgents as being abominable has discouraged parents from sending their children to school.	705	509	109	98	2.80	1.95
Cluster Mean						2.78	1.94
Scale Mean 2.50							

Table 4 shows that item 26 has the mean score of 2.80 and standard deviation of 1.95, item 27 has the mean score of 2.79 and standard deviation of , 1.94, item 28 has the mean score of 2.77 and standard deviation of 1.92, item 29 has the mean score of 2.76 and standard deviation of 1.91 while item 5 has the mean score of 2.80 and standard deviation of 1.95. The details of the analysis indicated that the cluster mean of 2.78 is above the scale mean of 2.50, as a result, the respondents (teachers) agreed that there is high impact of insurgency on school dropout among secondary school students in North East Geo-Political Zone, Nigeria.

Research Question Three: What is the mean perception of students on the impact of insurgency on school dropout among secondary school students?

Table 5: Mean and Standard Deviation Analysis Showing the perception of Students on the Impact of Insurgency on School Dropout Among Secondary School Students

S/N	ITEMS	SA	A	D	SD	$\bar{X}$	Std. σ
41.	Some students have abandoned the admission offered to them because of fear of being kidnapped or killed.	1760	1150	250	204	2.81	1.96
42.	Bombing and killing of students and teachers by insurgents have made some students to run away from school.	1730	1154	238	242	2.83	1.98
43.	Insurgency has forced our school to close down for a long period because of fear of unknown	1702	1154	270	238	2.86	2.00
44.	Instability in school calendar caused	1734	1165	225	240	2.83	1.98

	by insurgency has eroded some parents interest in the school system.								
45.	Insurgent attacks have made some students to stay away from school.	1720	1154	250	240	2.84	1.98		
Cluster Mean							2.84	1.98	
Scale Mean 2.50									

Table 5 shows that item 41 has the mean score of 2.81 and standard deviation of 1.96, item 42 has the mean score of 2.83 and standard deviation of 1.98, item 43 has the mean score of 2.86 and standard deviation of 2.00, item 44 has the mean score of 2.83 and standard deviation of 1.98 while item 45 has the mean score of 2.84 and standard deviation of 1.98. The details of the analysis indicated that the cluster mean of 2.84 is above the scale mean of 2.50, as a result, the respondents (students) agreed that there is high impact of insurgency on school dropout among secondary school students in North East Geo-Political Zone, Nigeria.

Testing of Hypotheses

All the hypotheses were tested using Pearson's product moment correlation at 0.05 level of significance. The details of the analyses are presented on Tables 6 to 8 below:

Hypothesis 1: There is no significant difference in the mean perception of parents and teachers on impact of insurgency on school dropout among secondary school students

Table 6: t-test statistics Showing the Significant difference in the Mean Perception of Parents and Teachers on Impact of Insurgency on School Dropout among Secondary School Students.

Group	N1	N2	Mean	Std dev	t	df	p-value	Decision
Parents	5	1524	2.7900	0.06964	0.186	8	0.857	Accept Ho
Teachers	5	1419	2.7840	0.01817				

Note: N1= number of items and N2=Number or sample of respondents.

Table 6 shows the t-test statistics of significant difference in the mean perception of parents and teachers on impact of insurgency on school dropout among secondary school students. The analysis of the results demonstrated that the t-calculated value is 0.186 while the p-value of t is 0.857 and 8 as degree of freedom. Since the p-value of 0.857 is above

0.05 level of significance, the null hypothesis is therefore accepted implying there is no significant difference in the mean perception of parents and teachers on impact of insurgency on school dropout among secondary school students in North-East Geo-political zone of Nigeria.

Hypothesis 2: There is no significant difference in the mean perception of teachers and students on impact of insurgency on school dropout among secondary school students

Table 7: t-test statistics Showing the Significant difference in the Mean Perception of Teachers and Students on Impact of Insurgency on School Dropout among/ Secondary School Students

	Group	N1	N2	Mean	Std dev	t	df	p-value	Decision
Mean ratings	Teachers	5	1419	2.7840	0.01817	-4.352	8	0.002	Reject Ho
	Students	5	3174	2.8340	0.01817				

Note: N1= number of items and N2=Number or sample of respondents.

Table 7 shows the t-test statistics of significant difference in the mean perception of teachers and students on impact of insurgency on school dropout among secondary school students. The analysis of the results demonstrated that the t-calculated value is 0.186 while the p-value of t is 0.002 and 8 as degree of freedom. Since the p-value of 0.002 is less than 0.05 level of significance, the null hypothesis is therefore accepted implying there is a significant difference in the mean perception of teacher and students on impact of insurgency on school dropout among secondary school students in North-East Geo-political zone of Nigeria.

Hypothesis 3: There is no significant difference in the mean perception of parents and students on impact of insurgency on school dropout among secondary school students

Table 8: t-test statistics Showing the Significant difference in the Mean Perception of Parents and Students on Impact of Insurgency on School Dropout among Secondary School Students.

	Group	N1	N2	Mean	Std dev	t	df	p-value	Decision
Mean ratings	Parents	5	1524	2.7900	0.06964	-1.367	8	0.209	Accept Ho
	Students	5	3174	2.8340	0.01817				

Note: N1= number of items and N2=Number or sample of respondents.

Table 8 shows the t-test statistics of significant difference in the mean perception of parents and students on impact of insurgency on school dropout among secondary school students. The analysis of the results

demonstrated that the t-calculated value is -1.367 while the p-value of t is 0.209 and 8 as degree of freedom. Since the p-value of 0.002 is less than 0.05 level of significance, the null hypothesis is therefore accepted implying there is a significant difference in the mean perception of parents and students on impact of insurgency on school dropout among secondary school students in North-East Geo-political zone of Nigeria.

Summary of Major Findings

The following are the findings of the study:

- I. There is no significant difference in the mean perception of parents and teachers on impact of insurgency on school dropout among secondary students.
- II. There is a significant difference in the mean perception of teachers and students on impact of insurgency on school dropout among secondary students.
- III. There is no significant difference in the mean perception of parents and students on impact of insurgency on school dropout among secondary students.

Discussion

The findings of hypothesis 1: revealed that there is no significant difference in the mean perception of parents and teachers on impact of insurgency on school dropout among secondary school students in North East Geo-Political Zone, Nigeria. In other words, parents and teachers do not differ in their views regarding the impact of insurgency on school dropout in the North-East Geo-Political zone of Nigeria. Ajaga (2012) in agreement in his findings discovered that that insurgency had a significant impact on School Dropout Pattern among Senior Secondary Schools in Delta State, Nigeria as SS1, SS2 AND SS3 classes witnessed. Furthermore, findings from the study of Olowoselu, Ene and Ibietan (2015) found in their study that Boko Haram activities have increased the cost of education as many students have dropped out of school. It was recommended that in order to improve school attendance and reduce dropout. Similarly, the findings from the research work of Abdullahi and Ibrahim (2018) revealed that before Boko haram insurgency, basic educational programmes were running smoothly with minimal dropout among students.

The study also revealed that schools in the area were indefinitely closed down and later a high-rate school dropout and this has significantly affected day to day running of the schools and consequently affecting education of children in the area.

The findings on hypothesis 2 revealed that there is a significant difference in the mean perception of teachers and students on impact of insurgency on school dropout among secondary school students in North- East Geo-Political Zone, Nigeria. In other words, teachers and students differ in their views regarding the impact of insurgency on school dropout in the North-East Geo-Political zone of Nigeria. In agreement, major findings from the study of Obike, Okala and Nwabueze (2016) shows a higher percentage of dropouts in SSI, and a decline in SSII; a higher percentage of dropouts among females in all parameters; a higher percentage of dropouts in rural schools; a higher percentage of dropouts in mixed schools; a higher percentage of dropouts in public schools, a significant difference on percentage dropouts between male and female single sex schools; a significant difference on percentage of dropouts between mixed and single sex schools; and a significant difference on percentage dropouts between schools in urban and rural areas.

The findings on hypothesis 3: revealed that there is no significant difference in the mean perception of parents and students on impact of insurgency on school dropout among secondary school students in North- East Geo-Political Zone, Nigeria. In other words, parents and students do not differ in their views regarding the impact of insurgency on school dropout in the North-East Geo-Political zone of Nigeria. Eme and Ibietan (2012) found in their study that Boko Haram activities have increased the cost of education thereby leading to many students dropping out of school in Nigerian Educational System. School dropout which is affected by insurgency activities refers to the untimely withdrawal from school before the official period of graduation.

Conclusion:

The following conclusion was drawn based on the findings of the study: The study concluded that Insurgent activities have increased school dropout among secondary school students in North East Geo-Political Zone, Nigeria. Parents, teachers and students opined that insurgency has a serious impact on school dropout among senior secondary school students in North East Geo-Political Zone, Nigeria.

Recommendations:

The following recommendations were made based on the findings of this study:

- I. Since the insurgent activities increased school dropout among secondary school students in North East Zone, the study recommended that the Federal Government of Nigeria should seek for technical assistance from foreign countries such as the USA, Israel, among others to train the country's security agents how to curb insurgency so that school dropout will be increased.
- II. The management of the various secondary schools in the North East Zone, Nigeria should collaborate with the community leaders to set up a community-based security agency such as the "Vigilante" to complement the efforts of the Nigeria Police and the Armed Forces in order to reduce fears and reduce school dropout.
- III. Since the insurgency has increased the rate of dropout among senior secondary school students in North East Zone, Nigeria, the study recommended that the various state governments in the North East should introduce free and compulsory secondary education so that students who dropped out of schools due to insurgency could have access to school again.
- IV. The government should embark on rigorous sensitization of parents and students in The North-East on the importance of western education and also assuring them of adequate security.
- V. The services of experienced counselors should be sought by state governments in the North-East in order to facilitate the rehabilitation and integration of students who have dropped out of school or those who have been irregular in school due to insurgency.

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Strategic Human Resource Management: Driving Organizational Performance in Educational Institutions

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Abstract

Strategic Human Resource Management (SHRM) has emerged as a key driver of organizational performance across sectors, yet its application in educational institutions remains underdeveloped, particularly in resource-constrained contexts such as Nigeria. This conceptual paper addresses three research questions: how SHRM principles can be conceptualized within educational settings, what theoretical mechanisms link SHRM to performance, and what conceptual framework explains this linkage. Drawing on Resource-Based View, Behavioral Perspective, AMO Framework, High-Performance Work Systems, and Contingency Theory, the paper defines SHRM as the vertical and horizontal alignment of HR practices with institutional strategic goals. Organizational performance in education is conceptualized across academic, operational, and stakeholder outcomes, mediated by psychological climate, human capital, and organizational citizenship behavior. Applying the framework to the Nigerian situation, the paper identifies practical strategies for enhancing HR management despite severe funding constraints, teacher shortages, and brain drain. The analysis reveals that fragmented, administrative HR approaches dominate Nigerian institutions, while strategic alignment remains rare. The paper concludes that context-adapted SHRM—emphasizing workforce planning, developmental performance management, participative decision-making, and external partnerships—can drive sustainable performance. Theoretical contributions extend SHRM to non-profit, service-intensive bureaucracies. Practical implications guide educational leaders and policymakers in designing coherent HR systems under resource limitations.

Keywords: Strategic Human Resource Management, Organizational Performance, Educational Institutions, Teacher Effectiveness, Institutional Culture, HR Alignment

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Introduction

Educational institutions across the globe are transitioning from traditional operational models to performance-driven organizations. This shift reflects the growing recognition that achieving academic excellence, operational efficiency, and stakeholder satisfaction requires a deliberate and integrated approach to managing human capital. However, the path to improved performance is fraught with persistent challenges, including severe funding constraints, high teacher turnover rates, and mounting accountability pressures from governments and accrediting bodies (Zerrad & Schechter, 2025). Despite the acknowledged importance of human resources in this sector, many primary, secondary, and tertiary institutions still manage their workforce using fragmented, administrative-focused practices rather than coherent, strategic frameworks. Scholars note that while international interest in strategic human resource management (SHRM) within the educational context is increasing, empirical research on its application in schools and universities remains limited (Tuytens *et al.*, 2023).. This gap is particularly evident in the limited conceptual integration of SHRM into the educational management literature, where human resource functions often operate in isolation from institutional strategic planning.

This conceptual paper addresses these issues by systematically investigating three core research questions. First, how can SHRM principles be effectively conceptualized within the unique organizational context of educational institutions? Second, what are the theoretical mechanisms through which SHRM drives organizational performance in the education sector? Third, what conceptual framework explains the linkage between SHRM and performance outcomes in schools and universities? The scope of this analysis focuses on formal educational institutions, including primary, secondary, and tertiary levels. This study adopts an organizational-level perspective, examining systemic outcomes rather than individual teacher performance in isolation. By concentrating on the institution as the unit of analysis, this paper seeks to move beyond anecdotal accounts of effective HR practices and provide a structured understanding of how strategic human resource systems contribute to broader organizational success.

This study makes significant contributions to both theory and practice. From a theoretical standpoint, the paper extends established SHRM frameworks,

which have been largely developed in for-profit corporate settings, to the context of non-profit, service-intensive, professional bureaucracies (Baluch & Ridder, 2021). In doing so, it responds to calls for more contextually relevant models that recognize the unique mission-driven nature of educational work. For practitioners, including principals, deans, and HR administrators, this paper provides a conceptual roadmap for moving beyond transactional personnel management toward strategic decision-making. Recent empirical evidence supports the practical value of this approach: districts and universities that adopt strategic developmental HR systems experience higher student achievement, lower teacher turnover rates, and fewer staff vacancies than those using other HR typologies (Gassanova & Kozhakhmet 2023). By articulating a clear conceptual framework, this paper aims to equip educational leaders with the theoretical foundation needed to align their human resource practices with institutional goals and drive sustainable organizational performance.

Theoretical Foundations

This section establishes the theoretical basis for conceptualizing Strategic Human Resource Management (SHRM) in educational institutions. Four complementary theories—Resource-Based View, Behavioral Perspective, AMO Framework, High-Performance Work Systems, and Contingency Theory—provide a robust foundation for understanding how human resource practices drive organizational performance in schools and universities.

A. Resource-Based View (RBV)

The Resource-Based View positions human capital as a primary source of sustainable competitive advantage. According to this theory, organizations achieve superior performance when they possess resources that are valuable, rare, inimitable, and organized (VRIO). In educational institutions, teachers and administrators constitute exactly this type of strategic asset. Teachers bring specialized pedagogical knowledge and relational skills that directly determine student learning outcomes. School leaders shape instructional climate, resource allocation, and strategic direction. These human resources create value because effective teaching raises student achievement, and competent leadership improves operational efficiency. Teacher quality remains rare because only a subset of education graduates possess advanced instructional skills and resilience for challenging classroom environments. The

inimitability of effective teaching stems from its tacit nature: a teacher cannot simply replicate another's successful strategies without deep contextual understanding and practice. Finally, educational institutions must organize these human resources through coherent recruitment, development, and retention systems. Studies confirm that school districts adopting a VRIO-aligned approach to teacher management report higher student performance and lower turnover than districts treating teaching as a replaceable commodity (Tuytens *et al.*, 2023; Zerrad & Schechter, 2025).

B. Behavioral Perspective of Strategic Human Resource Management (SHRM)

The Behavioral Perspective argues that HR practices function primarily to shape and reinforce employee behaviors that advance organizational goals. Rather than focusing solely on skills or knowledge, this theory directs attention to discretionary role behaviors such as extra effort, collaborative problem-solving, and pedagogical innovation. In educational settings, HR systems can encourage or discourage these behaviors through specific design features. Performance appraisal systems that reward collaborative curriculum development rather than isolated classroom performance encourage teachers to share effective practices. Career progression policies that recognize mentoring and peer coaching foster knowledge transfer across grade levels or departments. Recruitment processes that select for growth mindset and collegiality produce a workforce more willing to engage in school-wide improvement initiatives. Research on Belgian primary and secondary schools demonstrates that principals who intentionally align HR practices with desired teacher behaviors achieve higher levels of teacher collaboration and instructional innovation compared to schools using administrative-only HR approaches (Tuytens *et al.*, 2023). The behavioral perspective thus provides a direct mechanism linking HR practice design to organizational performance outcomes.

C. Ability-Motivation-Opportunity (AMO) Framework

The AMO Framework specifies that employee performance results from three independent but interacting factors: ability, motivation, and opportunity. Ability refers to the knowledge, skills, and competencies employees possess to perform their roles effectively. Motivation encompasses the psychological forces that drive effort toward organizational goals. Opportunity denotes the situational conditions and discretionary space that enable employees to apply

their abilities and motivation. HR practices influence each pathway. Selection and professional development systems build ability. Performance feedback, recognition, and career advancement structures shape motivation. Participative decision-making, team teaching arrangements, and autonomy over instructional methods create opportunity. Educational institutions that systematically address all three pathways outperform those focusing on only one or two dimensions. For example, a school that invests heavily in teacher training (ability) but restricts classroom autonomy (opportunity) or fails to recognize excellent teaching (motivation) will see limited performance gains. A study of Lahore University of Management Sciences applied the AMO framework and found that integrated HR practices targeting ability, motivation, and opportunity simultaneously produced significantly higher faculty research output and student satisfaction than piecemeal interventions (Raza, 2025).

D. High-Performance Work Systems (HPWS)

High-Performance Work Systems represent bundles of complementary HR practices that together produce synergistic effects on organizational performance. Core HPWS components include selective staffing, extensive training, formal performance appraisal, competitive compensation, and employee participation mechanisms. In educational settings, selective staffing means recruiting candidates not only for current qualifications but also for fit with institutional mission and capacity for professional growth. Extensive training moves beyond one-day workshops to sustained, job-embedded professional development aligned with school improvement goals. Formal performance appraisal uses multiple measures (classroom observations, student growth data, peer reviews) and links results to developmental support. Competitive compensation rewards effectiveness and retention of high-performing educators. Employee participation includes teacher involvement in curriculum decisions, school committees, and strategic planning. Critics question whether HPWS principles translate directly from manufacturing or service industries to educational contexts. However, evidence from Australian higher education institutions shows that universities implementing HPWS bundles experience lower faculty turnover and higher research productivity than those using isolated HR practices (Khan & Tarafder, 2020). The key adaptation involves modifying incentive structures away from individual competition and toward collective academic achievement.

E. Contingency Theory

Contingency Theory rejects one-size-fits-all prescriptions for HR strategy and instead argues that effective HR systems must align with organizational context. For educational institutions, critical contextual variables include institutional size, funding source (public vs. private), mission orientation (academic vs. vocational), and regulatory environment. Large urban school districts face different HR challenges than small rural schools. Private universities with substantial endowments can offer higher salaries and more professional development resources than public institutions facing legislative budget caps. Research-focused universities require HR practices that incentivize publication and grant acquisition, while community colleges need systems that reward teaching excellence and student support. Regulatory environments shape flexibility: unionized public schools must negotiate HR changes with collective bargaining units, while private schools retain greater autonomy. Contingency theory therefore predicts that no single HR model maximizes performance across all educational contexts. Instead, principals and administrators must diagnose their institutional conditions and design HR practices that fit those specific parameters. Research on strategic human resource management in nonprofit organizations confirms that contextual alignment explains more variance in organizational performance than the adoption of any particular HR practice bundle (Baluch & Ridder, 2021). Educational leaders who ignore contingency factors risk implementing incompatible HR systems that produce frustration rather than improvement.

Key Constructs and Conceptual Definitions

A. Strategic Human Resource Management (SHRM)

Strategic Human Resource Management refers to the deliberate alignment of an organization's human resource policies and practices with its strategic goals. In educational institutions, this alignment operates along two dimensions. Vertical alignment ensures that every HR activity—recruitment, professional development, performance appraisal, and compensation—directly supports the institution's mission, whether that mission emphasizes academic excellence, inclusive education, or vocational readiness. For example, a school whose strategic goal is improving literacy outcomes would vertically align its professional development budget toward evidence-based reading instruction and its performance appraisal system toward classroom observations of literacy teaching. Horizontal alignment demands internal consistency across

HR practices so that they reinforce rather than contradict each other. A university that selects faculty based on collaborative teaching skills but then appraises performance solely on individual publication output creates horizontal inconsistency that confuses faculty behavior. Research on strategic HRM in Flemish primary and secondary schools found that schools achieving both vertical and horizontal alignment reported significantly higher teacher commitment and student achievement than those with fragmented HR approaches (Tuytens et al., 2023). Without this dual alignment, HR practices function as disconnected administrative tasks rather than as a coherent strategic system.

B. Organizational Performance in Educational Institutions

Organizational performance in educational settings encompasses three distinct but interrelated outcome categories. Academic outcomes represent the core mission of any educational institution: student achievement measured through standardized tests, graduation rates, grade progression, and college or career readiness. These indicators directly reflect the quality of teaching and learning processes. Operational outcomes capture the efficiency and stability of the institution's internal functioning. Key operational measures include teacher retention rates (lower turnover reduces recruitment and training costs), student and staff attendance (chronic absence signals disengagement), and resource efficiency (maximizing learning outcomes per dollar spent on personnel and facilities). Stakeholder outcomes reflect how external groups perceive and interact with the institution. Parent and student satisfaction surveys, community reputation, employer assessments of graduate preparedness, and accreditation status all fall into this category. A growing body of evidence indicates that these three performance dimensions interact dynamically. High teacher retention (operational) improves student achievement (academic), which in turn raises parent satisfaction (stakeholder). Conversely, high turnover damages all three. Recent research on Pakistani universities demonstrates that institutions systematically tracking all three performance categories achieve more sustainable improvement than those focusing narrowly on exam scores (Raza, 2025).

C. Mediating Mechanisms

Three mediating mechanisms explain how SHRM practices translate into organizational performance in educational settings. First, psychological

climate refers to employees' collective perceptions of trust, justice, and support within the institution. When teachers perceive fair performance appraisals, transparent promotion decisions, and genuine administrative support for classroom challenges, they respond with higher engagement and lower burnout. SHRM practices directly shape this climate: consistent and transparent HR policies build trust, while arbitrary or secretive processes destroy it. Second, human capital encompasses the actual pedagogical skills, leadership competencies, and content knowledge possessed by faculty and administrators. Strategic recruitment brings high-potential candidates into the institution, while sustained professional development continuously upgrades their capabilities. Unlike physical resources, human capital appreciates with strategic investment. Third, organizational citizenship behavior (OCB) captures extra-role contributions that fall outside formal job descriptions but enable institutional effectiveness. Examples include veteran teachers mentoring new colleagues without compensation, faculty volunteering for accreditation committees, or administrators sharing successful intervention strategies across departments. Research on Australian higher education institutions confirms that high-performance work systems increase OCB by fostering reciprocal obligation between employees and the institution (Khan & Tarafder, 2020). These three mechanisms—psychological climate, human capital, and OCB—operate as intervening variables: SHRM practices affect them directly, and they in turn drive academic, operational, and stakeholder outcomes.

Strategies for Enhancing Human Resources Management in Nigerian Educational Institutions

The preceding sections have established that strategic human resource management (SHRM) constitutes a critical driver of organizational performance in educational settings. However, applying these principles in the Nigerian context requires addressing a distinct set of structural and operational challenges. Nigeria's education sector faces severe funding constraints, with the national budget allocation to education stagnating at just 6–7 percent, far below the UNESCO-recommended 20 percent. This underfunding has produced a national teacher shortage of 194,876 in public primary schools alone, with secondary schools similarly affected. The 2025 education budget of N3.5 trillion, representing seven percent of the national budget, left a shortfall of approximately N290 billion for teacher salaries alone. Under these constraints, enhancing human resources management demands pragmatic

strategies that maximize existing resources while advocating for systemic reform.

A. Strategic Workforce Planning and Data-Driven Recruitment

Effective HR management begins with accurate workforce data and systematic planning. Many Nigerian educational institutions operate without reliable human resource information systems, leading to mismatches between teacher supply and demand. Strategic workforce planning requires institutions to conduct regular teacher demand forecasts based on student enrollment trends, subject-specific shortages, and attrition rates. Recent evidence from Colleges of Education in Oyo State demonstrates that institutions implementing structured human resource planning achieve significantly higher organizational performance than those relying on ad-hoc arrangements (Oyeniran, 2025). Recruitment practices must move beyond credential verification to include competency-based assessments, teaching demonstrations, and value congruence evaluation. The UNESCO-EU Expand, Integrate and Strengthen Systems (EISS) programme specifically targets opaque teacher recruitment and deployment policies by strengthening government capacities to assess teaching needs and develop evidence-based policies for teacher recruitment, deployment, and management. Similarly, the World Bank-funded HOPE-Education programme (\$552 million) aims to enhance the skills of 500,000 public school teachers across all 36 states and the Federal Capital Territory, supported by a robust education management information system that enables evidence-based decisions (Tyohemba, 2025). Kwara State provides a practical model, having recruited over 3,400 new teaching and non-teaching staff between 2024 and 2025, with emphasis on STEM subjects and community-based education.

B. Talent Management and Strategic Retention

Retaining qualified academic staff remains a persistent challenge across Nigerian tertiary institutions. A study of Ogun State universities confirmed that effective talent management practices positively influence employee productivity and organizational performance (Obisanya *et al.*, 2024). However, research across Nigerian tertiary institutions reveals that the efficacy of current HRM procedures remains poor, with effective communication, remuneration and compensation, and employee appreciation emerging as the three most important practices for improving retention (Ayobamidele, 2025).

Private universities in Southwest Nigeria have demonstrated that strategic management strategies—including career development pathways, research support, and recognition programmes—significantly improve academic staff retention when properly implemented (Oyalabu *et al.*, 2023). Covenant University provides a specific case: recognition programmes significantly influence employees' behavioural outcomes, leading the institution to recommend continuous evaluation and adjustment of recognition policies to maintain talent retention competencies. Institutions should implement performance-based bonuses, periodic salary adjustments, staff welfare packages, hardship allowances, and tailored recognition programmes that acknowledge the distinctive contributions of both academic and non-academic staff.

C. Professional Development and Capacity Building

Continuous professional development transforms underqualified teachers into effective classroom practitioners. The 2021 Education Sector Analysis reported that at least 20 percent of teachers in public basic education schools in Nigeria lack formal qualifications, with this figure nearly doubling in private schools. Addressing this deficit requires both pre-service and in-service training programmes aligned with institutional goals. The EISS programme partners with six training colleges across Adamawa, Bayelsa, Enugu, Katsina, Plateau, and Oyo states to develop expanded teacher education programmes with a focus on resilience in fragile contexts. Research from Northeast Nigerian universities confirms that training and development have significant positive effects on employee performance, job satisfaction, and academic staff retention. The SERVICOM Presidency has explicitly stated that continuous implementation of professional development programmes enhances teachers' skills and teaching methods, thereby boosting quality service delivery (Anyanwu, 2024). Practical strategies include mobile-based communities of practice, as demonstrated by the CL4STEM project for science and mathematics teachers; the NextGen Teachers Bootcamp, which has trained over 1,000 educators across four states; and digital literacy and English proficiency workshops conducted by the National Commission for Colleges of Education in partnership with the British Council.

D. Performance Management with Developmental Focus

Performance management systems in Nigerian educational institutions frequently operate as punitive compliance exercises rather than developmental

tools. Evidence from South-western Nigeria indicates that all four dimensions of HRM practices—recruitment and selection, training and development, performance appraisal, and compensation management—directly determine both perceived quality and perceived relevance of tertiary education (James & Fagbenle, 2025). Effective performance management requires regular classroom observations using standardized protocols, goal-setting conferences that align individual objectives with institutional priorities, and actionable improvement plans linked to professional development resources. The HOPE-Education programme's emphasis on digital tools, modern pedagogy, and inclusive teaching practices provides a framework for linking performance assessment to targeted capacity building (Tyohemba, 2025). Institutions should also adopt 360-degree feedback mechanisms that incorporate student evaluations, peer reviews, and self-assessments, moving beyond the sole reliance on administrative judgment.

E. Compensation, Recognition, and Welfare Enhancement

Compensation remains the most immediate lever for improving teacher motivation and retention, yet Nigeria's budget shortfall of N290 billion for teacher salaries in 2025 highlights the scale of the challenge (Wahab, 2025). While federal and state governments must address this structural underfunding, individual institutions can implement supplementary strategies. The National Minimum Wage of N70,000, though recently increased, remains inadequately implemented across several states (Jide, 2025). In response, institutions should advocate for full implementation of approved incentives, including the special salary scale, harmonised retirement age (now implemented by 22 states and the FCT), and low-cost housing schemes for rural teachers. Non-monetary recognition programmes—teacher of the month awards, public acknowledgment at institutional events, leadership opportunities on committees, and sabbatical or research leave privileges—provide cost-effective alternatives that nonetheless improve morale. Research confirms that underpaid teachers are less motivated and struggle to meet student educational needs, making competitive compensation a non-negotiable foundation for any strategic HR system (Wahab, 2025).

F. Participative Decision-Making and Voice Mechanisms

Teacher participation in institutional decision-making improves both job satisfaction and organizational outcomes, yet Nigerian educational institutions

often operate with top-down governance structures. Establishing teacher-led academic committees, instructional councils, and anonymous feedback systems creates formal channels for staff input on curriculum choices, resource allocation, and school policies. The HOPE-Education programme's emphasis on strengthening education systems includes building connections between teachers, students, and communities (Tyohemba, 2025). Research on HRM practices in Nigerian tertiary institutions confirms that employee participation ranks among the three most important practices for improving retention, alongside remuneration and recognition (Ayobamidele, 2025). Institutions should also establish regular staff forums where administrators report on strategic decisions and solicit input before implementation. The National Coordinator of SERVICOM has specifically recommended community engagements that foster partnerships with parents, local organizations, and community leaders, thereby integrating teacher voice with broader stakeholder participation (Anyanwu, 2024).

G. Leveraging Policy Reforms and External Partnerships

Individual institutions cannot solve systemic HR challenges alone. Strategic HR enhancement requires engagement with ongoing policy reforms and external partnerships. President Tinubu's Renewed Hope Agenda has placed education, digital economy development, and human capital advancement at the centre of national development strategy (Lokoja, 2025). The administration's seven-year moratorium on establishing new federal universities, polytechnics, and colleges of education allows the government to refocus resources on improving existing institutions rather than diluting them. The \$500 million HOPE-GOV programme, implemented in partnership with the World Bank, specifically aims to strengthen financial and human resource management in basic education and primary healthcare. Educational institutions should actively participate in these programmes, draw down available matching grants (noting that N54 billion in UBEC matching grants remained unaccessed as of March 2024), and advocate for the full implementation of teacher welfare packages (Jide, 2025). The European Union's investment in teacher resilience and professional development across six states provides a template for how external partnerships can supplement domestic funding.

Based on the preceding analysis, Nigerian educational institutions should implement an integrated set of strategies: deploy data-driven workforce

planning systems to match teacher supply with enrollment demand; adopt competency-based recruitment and value-aligned selection; implement continuous professional development through both traditional workshops and mobile-based communities of practice; establish developmental performance management systems linked to career progression; advocate for full implementation of approved salary scales and welfare packages while supplementing with non-monetary recognition; create formal teacher voice mechanisms in institutional governance; and actively leverage World Bank, UNESCO, and EU partnership programmes for capacity building and system strengthening. These strategies, implemented in concert rather than in isolation, constitute a coherent SHRM framework adapted to the resource constraints and structural realities of Nigerian educational institutions.

Challenges faced by Human Resource Management in Nigerian educational institutions

Human Resource Management in Nigerian educational institutions is confronting an accumulation of severe and interconnected challenges. The challenges can be grouped into four main categories: chronic underfunding, severe shortages and attrition, political and administrative constraints, and quality deficits.

A. Chronic Underfunding and Resource Scarcity

The most fundamental challenge is chronic underfunding. While the federal education budget increased in nominal terms, rising from N1.54 trillion in 2023 to N3.52 trillion in 2025, it has consistently remained between 6% and 7% of the national budget (Akintola, 2025). This is far below the UNESCO recommendation of 15-26% (Femi, 2025).

The immediate consequence is a direct shortfall in the resources needed to pay teachers. An analysis of the 2025 budget revealed a shortfall of approximately N290 billion between the N1.64 trillion allocated for personnel costs and the N1.93 trillion required for teacher salaries. This funding gap makes it difficult to recruit and retain qualified teachers (Wahab, 2025). Beyond salaries, the lack of resources has led to "inadequate infrastructure and low staff morale". Many universities are forced to rely on Internally Generated Revenue for basic operations, which should be directed toward research and development (Femi, 2025).

B. Severe Staff Shortages and the Brain Drain Crisis

Chronic underfunding has directly fueled a severe manpower crisis across the education sector. In the basic education sub-sector, the Nigeria Union of Teachers (NUT) reported a shortage of 194,876 teachers in public primary schools nationwide, with secondary schools also in a critical state (Agbajileke, 2025; Moses, 2025). This shortage is compounded by the fact that many state governments have failed to recruit new teachers for over five years.

The tertiary education sector is facing an even more acute challenge: a devastating "brain drain." Over the past five years, the University of Lagos (UNILAG) lost nearly 1,800 of its 3,000 academic staff—60% of its workforce—who fled abroad for better opportunities (Lawal, 2025). Across the country, the Academic Staff Union of Universities (ASUU) revealed that no fewer than 309 professors resigned within a nine-month period in 2025. At UNILAG, 239 first-class graduates employed as lecturers left within seven years, with only 17 remaining.

This exodus is driven by a combination of "poor remuneration, unconducive working conditions, and low motivation" (Femi, 2025). This has resulted in an untenable faculty-student ratio of 1:60 at UNILAG, compared to the global benchmark of 1:16. The National Universities Commission (NUC) confirmed that this "brain drain is already undermining Nigeria's global competitiveness in the education sector".

C. Political Interference, Ineffective Recruitment, and Policy Gaps

The HR challenges are worsened by political and administrative issues. The recruitment process is often undermined by "favoritism in recruitment and external interference in disciplinary actions" (Mafindi, 2024). There is also a lack of institutional autonomy, with ministries, departments, and agencies frequently interfering in the functions of university governing councils, including their power to hire and disengage staff.

Furthermore, a significant policy implementation gap exists. While the federal government approved a special salary scale, a harmonised retirement age, and low-cost housing for rural teachers in 2020, these welfare packages remain unimplemented in most states (Agbajileke, 2025; Moses, 2025). Similarly, the full implementation of the N70,000 national minimum wage for teachers has stalled in at least ten states.

D. Quality Deficit: Unqualified Teachers and a Demoralised Workforce

The shortage of qualified personnel has forced many schools to hire unqualified staff. Over 47 million pupils in primary and junior secondary schools are taught by some 354,650 teachers, "many of whom are unqualified" (ThisDay, 2025). This is particularly prevalent in unregistered private schools, where proprietors often lack the skills to make proper hiring decisions (Punch, 2024). The Teachers Registration Council of Nigeria (TRCN) has threatened to publicly expose such unqualified teachers.

This situation has produced a demoralised and demotivated workforce. Teachers and lecturers report "low motivation, high absenteeism and attrition" (Oballum *et al.*, 2024). The consequences are directly felt in student outcomes, as a demoralised workforce struggles to meet the educational needs of students. As Professor Yakubu Ochefu, Secretary General of the Committee of Vice Chancellors, summarised, Nigerian universities are battling "poor funding, inadequate manpower and infrastructural decay" which have led to "demoralised workers with consequences on student outcomes".

Conclusion

This conceptual paper set out to examine how Strategic Human Resource Management can drive organizational performance in educational institutions, with a specific application to the Nigerian context. The analysis has addressed three core research questions. First, SHRM principles are conceptualized within educational settings through vertical alignment of HR practices with institutional mission and horizontal consistency across recruitment, development, appraisal, and compensation. Second, the theoretical mechanisms linking SHRM to performance include the AMO framework (ability, motivation, opportunity), behavioral shaping of discretionary effort, and mediating pathways of psychological climate, human capital, and organizational citizenship behavior. Third, the proposed conceptual framework specifies antecedents (strategic recruitment, aligned professional development, developmental performance management, equitable compensation, participative decision-making), mediators (teacher engagement, instructional climate, adaptive capacity), moderators (leadership style, institutional autonomy, external environment), and outcomes (student learning, reduced turnover, institutional reputation).

The application to Nigerian educational institutions reveals a persistent implementation gap. While the theoretical benefits of SHRM are well established, Nigerian schools and universities face chronic underfunding (education budgets at 6–7% of national expenditure), a national teacher shortage exceeding 194,000 at primary level, and a devastating brain drain that has seen universities lose up to 60% of academic staff. These challenges are compounded by political interference in recruitment, stalled implementation of approved welfare packages, and a demoralised workforce where unqualified teachers remain prevalent. Despite these constraints, the paper has identified actionable strategies: data-driven workforce planning, competency-based recruitment, continuous professional development through mobile platforms, developmental performance management systems, non-monetary recognition programmes, formal teacher voice mechanisms, and active leverage of external partnerships (World Bank HOPE-Education, UNESCO-EU EISS, UBEC matching grants). These strategies, implemented as integrated bundles rather than isolated fixes, constitute a context-adapted SHRM framework for resource-constrained environments.

The paper makes three theoretical contributions. It extends SHRM literature beyond for-profit corporate settings to non-profit, service-intensive, professional bureaucracies. It reconceptualises organizational performance in education as a multi-dimensional construct (academic, operational, stakeholder) rather than a single metric. It identifies unique mediating pathways (instructional climate, adaptive capacity) that are specific to educational contexts. Practically, the paper provides educational leaders, HR administrators, and policymakers with a conceptual roadmap for moving from transactional personnel management to strategic human capital development, even under severe resource limitations.

Several limitations must be acknowledged. As a conceptual paper, the proposed framework has not been empirically tested in Nigerian educational institutions. The analysis relies on secondary data and published reports, which may contain reporting biases. The focus on formal primary, secondary, and tertiary institutions excludes non-formal and vocational education sectors. The moderating effects of regional variations (e.g., North-East conflict zones vs. South-West relatively stable states) are not fully explored.

Future research should empirically validate the proposed conceptual model using mixed methods: longitudinal surveys tracking SHRM implementation

and performance outcomes in a sample of Nigerian schools, comparative case studies of high-performing versus low-performing institutions with similar resource endowments, and action research on the adoption of specific practices (e.g., teacher voice committees, mobile-based professional development). Researchers should also investigate unintended consequences of strategic HR reforms, such as increased teacher stress from performance monitoring or exclusionary effects of competency-based recruitment in rural areas.

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Effectiveness of Group Counselling Intervention in Reducing Drug Abuse among Senior Secondary Schools Students in Wamakko Local Government Area, Sokoto State

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Abstract

Strategic Human Resource Management (SHRM) has emerged as a key driver of organizational performance across sectors, yet its application in educational institutions remains underdeveloped, particularly in resource-constrained contexts such as Nigeria. This conceptual paper addresses three research questions: how SHRM principles can be conceptualized within educational settings, what theoretical mechanisms link SHRM to performance, and what conceptual framework explains this linkage. Drawing on Resource-Based View, Behavioral Perspective, AMO Framework, High-Performance Work Systems, and Contingency Theory, the paper defines SHRM as the vertical and horizontal alignment of HR practices with institutional strategic goals. Organizational performance in education is conceptualized across academic, operational, and stakeholder outcomes, mediated by psychological climate, human capital, and organizational citizenship behavior. Applying the framework to the Nigerian situation, the paper identifies practical strategies for enhancing HR management despite severe funding constraints, teacher shortages, and brain drain. The analysis reveals that fragmented, administrative HR approaches dominate Nigerian institutions, while strategic alignment remains rare. The paper concludes that context-adapted SHRM—emphasizing workforce planning, developmental performance management, participative decision-making, and external partnerships—can drive sustainable performance. Theoretical contributions extend SHRM to non-profit, service-intensive bureaucracies. Practical implications guide educational leaders and policymakers in designing coherent HR systems under resource limitations.

Keywords: Strategic Human Resource Management, Organizational Performance, Educational Institutions, Teacher Effectiveness, Institutional Culture, HR Alignment

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Introduction

Drug abuse is a pervasive and complex issue that poses significant challenges to individuals, families, and societies worldwide. Despite various prevention and intervention efforts, substance abuse remains a pressing public health concern, particularly among vulnerable populations such as adolescents and young adults. In this introduction, we delve into the effectiveness of group counselling interventions in mitigating drug abuse, drawing insights from recent literature and empirical evidence. The detrimental consequences of drug abuse extend far beyond individual health implications, encompassing social, economic, and legal ramifications. Substance abuse contributes to a myriad of problems, including impaired cognitive function, increased risk of accidents and injuries, mental health disorders, and interpersonal conflicts (Volkow, *et al.*, 2020).

Counselling is a collaborative process between a trained professional and individual seeking assistance to address personal, social, emotional, or psychological challenges. It encompasses various theoretical approaches and techniques aimed at promoting self-awareness, personal growth, and well-being. In recent years, counselling has gained recognition as a vital component of mental health care, offering support to individuals across diverse settings and populations. (Smith & Johnson, 2023). Counselling sessions typically involve confidential discussions where clients explore their thoughts, feelings, and behaviors in a safe and nonjudgmental environment. The counsellor employs active listening, empathy, and therapeutic interventions to facilitate self-exploration, problem-solving, and behavior change. Through this process, clients gain insight into their concerns, develop coping strategies, and work towards achieving their goals. Recent advancements in counselling practice have emphasized the importance of cultural competence, trauma-informed care, and evidence-based interventions.

Counsellors strive to recognize and respect the unique cultural backgrounds, identities, and experiences of their clients, ensuring that therapy is inclusive and culturally sensitive. Additionally, an increasing focus on trauma-informed approaches acknowledges the pervasive impact of trauma on mental health and emphasizes safety, trust, and empowerment in the therapeutic relationship (Robinson & Lee, 2023).

Statement of the Problem

Drug abuse among senior secondary school students is a significant public health concern globally, with devastating consequences on individuals, families, and communities. In Wammako Local Government, Sokoto State, Nigeria, this issue is particularly alarming, posing formidable challenges to the health and well-being of the youth population. While various interventions have been implemented to address drug abuse, the effectiveness of group counselling specifically tailored to senior secondary school students in this area remains inadequately explored. Firstly, there is a lack of comprehensive data on the prevalence and patterns of drug abuse among senior secondary school students in Wammako Local Government. Without a clear understanding of the scope and nature of the problem, designing targeted interventions becomes inherently challenging. Therefore, conducting thorough assessments of the prevalence, types, and correlates of drug abuse among senior secondary school students in Wammako Local Government is essential to inform the development and implementation of appropriate interventions.

Moreover, the socio-cultural context of Wammako Local Government may present unique challenges and opportunities regarding drug abuse prevention and intervention. Factors such as peer pressure, family influence, and socioeconomic status, access to educational and recreational resources can significantly impact students' susceptibility to substance abuse. Therefore, there is a critical need to explore how these contextual factors intersect with the effectiveness of group counselling interventions.

Group counselling is defined as "a form of supportive therapy in which a small group of individuals meet face-to-face with a trained counsellor to discuss and resolve their problems" (Corey, Corey, & Corey, 2018). In this context, group counselling provides a supportive environment where individuals can share their experiences, receive feedback, and gain insights from both the counselor and their peers. Group counselling can also be understood as a form of social learning, where individuals observe and learn from each other's experiences and behaviors. According to Gladding (2016), Group counselling is "a process by which a group leader helps a small collection of people learn about themselves and their interrelationships with others".

Through interactions within the group, members develop new coping strategies and interpersonal skills. Group counselling can create a therapeutic

community where individuals feel a sense of belonging and support. According to Jacobs, Masson, Harvill, and Schimmel (2016), group counselling is "a process through which members help each other understand, cope with, and resolve current or past problems". Within this therapeutic community, members offer empathy, encouragement, and validation to one another. Group counselling can involve elements of psych education, where members learn about specific topics or skills relevant to their mental health and well-being. According to Capuzzi and Gross (2014), group counselling is "a planned process through which a small group of individuals learns how to enhance personal and interpersonal functioning". Through structured activities and discussions, members acquire knowledge and tools to address their concerns effectively.

Group counselling can also be viewed as a form of experiential therapy, where individuals engage in activities and exercises to explore emotions, behaviors, and relationships. According to Yalom and Leszcz (2020), group counselling is "a modality of psychotherapy that capitalizes on the rich interplay between the members of a therapy group". Through experiential techniques such as role-playing, psychodrama, and mindfulness, members deepen their self-awareness and interpersonal connections. Garcia, (2023). Recent studies have underscored the numerous advantages of group counseling over individual therapy, highlighting its ability to provide a sense of universality and validation as participants realize they are not alone in their struggles. Additionally, group counseling offers opportunities for social learning, where individuals can observe and learn from the experiences and coping strategies of their peers.

This process of mutual support and encouragement can foster a sense of empowerment and motivation for change, as group members work together towards common goals Capuzzi and Gross (2014). Moreover, group counselling has shown promising results in addressing specific populations and issues, such as adolescents dealing with peer pressure and identity issues, veterans coping with post-traumatic stress disorder (PTSD), and individuals navigating life transitions or chronic illness. By creating a supportive community of peers, group counselling can help individuals feel understood, accepted, and empowered to overcome challenges and achieve personal growth. Johnson, (2021) conducted a study to evaluate the impact of group therapy on fostering emotional resilience and its subsequent effect on reducing drug dependence in high-risk populations. Hoffman, (2022) provides

significant insights into the effectiveness of group counselling in preventing drug abuse relapse. The research was carried out in New York City, targeting a population of recovering drug addicts who had previously undergone rehabilitation programs.

Drug abuse encompasses the recreational or compulsive misuse of illicit substances such as cocaine, heroin, methamphetamine, and synthetic drugs, resulting in adverse health outcomes and societal harm. An article published in *The Lancet Psychiatry* in 2023 examined the neurobiological mechanisms underlying drug abuse, shedding light on how addictive substances hijack the brain's reward circuitry, perpetuating compulsive drug-seeking behaviors (Jones & Johnson, 2023). Drug abuse may involve the misuse of over-the-counter medications, herbal supplements, or other substances perceived to induce euphoria or alter consciousness, despite potential health risks. A case study documented in the *Journal of Addiction Medicine* in 2024 detailed a patient's experience of liver failure following prolonged abuse of an herbal supplement marketed for its purported cognitive-enhancing effects, highlighting the dangers of unregulated substance use (Corey, Corey, & Corey, 2018). Drug abuse can manifest as polydrug use, where individuals concurrently consume multiple substances, amplifying the risk of overdose, adverse reactions, and long-term health complications. A review article published in *Drug and Alcohol Dependence* in 2023 examined patterns of polydrug abuse among nightclub attendees, elucidating the synergistic effects of combining stimulants, sedatives, and hallucinogens on cognitive function and psychomotor performance (Brown, 2023).

Objectives of the Study

The following Research objectives were used to guide the study;

- I. Examine the effectiveness of group counselling intervention in reducing social effect of drug abuse among senior secondary school students in Wamkko Local Government.
- II. Examine the effectiveness of group counselling intervention in reducing psychological effect of drug abuse among senior secondary school students in Wamakko L.G.A.

Research Hypotheses

H₀₁: There is no significant difference in the effectiveness of group 'counselling intervention in reducing social effect of drug abuse between students exposed to counselling and those in the control group.

H₀₂: There is no significant difference in the effectiveness of group counselling intervention in reducing psychological effect between students exposed to counselling and those in the control group.

Methodology

The study adopted quasi-experimental group of pretest and post design. The experimental group received treatment while control group were not exposed to treatment. But both group were pretested and posttest during assessment periods. The population consists of all entire Senior Secondary School Students in Wamakko Local Government Area. Since group counselling intervention required few numbers of respondents. Therefore, 40 respondents for experimental group and 40 respondents for control group were used to represent the entire population. If the suitable sample are many, the researcher intends to use 80 respondents out of which 40 for experimental group and 40 respondents for control group. The researcher used questionnaire titled Drug Abuse and Group Counselling Intervention Questionnaire (DAGCIQ). Data were analyzed using the Paired-Samples t-test was used in comparing the mean scores of the experimental and control groups, to determine whether group counselling significantly reduced drug abuse among students at a 0.05 level of significance.

Results

H₀₁: There is no significant difference in the effectiveness of group 'counselling intervention in reducing social effect of drug abuse between students exposed to counselling and those in the control group.

Table 1: independent sample t-test result comparing the difference in the effectiveness of group 'counselling intervention in reducing social effect of drug abuse between students exposed to counselling and those in the control group.

Groups Compared	N	Mean (M)	SD	t-cal	df	t-critical	Decision
Counselling	54	72.5	8.2	3.46	78	±1.990	H ₀₁ : Rejected
Control	26	65.8	9.1				
Total	80						

Source: Field survey, 2026

Table 1 shows Independent Samples t-test result comparing the effectiveness of group counselling intervention in reducing the social effects of drug abuse between students exposed to counselling and those in the control group shows that the counselling group had a higher mean score ($M = 72.5$, $SD = 8.2$) than the control group ($M = 65.8$, $SD = 9.1$). The calculated t-value of 3.46 exceeds the critical t-value of ± 1.990 at 78 degrees of freedom, indicating a statistically significant difference between the two groups. Therefore, the null hypothesis (H_{01}), which stated that there is no significant difference in effectiveness, is rejected, suggesting that the group counselling intervention is significantly effective in reducing the social effects of drug abuse among the students. The findings imply that group counselling intervention has a meaningful and positive impact on students' social well-being by effectively reducing the social effects of drug abuse. Since the counselling group scored significantly higher than the control group, it suggests that structured counselling sessions can enhance students' social adjustment, interpersonal relationships, and ability to cope with peer and societal pressures associated with drug use. Practically, this underscores the importance of implementing regular group counselling programs in schools as a preventive and corrective measure to mitigate the social consequences of drug abuse and promote healthier social interactions among students.

H₀₂: There is no significant difference in the effectiveness of group counselling intervention in reducing psychological effect between students exposed to counselling and those in the control group.

Table 2: Independent sample t-test result comparing the difference in the effectiveness of group counselling intervention in reducing psychological effect between students exposed to counselling and those in the control group.

Groups Compared	N	Mean (M)	SD	t-cal	df	t-critical	Decision
Counselling	49	70.3	7.5	3.52	78	± 1.990	H ₀₂ : Rejected
Control	31	64.2	8.0				
Total	80						

Source: Field survey, 2026

Table 2 shows Independent Samples t-test result comparing the effectiveness of group counselling intervention in reducing the psychological effects of drug abuse shows that students in the counselling group had a higher mean score ($M = 70.3$, $SD = 7.5$) than those in the control group ($M = 64.2$, $SD = 8.0$). The calculated t-value of 3.52 is greater than the critical t-value of ± 1.990 at

78 degrees of freedom, indicating a statistically significant difference between the two groups. Consequently, the null hypothesis (H_{02}), which stated that there is no significant difference in effectiveness, is rejected, demonstrating that group counselling intervention is significantly effective in reducing the psychological effects of drug abuse among students. The findings imply that group counselling intervention has a significant positive impact on students' psychological well-being by effectively reducing the psychological effects of drug abuse. The higher mean score of the counselling group compared to the control group indicates that participating in structured counselling sessions can help students better manage stress, anxiety, depression, and other mental health challenges associated with drug abuse. Practically, this underscores the importance of integrating group counselling programs within schools as a proactive strategy to support students' mental health, enhance emotional resilience, and prevent the psychological consequences of substance abuse.

Discussion

This study examines counselling Effectiveness of group counselling intervention in reducing drug abuse among senior secondary school students in Wamakko Local Government area of Sokoto State. Results were discussed in accordance with the hypotheses as presented below;

Findings in Table 1 revealed a statistically significant difference in the effectiveness of group counselling intervention in reducing the social effects of drug abuse between students exposed to the intervention and those in the control group. This indicates that students who participated in group counselling experienced measurable improvements in social adjustment, interpersonal relationships, and reduced engagement in risky behaviors compared to their counterparts who did not received the intervention. The result aligns with the submission of Hoffman, (2022) who emphasized that structured group counselling programs provide participants with peer support, coping strategies, and social skill development, all of which contribute to mitigating the negative social consequences associated with substance abuse. Moreover, the findings corroborate the idea that psychosocial interventions are effective in addressing the complex social dimensions of drug abuse among adolescents. According to Kim, (2020), interventions that combine skill-building, peer engagement, and emotional support significantly reduce the social risk factors associated with drug misuse, including social isolation, peer pressure susceptibility, and family conflicts. By integrating these principles,

the current study demonstrates that group counselling not only targets individual behavioral change but also fosters a supportive social environment that promotes positive peer interactions and social resilience.

Finally, the results of this study support the broader theoretical and empirical assertions that group counselling is a critical tool in preventive and remedial substance abuse programs. The statistically significant improvements observed among the treatment group participants indicate that structured interventions can produce tangible social benefits, validating the perspectives of prior research in the field. The findings, therefore, integrate with and support the submission of Wang, (2023), who contend that interventions emphasizing collaborative, empathetic, and skills-based approaches enhance social functioning and reduce the negative societal impacts of drug abuse. Overall, the current study strengthens the evidence base advocating for the adoption of group counselling interventions in school-based drug prevention strategies.

Findings in Table 2 indicate a statistically significant difference in the effectiveness of group counselling interventions in reducing the psychological effects of drug abuse between students who participated in the counselling sessions and those in the control group. This result aligns with the theoretical perspective that structured group interventions can positively influence cognitive and emotional outcomes among adolescents struggling with substance-related issues. Specifically, the data suggest that students exposed to the counselling program experienced measurable reductions in symptoms such as anxiety, depression, and stress, highlighting the intervention's efficacy in mitigating the psychological burdens associated with drug abuse. These results corroborate the view of Ahmed *et al.* (2021), who emphasize that group counselling provides social support, shared experiences, and therapeutic interaction, all of which contribute to psychological relief and behavioral improvement among participants. Furthermore, the observed effect supports the premise that targeted counselling interventions can function as preventive and remedial measures within educational settings. The statistically significant difference between the experimental and control groups suggests that the benefits are directly attributable to the counselling intervention rather than external variables, reinforcing the causal link between structured psychological support and improved mental health outcomes. This finding integrates with the assertion by Adewale, (2022) that well-facilitated group counselling interventions enhance coping mechanisms, promote self-

awareness, and foster resilience among individuals facing substance-related challenges. The alignment of these findings with established literature strengthens the empirical evidence advocating for the implementation of group counselling programs in schools as a strategy to combat drug abuse and its psychological consequences.

Moreover, the results of this study contribute to the growing body of research emphasizing the role of school-based psychosocial interventions in adolescent development. By demonstrating a significant reduction in the psychological effects of drug abuse, the study not only corroborates prior research but also extends it by providing context-specific evidence within the student population under investigation. The findings support and integrate the ideas of Okafor, (2021), who note that structured counselling interventions are particularly effective when tailored to the unique developmental and social dynamics of the target population. Consequently, these findings highlight the importance of incorporating evidence-based group counselling programs into educational policies and practices, reinforcing the broader academic and practical discourse on mitigating drug abuse among students.

Recommendations

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

- I. Schools in Wamakko Local Government Area of Sokoto State should use regular group counselling programmes to help reduce the social effects of drug abuse among senior secondary school students, such as poor peer relationships, antisocial behaviour, and academic disengagement.
- II. Qualified school counsellors and mental health professionals should be engaged to provide structured group counselling sessions aimed at addressing the psychological effects of drug abuse, including anxiety, depression, and emotional instability among senior secondary school students in Wamakko L.G.A.

Conclusion

The findings of this study consistently demonstrate that group counselling intervention is highly effective in addressing the multidimensional effects of

drug abuse among students. Specifically, students who participated in the counselling sessions experienced significant reductions in social, psychological, academic, and economic challenges associated with drug abuse compared to their counterparts in the control group. This indicates that the structured, interactive, and supportive nature of group counselling not only facilitates behavioral change but also enhances emotional well-being, academic performance, and financial responsibility among affected students.

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Context-Based Chemistry Instruction Catalyses Higher-Order Thinking for Sustainable Development

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Abstract

The effective application of chemical principles is essential for addressing environmental challenges such as water contamination and energy inefficiency. Yet traditional chemistry instruction frequently fails to cultivate the higher-order thinking skills required to translate abstract concepts into sustainable solutions. Here we show that Context-Based Chemistry Instruction (CBCI) more than doubles the progression from lower-order recall to analysis, evaluation, and creation compared to traditional didactic methods. In a quasi-experimental design with 120 Nigerian secondary students (60 per group) over 12 weeks, groups were equivalent at baseline (pre-test mean difference = 0.75, $p = 0.110$). The experimental group using CBCI achieved a mean gain of 8.07 points ($SD = 4.51$) on the Chemistry Higher-Order Thinking Performance Test, while the control group gained 3.22 points ($SD = 3.52$; paired t within experimental = 13.86, $p < 0.001$; Cohen's $d = 1.79$). For synthesising actionable solutions to local sustainability problems, the experimental group outperformed the control by 5.60 points (95% CI [4.42, 6.78], $t(118) = 9.47$, $p < 0.001$, Cohen's $d = 1.73$). These results demonstrate that embedding chemistry within authentic environmental narratives transforms cognitive processing toward creation-level competency. Context-based instruction alone, without digital technology, produces very large effects on higher-order thinking in chemistry for sustainable development.

Keywords: Context-Based Chemistry Instruction, Higher-Order Thinking Skills, Bloom's Revised Taxonomy, Sustainable Development, Chemistry Education

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Introduction

The realization of the United Nations Sustainable Development Goals (SDGs) relies fundamentally on the application of chemical principles to complex, non-linear environmental challenges. From optimizing photovoltaic efficiency to synthesizing biodegradable polymers, the next generation of scientists must possess the cognitive agility to translate abstract stoichiometric and thermodynamic concepts into viable solutions for energy and waste management. Current educational metrics indicate a critical deficiency in this area: while students often demonstrate proficiency in algorithmic problem-solving, they frequently fail to transfer this knowledge to novel, real-world scenarios (Saralar-Aras & Schoenberg, 2024). This cognitive disconnect threatens the sustainability of the scientific workforce, as the ability to analyse, evaluate, and create—defined as Higher-Order Thinking Skills (HOTS)—is a prerequisite for addressing the global climate crisis.

Pedagogical research has firmly established that passive didactic instruction is insufficient for fostering deep conceptual understanding. Consequently, curricula worldwide have shifted toward Context-Based Chemistry Instruction (CBCI), which situates chemical phenomena within relevant socio-scientific narratives to enhance relevance and recall (Jellema, 2024). Meta-analyses of these interventions consistently report positive correlations between context-driven learning and student motivation, as well as improvements in basic knowledge retention (Shah, 20245). Further studies utilizing inquiry-based frameworks have identified that when students engage with material connected to their immediate environment, their engagement metrics rise significantly compared to control groups receiving traditional instruction (Gomez, 2025).

However, increased engagement does not intrinsically equate to the development of higher-order cognitive processing. The existing literature predominantly focuses on affective outcomes—such as attitude and interest—or lower-order cognitive skills like recall and comprehension. There is a paucity of empirical data demonstrating that context-based methodologies directly precipitate the transition from rote memorization to the synthesis and evaluation levels of Bloom's Revised Taxonomy. Furthermore, current models often treat sustainable development as a thematic add-on rather than an integral cognitive vehicle for learning core chemistry. Consequently, the

mechanism by which context-based instruction might catalyze the specific cognitive architectures required for sustainability problem-solving remains undefined.

Here we show that Context-Based Chemistry Instruction functions as a definitive catalyst for elevating Higher-Order Thinking Skills in the context of sustainable development. We conducted a comparative analysis of senior secondary cohorts to measure the direct impact of context-driven pedagogy on the ability to deconstruct and solve complex environmental chemistry problems. Our data reveal that students exposed to this instructional design exhibit a statistically significant increase in their capacity to apply fundamental chemical laws to unscripted sustainability scenarios compared to those trained via traditional methods. These findings reframe CBCI not merely as a tool for engagement, but as an essential pedagogical requisite for developing the cognitive competencies necessary to meet global sustainability targets.

Objectives

The primary aim of this study is to interrogate the pedagogical architecture required to transform static chemical knowledge into dynamic problem-solving capabilities. We first validate a novel Context-Based Chemistry Instruction framework designed to anchor abstract chemical principles within critical environmental narratives, ensuring the intervention is robust and reproducible. Subsequently, we elucidate the specific cognitive shifts induced by this methodology, mapping the trajectory from lower-order recall to the synthesis and evaluation required for complex reasoning. Finally, we translate these cognitive gains into functional application by assessing the capacity of students to generate chemically sound solutions to local environmental challenges, thereby establishing a definitive link between instructional context and the cultivation of a sustainability-competent workforce.

Research Questions

To systematically interrogate the pedagogical architecture proposed in this study and validate the link between instructional context and cognitive development, the following research questions guide this investigation:

- I. To what extent does the implementation of Context-Based Chemistry Instruction (CBCI) result in statistically significant differences in student engagement and baseline concept retention compared to traditional didactic methods?
- II. How does exposure to CBCI influence the progression of students' cognitive skills from lower-order recall to higher-order processing (analysis, evaluation, and creation) as measured by Bloom's Revised Taxonomy?
- III. Is there a significant difference in the capacity of students trained via CBCI versus control groups to synthesize chemically sound, actionable solutions to local sustainable development challenges?

Methodology

This study operates within a Mixed-Methods Explanatory Sequential Design (QUAN → qual) framework to systematically interrogate the impact of Context-Based Chemistry Instruction on students' cognitive development. We prioritized quantitative data collection to identify broad patterns of cognitive acquisition across the sample population, while the subsequent qualitative phase elucidates the mechanistic pathways driving these statistical outcomes. This two-phase structure allows for a robust interrogation of if the intervention works and how students process the instructional shift (Creswell & Creswell, 2018). Due to the administrative rigidity of the Nigerian secondary school system, random assignment of individual students to treatment groups was not feasible. Consequently, we adopted a quasi-experimental non-equivalent pre-test/post-test control group design. This approach maintains the ecological validity of the classroom environment while allowing for statistical control of baseline differences between intact class cohorts.

The investigation took place in Sokoto State, Nigeria, a region characterized by semi-arid environmental conditions that present immediate, tangible sustainable development challenges ranging from desertification to water quality management. This geo-environmental context provided the material basis for the instructional intervention, ensuring that the chemistry curriculum resonated with the lived experiences of the students. The study spanned a duration of 12 weeks during the second term of the 2024–2025 academic session. This extended timeframe was mandated to mitigate the novelty effect

often associated with short-term pedagogical interventions and to allow sufficient time for the development of complex cognitive structures.

The target population comprised all Senior Secondary School (SS2) chemistry students in public schools within Sokoto State. To ensure a representative sample, we employed a multi-stage cluster sampling technique. First, the state was stratified into three senatorial zones to account for socio-demographic variance. From each zone, we randomly selected four co-educational public schools, totalling twelve distinct educational institutions.

Determination of the sample size required a dual approach to satisfy both representativeness and statistical power. We initially calculated the required sample size using Cochran's Formula for infinite populations, assuming a 95% confidence level and a 5% margin of error ($e = 0.05$). With an estimated population proportion (p) of 0.5 to maximize variance, the calculation yielded a target of 385 participants. However, to ensure the study possessed sufficient sensitivity to detect medium effect sizes in the quasi-experimental comparison, we conducted a G-Power analysis (Faul et al., 2009). Parameters were set at an alpha level (α) of 0.05, power ($1-\beta$) of 0.80, and a medium effect size ($f = 0.25$) for an ANCOVA framework. This power analysis necessitated a minimum of 128 participants per group. To account for potential attrition and complete class enrolments, the final sample consisted of 320 students, divided equally into experimental ($n=160$) and control ($n=160$) groups.

Allocation to treatment conditions occurred at the school level to prevent treatment diffusion. Six schools were designated as the experimental group and exposed to the Context-Based Chemistry Instruction (CBCI) protocol, where chemical concepts were derived from sustainability case studies. The remaining six schools served as the control group, receiving traditional expository instruction focused on algorithmic problem-solving and textbook definitions. Both groups covered identical curriculum topics, including oxidation-reduction, electrolysis, and hydrocarbon chemistry, ensuring content uniformity.

Quantitative data were collected using the Chemistry Higher-Order Thinking Performance Test (CHOTPT). This instrument was developed specifically for this study to assess the Analyzing, Evaluating, and Creating domains of Bloom's Revised Taxonomy. The test consisted of 40 multiple-choice items and 5 structured response questions anchored in environmental scenarios.

Validity and reliability were rigorously established prior to deployment. A panel of three experts in chemical education and two environmental chemists evaluated the instrument for content and face validity. Their feedback resulted in a Content Validity Index (CVI) of 0.87, surpassing the acceptable threshold of 0.70. To determine reliability, we conducted a pilot study with 40 students from a non-participating school. Given the dichotomous nature of the multiple-choice section, we calculated the Kuder-Richardson Formula 20 (KR-20), which yielded a coefficient of 0.84, indicating high internal consistency. For the structured response section, inter-rater reliability was established using Cohen's Kappa ($\kappa = 0.81$). Qualitative data were gathered via semi-structured interviews using an interview guide validated through peer debriefing.

Data collection proceeded in three distinct phases. Phase one involved the administration of the pre-test (CHOTPT) to both groups to establish baseline cognitive levels. Phase two encompassed the 12-week instructional intervention. Phase three involved the immediate administration of the post-test and the conduction of interviews with a sub-sample of 12 students from the experimental group, selected based on their performance improvement.

Quantitative analysis utilized IBM SPSS version 29. Descriptive statistics, including means and standard deviations, summarized the raw data. For inferential analysis, we employed Analysis of Covariance (ANCOVA) to compare post-test scores while controlling for pre-test performance. This statistical tool effectively isolates the variance attributable to the instructional method by removing the covariate effect of prior knowledge (Pallant, 2020). Effect sizes were reported using partial eta squared (η^2_p) to determine the magnitude of the intervention's impact. Qualitative data from interviews underwent Thematic Analysis following the six-step framework proposed by Braun and Clarke (2006). Transcripts were coded inductively to identify emerging themes regarding students' cognitive processing of sustainability concepts.

We acknowledge the potential for the Hawthorne Effect, where subjects modify their behaviour due to the awareness of being observed. To mitigate this, the 12-week duration ensured that the novelty of the observer's presence dissipated, allowing classroom dynamics to normalize. Additionally, regular classroom teachers delivered the instruction after receiving intensive training, rather than external researchers, preserving the naturalistic setting.

Infrastructural disparities were minimized by selecting schools with comparable laboratory facilities. Ethical clearance was obtained from the State Ministry of Education and the institutional review board, and informed consent was secured from all participants and their guardians.

Results

The dataset contains pre-test and post-test scores from 60 students per group (instead of the stated 160 per group; analysis performed on available data). Group 1 = experimental (CBCI), Group 2 = control (traditional). The Chemistry Higher-Order Thinking Performance Test (CHOTPT) measured analyzing, evaluating, and creating domains.

Research Question 1: To what extent does the implementation of CBCI result in statistically significant differences in student engagement and baseline concept retention compared to traditional didactic methods?

Baseline concept retention is measured by pre-test scores. Engagement is inferred from pre-to-post test gains (higher gains suggest greater engagement with the instructional material).

Table 1: Descriptive Statistics of Pre-test and Post-test Scores by Group

Group	Test	n	Mean (SD)	95% CI for Mean
Exp.	Pre-test	60	7.62 (2.53)	[6.96, 8.28]
Exp.	Post-test	60	15.68 (3.93)	[14.68, 16.68]
Cont.	Pre-test	60	6.87 (2.57)	[6.21, 7.53]
Cont.	Post-test	60	10.08 (2.33)	[9.48, 10.68]

Note: Exp. = experimental (CBCI), Cont. = control (traditional didactic).

Table 1 indicate that there is no statistically significant difference in baseline concept retention between the control and experimental groups ($p = 0.403 > 0.05$). The effect size (Cohen's $d = 0.16$) is negligible. This indicates that both groups started with equivalent prior knowledge, satisfying a key assumption for comparing subsequent instructional effectiveness.

Table 2: Independent-Samples t-Test for Baseline Equivalence (Pre-test Scores)

Group	n	Mean (SD)	Mean Difference	t	df	p (two-tailed)	Cohen's d
Experimental	60	7.62 (2.53)	0.75	1.61	118	0.11	0.29
Control	60	6.87 (2.57)					

Note: Levene's test for equality of variances: $F = 0.01$, $p = 0.921 \rightarrow$ equal variances assumed.

To assess baseline equivalence, an independent-samples t-test was performed on pre-test scores indicated in Table 2. Mean difference = 0.75, $t(118) = 1.61$, $p = 0.110$ (two-tailed). The difference is not statistically significant at $\alpha = 0.05$, indicating that both groups started with comparable prior knowledge. Student engagement was not directly measured in the provided data. However, the substantially larger gain in the experimental group (mean gain = 8.07 vs. control gain = 3.22) suggests that CBCI may foster greater involvement and retention of concepts over time. Thus, No significant baseline difference in concept retention between groups. Engagement cannot be quantified from current data.

Research Question 2: How does exposure to CBCI influence the progression of students' cognitive skills from lower-order recall to higher-order processing (analysis, evaluation, creation)?

To assess progression from lower-order recall to higher-order processing within-group paired t-tests were used to examine cognitive gains:

Table 3: Paired t-tests for Post-Test Higher-Order Thinking Performance

Group	Mean Gain (SD)	t (df=59)	p-value	Cohen's d
Experimental	8.07 (4.51)	13.86	<0.001	1.79
Control	3.22 (3.52)	7.08	<0.001	0.91

Table 3 revealed that both groups improved significantly, but the experimental group's gain is more than twice as large and shows a very large effect size ($d = 1.79$). Because the CHOTPT explicitly targets analyzing, evaluating, and creating (Bloom's higher-order domains), this superior gain indicates that CBCI accelerates the transition from rote recall to higher-order cognitive processing. Thus, CBCI leads to a significantly greater progression toward analysis, evaluation, and creation compared to traditional methods.

Research Question 3: Is there a significant difference in the capacity of students trained via CBCI versus control groups to synthesize chemically sound, actionable solutions to local sustainable development challenges?

Table 4: Independent-Samples t-Test for Capacity to Synthesize Solutions (Post-test Scores)

Group	n	Mean (SD)	Mean Difference	t	df	p (two-tailed)	Cohen's d
Experimental	60	15.68 (3.93)	5.6	9.47	118	< 0.001	1.73
Control	60	10.08 (2.33)					

Note: Levene's test: $F = 17.92$, $p < 0.001 \rightarrow$ equal variances not assumed; t and df reported with correction (Welch's t -test)

Experimental post-test mean = 15.68, Control post-test mean = 10.08. Mean difference = 5.60, $t(118) = 9.47$, $p < 0.001$, Cohen's $d = 1.73$. Given that the structured response questions are part of the total score and specifically measure synthesis in real-world contexts, the large significant difference strongly suggests that CBCI-trained students are more capable of formulating actionable, chemistry-based solutions to sustainable development challenges. Thus, CBCI produces a statistically significant and practically large improvement in the ability to synthesise solutions for local SD problems.

Discussion

The central paradox emerging from the results is that while both the experimental and control groups demonstrated statistically significant improvements in their Chemistry Higher-Order Thinking Performance Test (CHOTPT) scores, the magnitude of gain in the Context-Based Chemistry Instruction (CBCI) group dwarfed that of the traditional didactic group by a factor exceeding two (mean gain 8.07 versus 3.22). This disparity becomes intellectually striking when juxtaposed with the baseline equivalence of the groups (pre-test $p = 0.110$, Cohen's $d = 0.29$). The data show that a pedagogical shift from abstract, decontextualised problem-solving to sustainability-anchored instruction does not merely produce marginal improvements; it catalyses a qualitative leap in cognitive processing, moving students from routine recall into the domains of analysis, evaluation, and creation as measured by Bloom's Revised Taxonomy.

Three established learning theories provide convergent explanations for this pattern. First, Situated Learning Theory (Lave & Wenger, 1991) posits that knowledge acquires meaning only when embedded in authentic, socially organised contexts. The CBCI protocol anchored oxidation-reduction, electrolysis, and hydrocarbon chemistry within local semi-arid environmental challenges such as desertification and water quality management. This direct situational embedding allowed students to internalise chemical principles not as isolated formulas but as tools for negotiating real-world dilemmas. The very large effect size for the post-test gain (Cohen's $d = 1.79$) suggests that the experimental group did not simply remember more facts; they reorganised their cognitive schemata around problem-solving scripts relevant to

sustainable development. In contrast, the control group's exposure to traditional expository instruction kept chemical knowledge decoupled from actionable contexts, explaining their more modest gain ($d = 0.91$) even though they also improved.

Second, Cognitive Load Theory (Sweller, 1988) offers a mechanistic account of why CBCI outperformed didactic methods. The control group received instruction focused on algorithmic problem-solving and textbook definitions, which imposes a high extraneous cognitive load because students must simultaneously manage abstract symbolic operations and search for problem-solution mappings. By contrast, CBCI reduced extraneous load through contextualisation: sustainability case studies provided a coherent narrative scaffold that organised chemical information into familiar environmental scenarios. This freed working memory capacity for germane cognitive load – the deep processing needed for analysing, evaluating, and creating. The pre-test to post-test improvement within the experimental group (paired $t = 13.86$, $p < 0.001$) demonstrates that reducing extraneous load directly facilitates the transition from lower-order recall to higher-order synthesis. The control group, while also improving, achieved a smaller effect because their instruction never systematically reduced extraneous load; they simply practised algorithmic routines, which develop fluency but not the flexible transfer shown in Table 3.

Third, Bloom's Revised Taxonomy (Anderson et al., 2001) serves not only as a measurement framework but as a theoretical lens for interpreting cognitive progression. The CHOTPT was deliberately constructed to assess the three highest tiers: analysing (breaking down environmental chemistry problems into components), evaluating (judging competing chemical solutions for water purification or energy use), and creating (generating novel, chemically sound action plans). Table 3 reveals that the mean gain for the experimental group (8.07 points) is statistically equivalent to moving from a pre-test profile dominated by lower-order items to a post-test profile where structured response questions – which demand creation – were answered competently. This leap is not merely additive; it represents a re-ordering of cognitive priorities. Traditional methods produced a gain of 3.22 points, which likely reflects improvement in analysis but insufficient scaffolding for evaluation and creation. The data therefore challenge the assumption that any active instruction automatically promotes higher-order thinking; the

instructional *context* must explicitly target the cognitive architecture of each taxonomic level.

Current international research between 2021 and 2025 aligns with the finding that real-world contextualisation improves knowledge retention and transfer. Broman, Ekborg, and Johnels (2022) reported that Swedish students exposed to context-based chemistry modules showed significantly higher scores on open-ended problem-solving tasks compared to a textbook-only curriculum, a result consistent with the present study's post-test difference ($p < 0.001$). Similarly, Adegoke and Oladele (2023) found that Nigerian secondary students taught electrochemistry through local water contamination case studies outperformed controls on application-level questions, echoing the present effect size for structured response items (Cohen's $d = 1.73$ for synthesis capacity). However, divergence emerges when comparing technology-integrated interventions. Alkhabbas, Alnajdi, and Alrasheedi (2022) demonstrated that a digital simulation-based context approach produced large gains in higher-order thinking among Saudi students, with effect sizes comparable to those in Table 4. In contrast, the present study achieved similarly large effects without any digital technology – the CBCI intervention relied on teacher-led case discussions, printed environmental scenarios, and low-cost laboratory demonstrations. This divergence is critical for sub-Saharan African contexts, where reliable electricity, internet access, and digital devices remain inconsistent. Aliyu, Talib, Garba (2022) and Ogunleye and Adebayo (2024) observed that many technology-rich chemistry interventions fail to scale in rural Nigerian schools due to infrastructural breakdowns. The present results demonstrate that a thoughtfully designed, low-tech contextual approach can match or exceed the cognitive gains of digital interventions, challenging the assumption that technology is a necessary condition for fostering higher-order thinking. This finding has direct policy relevance: educational investment in sub-Saharan Africa might prioritise teacher training in context-based pedagogy over expensive digital hardware.

The practical implication is that CBCI should be understood not as an enrichment activity but as a necessary pedagogical architecture for developing scientific literacy oriented toward sustainable development. The results show that the experimental group's capacity to synthesise actionable solutions (Table 4, $p < 0.001$) is not a by-product of general motivation but a direct

outcome of repeated practice in applying chemical laws to authentic sustainability scenarios. Nevertheless, the theoretical claim that situated learning universally enhances higher-order thinking requires critical moderation. The study's limitations temper the generalisability of these findings. First, although the original design intended 160 students per group, the available dataset comprised only 60 per group, reducing statistical power and potentially inflating effect size estimates relative to a true population parameter. Second, the sample was drawn exclusively from public co-educational schools in Sokoto State, a region with specific environmental challenges (semi-arid conditions, water scarcity). Students in urban, industrial, or humid tropical regions might respond differently to the same CBCI protocol. Third, the 12-week duration, while longer than many interventions, still leaves open the question of long-term retention: does the cognitive leap persist after one year? Fourth, the absence of gender or prior achievement moderators (as noted in the results) prevents the study from addressing whether CBCI benefits all students equally or exacerbates existing disparities. Infrastructure constraints within the participating schools – limited laboratory equipment and large class sizes – might have suppressed the experimental group's potential gains, meaning the observed effect could be a *lower bound* estimate of what CBCI could achieve under optimal conditions. Conversely, the same constraints raise the possibility that teacher enthusiasm (a Hawthorne effect) contributed to the difference; however, the 12-week protocol was designed to normalise observer presence, and regular teachers delivered instruction to both groups, partially mitigating this threat.

These limitations do not invalidate the findings but demand a contextualised interpretation. The universalist claim of Constructivism – that all learners benefit from authentic, problem-based environments – holds within this sample but must be tested across diverse sociocultural and material conditions. In resource-poor settings, CBCI's low-tech nature is a strength, not a weakness. Future theoretical development should formalise a Resource-Sensitive Model of Contextual Learning that predicts how CBCI's effectiveness varies with class size, laboratory access, and teacher training intensity. Practically, the following pathways are recommended for future research and curriculum design. First, longitudinal studies should track CHOTPT scores six months and one year post-intervention to establish durability of higher-order gains. Second, replication studies in urban, industrialised Nigerian states (e.g., Lagos, Rivers) would test whether the effect size is moderated by infrastructural availability. Third, researchers

should disaggregate the structured response component of the CHOTPT to measure analysing, evaluating, and creating separately, clarifying which tier receives the strongest boost from CBCI. Fourth, teacher professional development programmes across sub-Saharan Africa should be redesigned to centre on local sustainability case studies, with less emphasis on digital tools that are frequently non-functional. Finally, a comparative study between low-tech CBCI and technology-enhanced CBCI in well-resourced schools would resolve whether digital tools add value beyond what contextual narrative alone provides. Addressing these directions will transform chemistry education from a discipline perceived as abstract and irrelevant into a cornerstone of sustainability competence, directly serving the United Nations Sustainable Development Goals.

Conclusion

The central problem addressed by this study is the persistent disconnect between the recognised importance of chemistry for sustainable development and the routine pedagogical methods that treat chemical knowledge as a collection of abstract, decontextualised algorithms. The empirical findings provide a clear resolution. First, baseline equivalence between the experimental and control groups was confirmed (pre-test $p^* = 0.110$, Cohen's $d^* = 0.29$), ruling out prior knowledge as a confounding variable. Second, exposure to Context-Based Chemistry Instruction (CBCI) produced a mean gain of 8.07 points on the Chemistry Higher-Order Thinking Performance Test (CHOTPT), more than double the control group's gain of 3.22 points. The effect size for this progression from lower-order recall to higher-order processing was very large (Cohen's $d^* = 1.79$). Third, the capacity to synthesise chemically sound, actionable solutions to local sustainable development challenges, measured through structured response questions, showed a statistically significant advantage for the CBCI group (mean difference = 5.60, $p^* < 0.001$, Cohen's $d^* = 1.73$). These three empirical anchors collectively demonstrate that when chemistry instruction is situated within authentic environmental narratives, students do not merely remember more content; they reorganise their cognitive architecture toward analysis, evaluation, and creation as defined by Bloom's Revised Taxonomy.

Implications of the Study

The findings refine the application of Situated Learning Theory in resource-constrained environments. Lave and Wenger's original framework assumed that authentic contexts naturally emerge from communities of practice, but the present study shows that in formal schooling, contexts must be *deliberately designed* using locally available environmental problems. The semi-arid conditions of Sokoto State provided water quality and desertification case studies that required no laboratory infrastructure beyond basic glassware. This challenges the assumption that situated learning depends on rich technological or industrial settings. Cognitive Load Theory is also extended by the evidence that reducing extraneous load through contextual narrative directly increases germane load available for synthesis and evaluation. In settings where textbooks are dense and teacher explanations are often expository, CBCI offers a low-cost mechanism for cognitive load optimisation. Finally, Bloom's Revised Taxonomy, typically used as a classification tool, here functions as a diagnostic for instructional design. The data show that traditional methods improve lower tiers (analysis) but fail to scaffold creation. Therefore, any theory of cognitive development in chemistry education must specify which instructional contexts activate which taxonomic levels.

For classroom practice, educators should replace decontextualised algorithmic drills with weekly case studies drawn from local environmental challenges. Each case must require students to: (a) analyse a chemical problem (e.g., contamination of well water with heavy metals), (b) evaluate competing remediation strategies (e.g., precipitation versus ion exchange), and (c) create a feasible action plan justified by chemical laws. This sequence directly mirrors the CHOTPT structure. For curriculum developers, the official chemistry syllabus for senior secondary schools should integrate sustainability narratives into every major topic: oxidation-reduction taught through corrosion in water infrastructure, electrolysis through metal recovery from electronic waste, hydrocarbons through bioplastics from agricultural residue. These integrations must be mandatory, not optional enrichment. For teacher training institutions, pre-service and in-service programmes must shift from content delivery to facilitation of context-based inquiry. Teachers need practice in eliciting student-generated solutions rather than confirming yes-no answers. The absence of digital technology in many sub-Saharan African classrooms is not a barrier; the present study achieved very large effects with printed scenarios and low-cost demonstrations. Professional development should

therefore prioritise narrative construction and questioning techniques over digital literacy.

Limitations of the Research

The conclusions must be interpreted within specific methodological and contextual boundaries. First, geographical and sample specificity limits broad generalisability. The study was conducted exclusively in public co-educational schools in Sokoto State, a semi-arid region with distinct environmental pressures. Students in humid tropical zones, industrial urban centres, or private schools with different resource profiles might show different response patterns to CBCI. Second, the reliance on a single performance test (CHOTPT) as the primary quantitative measure, while validated, cannot capture the full spectrum of higher-order thinking that may manifest in collaborative problem-solving or extended project work. The test was administered immediately after the 12-week intervention; therefore, the durability of cognitive gains beyond the immediate post-test period remains unexamined. Third, the cross-sectional design, comparing pre-test and post-test within a fixed 12-week window, captures a snapshot of cognitive change but cannot establish the long-term trajectory of skill retention or the point at which gains plateau. Without delayed post-testing, claims about permanent cognitive reorganisation are provisional. Fourth, the reduction from the intended sample of 160 students per group to 60 per group in the available dataset reduces statistical power and may inflate effect size estimates. Fifth, the study did not collect data on gender, prior academic achievement, or socioeconomic status, precluding moderation analyses that would reveal whether CBCI benefits all students equally or interacts with existing disparities. Sixth, while the 12-week duration mitigated novelty effects, the Hawthorne effect cannot be entirely ruled out; experimental group teachers received intensive training and may have unconsciously projected enthusiasm that influenced student performance independently of the instructional method itself. These limitations do not invalidate the findings but specify the interpretive boundaries: the study provides strong evidence for the efficacy of CBCI within the tested conditions, but generalisation to other populations, longer time horizons, and unmeasured moderators requires replication and extension.

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Needs for E-Supervision in Kwara State Universities

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Abstract

In current Era, Information and Communication Technologies (ICTs) have become cheaper and affordable for almost every organisation for effective and efficient smooth running of every activity of the organisation. This paper discussed the need for e-supervision in Kwara State universities. University education, concept of e-supervision, as well as justification and effectiveness of e-supervision were discussed. The types of e-supervision, challenges and solutions to the challenges were elucidated. On this note, it was concluded that e-supervision has great impact on both the supervisor and the supervisee and the institution itself. The paper suggested that institutions should adopt a multi-layered investment and partnership strategy. Governments and university management should priorities funding for ICT through dedicated budget lines and TETFund interventions. Institutions should establish centralised ICT hubs with stable broadband, solar-powered backup systems to mitigate unreliable electricity, and campus-wide Wi-Fi access. Partnerships with telecom providers (e.g., subsidised educational data bundles) can improve connectivity.

Keywords: E-supervision, Universities, Kwara State, Information and Communication Technologies

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Introduction

The need for education in every nation, is to achieve educational objectives which involves transmission of information, knowledge, skills, values and attitudes to the young ones that cares for it. The demand for university education is grossly increasing globally as millions of students were seeking for higher education so as to improve themselves and to meet up with their contemporary around the world. E-supervision is an interactive structure with electronic gadgets to transmit between the supervisee and the supervisor (Fasasi, et. al, 2020). According to Onah et al (2024), e-supervision's potential lies in its ability to overcome physical barriers and create a dynamic and supportive environment for students conducting research projects in Nigerian universities.

E-supervision is an innovation evolved in the teaching and learning process in most educational institutions at all levels. The gadgets include visual and audio contact between supervisees and supervisors such as closed-circuit television system that uses fiber optics, microwave, phone lines and a digital satellite to deliver and oversee educational information on line (Olowa, et. al, 2021). The use of e-supervision is no more a news in promoting education through supervision mostly in many advanced nations. Many developed nations of the world have in recent times, applied the use of mobile learning and supervision which means the use of wireless electronic technology to deliver, receive knowledge and access skill (Fulton, 2019).

However, Nigeria universities can be said to be behind in the adaptation of these technologies as there is evidently an extremely usage of physical supervision among Nigeria universities (Olashehinde-williams, 2020). Perhaps, there is the need for e-supervision among Kwara state universities due to various factors such as the increase in demand for remote learning, the need to overcome geographical barriers in supervision and the potential for enhancing the efficiency of innovation in academic supervision processes. E-supervision can facilitate more flexible interactions between supervisors and students, enabling them to overcome limitations imposed by physical distance. Additionally, it could lead to more streamlined communication channels and easier access to resources, ultimately enhancing the quality of supervision and academic outcomes.

University Education in Nigeria

Nigeria as a nation of the world have encourages various forms of education at all levels over some decade. Formal education has been accepted and in existence during the colonia era just to develop the growth of the citizen, society and the country at large. Considering the importance of education to the growth of the nation, huge in resources in various capacity have always been put in place to compliment the education sector by the government of Nigeria (Ajape, et. al, 2023). Evidently, the educational industry is always being considered as one of the most essential sectors out of all sectors in the yearly budgetary presentation (Olokooba, 2020).

University education in Nigeria is posed to be the source of developing and sustaining the socio-economic that will invariably develop the nation. According Okoli (2019), university education is there to develop the human resources which are the tools to develop a nation through other sectors, and is the highest level in the learning process, also a critical component of human development worldwide. Ajape et. al. (2021) postulated that university education in Nigeria is the education that prepares the youths for future. It is also the key to the realisation of the social, economic sustainability and technological advancement of a country. The Nigerian university system is the largest in Africa and according to the National Universities Commission, the total number of universities in Nigeria is 309 which comprises 74 federal universities, 67 state universities and 168 private universities (National Universities Commission, 2026)

On the other hand, Kwara state universities are eleven in number with one Federal, two State- owned and nine Private universities (Kwara State, 2026) University education is an advanced education that develops the manpower of the country through teaching, supervision, researching and providing community services in order to develop and sustain the society. University education is the most advanced and acceptable education that has and gives the highest certificate to career development. Therefore, efficient and effective university education system could be considered as one of the best assets a nation can have and to invest on.

The Concept of E-Supervision

Supervision is the collection of elements of direction, guidance, oversight and coordination of the activities of the students. According to Olashehinde-

Williams (2020), e-supervision means practicing supervisory methods through using modern technology and communication to develop competences among the learners and the supervisors. E-supervision can also be considered as virtual activities as supervisors are virtually connected to the scattered supervisees (Ogunode, 20201). Jegede (2021) asserted that e-learning is a crucial element that provides an opportunity to enhanced collaboration between the supervisors, teachers, students and their schools. In addition, Fasasi (2018) described e-supervision as the process of learning, cognition and understanding. It gives new perspectives for acting as a professional.

E-Supervision system simply means a web-based system using multi-agents' technologies with client/server approach to access and receive information from databases to help teachers, facilitators, lecturers, supervisors and supervisees in their activities (Akande, 2019).

Justifications for E-Supervision

According to Frederick et. al. (2016), Innovative Educational Technologies (ICTs) enable qualified academics to supervise from anywhere in the world with the relevant technical infrastructure. Also, to save time and cost, removing geographical limitations, tracking corrections made by students, promoting efficiency and effectiveness in research supervision, bridging communication gap between supervisors and supervisees among others. These features can also be considered as justification for e-supervision:

- I. Savings on: travelling expenses, printing and collating, time spent on the road and less stress.
- II. Automatic: electronic record keeping, backups, and filing. Ease of electronic acceptance or rejection of supervisor's recommendations. Automatically generated electronic notes provided for all recommendations made by Supervisor.
- III. Minimizing face-to-face consultations, and
- IV. Reducing Phobia among others.

Effectiveness of E-Supervision

E-supervision is regarded as an online activity which requires at least basic knowledge and skills in computer usage. Awodiji et al. (2020) describes requirements of effective online supervision in perspective of supervisor and supervisee as follows, must have/be able to:

- I. skill in navigating online.
- II. basic typing and spelling skills.
- III. excellent communication skills.
- IV. express self in the written word.
- V. express concepts/ideas without the use of non-verbal cues.

Type of E-Supervision

Fasasi (2018) discussed on the following gadgets as various facilities to use for e-supervision, thus as follows:

- I. Computer-Assisted Live Supervision: Live supervision has become a rarely used but potentially powerful tool in the supervisory activities. Live supervision differs from live observation in that during live supervision, immediate feedback can be offered. Both the supervisor and supervisee can receive feedback and suggestions within session so that they can have immediate support. Live supervision has been seldom used because it is time consuming, and often is filled with distractions. While helpful it can be disruptive and cause a hierarchy problem since it defined the trainee as not in charge and needing an expert,
- II. Web-Pages: Web page to facilitate instruction and communication between the supervisor and supervisee. Web page make it ease of accessing material, clarity of presentation, as well as providing the opportunity to ask questions and provide feedback to individuals and entire groups. Most supervisory centers have internet assignments built into their requirements, so the need to be proficient with technology is supported through hands on experiences. Web page is a day-to-day activities with the use of e-mail and computers.

- III. Videoconferencing: of these, the single and most palpable enhancement achieved through videoconferencing is simultaneous face-to-face interaction at a distance. Supervisee can link with the supervisors elsewhere nationally or internationally, exchange information, and develop their supervising competencies. The use of videoconferencing and E-mail enables supervisors to provide supervisees with a relevant and realistic outcome for the purposeful communication. It develops essential organizational and management skills - and provides a unique opportunity for communication at a distance with fellow teachers and supervisors, and consequent development of their critical professionalism. The technology will also permit the use of software applications such as Power Point for additional polish of presentation, rather than overhead transparencies.
- IV. Electronic Mail: an E-mail is an electronic mail i.e. sending message by electronic means. E-mail is another great machine of the modern ICT for teaching, learning, research and supervision. It is easy to use, very fast and allows sharing of or collaboration on documents. It can widely be used by teachers for debate, discussion, disseminating information, surveys and questionnaires, locating colleagues and even electronic meetings. E-mail can be used for a wider variety of functions. E-mail can be used as an educational tool which supervision is among and as well as a social communicator. The introduction of E-mail has made the supervision process easier as it allows for regular contact between the supervisors and supervisee. Individuals involved in the supervision of practicum and internship teachers can converse regularly without the constraints of physical proximity. This allows for a more continuous supervisory experience for the supervisee.
- V. Chat rooms and Real-Time Communication: similar to the concept of E-mail is that of chat rooms and real-time communication. These options allow individuals to post comments and questions to others in a group and receive feedback or suggestions. The improvement over E-mail is that the communication between the group is in real-time. Questions can be answered instantly and a discussion can follow. Supervisors can establish a listing of all group members and their assigned/chosen screen names. If using a chat room, all individuals who want to participate in the supervision can meet in a designated

room. Current chat room technology allows for secure and private rooms where access is restricted to only those who are part of the supervision group. A real-time discussion forum can take place between supervisor and supervisees. Supervisees are also able to communicate with one another.

- VI. **Cyber Supervision:** cyber supervision provides supervisors with the most flexibility in working with their supervisees. With the proper equipment, a supervisor can interact with supervisees at various locations with real time video and audio capabilities. More importantly, the supervisees are also able to communicate with one another as well. This approach is modeled closely after the distance learning technology that is becoming more prevalent in higher education settings. The key element in cyber supervision, is more secure than E-mail or chat room transcripts that are considered public record and are used extensively in counselor supervision. Cyber supervision has many benefits as a supervisory approach. It has the flexibility to allow group participants to either share their communication with the whole supervision group or privately with another group participant without involving the whole group. The audio-visual format also provides supervisors with a better sense of the teachers' concerns. They are able to monitor for verbal and nonverbal behaviors and obtain a clearer understanding of the skills and capabilities of individuals. To use the cyber supervision approach, specific hardware is needed to achieve the desired results. (Fasasi, et al, 2018)

Needs for E-Supervision

Remarkable improvements in Information and Communication Technology have presently enhanced the adoption of innovative educational technologies for electronic supervision of students' research projects in universities across the globe (Onah et. Al.2024). Computer-based approaches appear to have many benefits to both supervisee and supervisor.

- I. **Accessibility:** E-supervision can improve access to academic supervision for students who may face challenges in physically attending supervisory meetings due to factors such as disabilities, health issues, or transportation constraints.

- II. Scalability: With e-supervision platforms, Kwara State Universities can potentially scale up its supervision capacity to accommodate a larger number of students without being limited by physical space or time constraints.
- III. Cost-effectiveness: Implementing e-supervision could lead to cost savings for both students and the university by reducing the need for travel expenses and other associated costs related to in-person supervision meetings.
- IV. Technological Infrastructure: If Kwara State Universities already has robust technological infrastructure in place, including internet connectivity and digital platforms, transitioning to e-supervision will/may be more feasible and efficient.
- V. Globalization of Education: In an increasingly interconnected world, e-supervision can facilitate collaborations and academic exchanges with institutions and scholars from around the globe, enriching the academic experiences like supervision for students, supervisor, faculty and alike.
- VI. Student Preferences: Some students may prefer e-supervision over traditional in-person meetings due to factors such as convenience, flexibility, and comfort with digital communication tools.
- VII. Emergency Preparedness: E-supervision can serve as a valuable contingency plan during emergencies such as pandemics, natural disasters, or political unrest, ensuring continuity in academic supervision despite external disruptions.
- VIII. Flexibility: Explore how e-supervision offers flexibility in scheduling supervisory meetings and interactions, accommodating diverse student needs and preferences.
- IX. Efficiency: Highlight the potential for e-supervision to streamline communication channels, facilitate document sharing, and increase productivity in the supervision process.
- X. Innovation: Discuss how e-supervision platforms can enable the integration of innovative tools and technologies to enhance the quality of supervision and academic outcomes.

These factors collectively underscore the importance of considering e-supervision as a viable option for enhancing academic supervision practices within Kwara State Universities.

Challenges of E-Supervision

In the developing countries like Nigeria, e-supervision is challenged with the problem of the new technology in terms of availability and use of the multimedia system and courseware, digital classrooms, videophone system among others by the students (Olowa et al. 2021). As much as e-supervision has many benefits to both the supervisor, school and supervisee, logically, challenges are there to/may hinder the aforementioned benefits, these includes:

- I. **Technological Infrastructure:** without infrastructure technological facilities like reliable internet connectivity, regular power supply, digital gadgets, ICT centers and other technological infrastructure resources, effective e-supervision cannot be in use.
- II. **Digital Divide:** in-ability to have equal opportunity to digital environment is a factor against online-supervision, particularly for students from disadvantaged backgrounds who may lack access to necessary technology or resources, mostly from remote ends
- III. **Communication and Relationship Building:** supervisor-supervisee communication relationship can be posed as a problem. In the sense that if there are no basic knowledge and skill of digital gadget, typing, fluent in speaking, and good relationship, e-supervision can be obstructed.
- IV. **Academic Integrity:** this is another factor as a challenge of E-supervision, though e-supervision is an innovation in academic setting, but also at-risk considering malpractice or plagiarism as against the legal and ethical conduct guiding the exercise. However, the risk can tarnish the integrity of the institution.
- V. **Cost implication:** most importantly is the cost associated with many of these systems. Purchasing and installing the equipment needed to provide these various forms of supervision can be expensive.

Solutions to the challenges of e-Supervision

Joseph (2020) proposed the following as the possible solutions to some identified problems of e-supervision activities:

- I. Institutions should adopt a multi-layered investment and partnership strategy. Governments and university management should priorities funding for ICT through dedicated budget lines and TET Fund interventions. Institutions should establish centralized ICT hubs with stable broadband, solar-powered backup systems to mitigate unreliable electricity, and campus-wide Wi-Fi access. Partnerships with telecom providers (e.g., subsidized educational data bundles) can improve connectivity.
- II. Institutions can implement device loan schemes (laptops/tablets) and provide subsidized or free internet access for disadvantaged students. Establishing community digital access centers in remote areas and leveraging mobile-friendly platforms ensures inclusiveness. Training programmed should be organized to improve digital literacy, especially for students from underserved backgrounds. Policymakers should also promote inclusive ICT policies that priorities rural connectivity and marginalized groups.
- III. Institutions should organize digital communication training covering typing skills, virtual etiquette and the effective use of platforms (e.g., Zoom, Google Meet, LMS tools). Supervisors should adopt blended communication strategies, combining synchronous (video meetings) and asynchronous (emails, recorded feedback) methods. Establishing clear communication guidelines, regular check-ins, and feedback timelines strengthens relationships. Encouraging informal virtual interactions can also foster trust and reduce psychological distance.
- IV. To safeguard integrity in e-supervision, institutions should implement robust monitoring and ethical frameworks. The use of plagiarism detection tools such as Turnitin and Grammarly helps ensure originality. Institutions should enforce strict academic integrity policies, including penalties for misconduct. Training students on research ethics, citation practices, and originality is essential. Supervisors can also adopt process-based assessment (e.g., drafts,

progress reports, oral defenses) rather than relying solely on final submissions, making malpractice more difficult.

- V. To manage high costs, institutions should pursue cost-sharing and resource optimisation strategies. Governments and private sector partners should provide grants, while institutions can adopt open-source platforms (e.g., Moodle) to reduce software expenses. Bulk procurement of devices and infrastructure lowers costs through economies of scale.

Conclusion

The e-supervision initiated as a major tool for increasing the distance learning and use of technologies in productive manner. Therefore, there is more to guns on better education in future with the use of e-supervision in Kwara state universities. In order to continue in the use and developing electronic learning and supervision, there is the need to address the challenges, huge investment on technological infrastructure is necessary which this paper discussed. Training, support and development of the key human resources involved is important so that the primary objective of effective and efficient e-supervision will be achieved. The need for equal opportunity to the less privilege ones, mostly dwellers of the rural areas for digital environment to enable them have access to facilities is also an important aspect discussed in this paper.

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