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EDITORIAL

It is with great pleasure that I welcome our esteemed readers, contributors, reviewers, and members of the academic community to Volume 6, Issue 3 (September 2026) of the *Journal of Research in Science Education (JORISE)*, an official publication of the Department of Science Education, Faculty of Education, Ekiti State University.

JORISE remains committed to providing a credible platform for the dissemination of contemporary research, innovative ideas, and scholarly perspectives in science education and related fields. The journal welcomes research across a broad spectrum of science disciplines, pedagogy, curriculum, instruction, educational technology, and other emerging areas relevant to the advancement of science education at national and international levels.

As a double-blind peer-reviewed journal, JORISE upholds rigorous academic and ethical standards in the review and publication of scholarly works. Through the contributions of researchers and scholars, the journal continues to promote meaningful academic discourse, knowledge sharing, and evidence-based approaches to teaching, learning, and research.

This Volume 6, Issue 3 (September 2026) features scholarly contributions that reflect the diverse and evolving nature of research in science education. I sincerely appreciate all the authors whose scholarly efforts have contributed to the successful publication of this issue, as well as the reviewers whose valuable assessments have helped maintain the quality and integrity of the journal.

I encourage researchers, educators, postgraduate students, and other scholars to continue to engage with JORISE by submitting high-quality research for consideration in future issues. The continued support and participation of the academic community remain essential to the growth, visibility, and sustainability of the journal.

As JORISE moves forward, we remain dedicated to strengthening its role as a platform for advancing knowledge and promoting research that contributes meaningfully to the improvement of science teaching, learning, and educational practice.

I express my sincere appreciation to all contributors, reviewers, editorial team members, and readers for their continued support and commitment to JORISE. Your contributions and engagement continue to strengthen the journal and the broader field of science education.

Thank you for your continued support.

O. I. Oginni, Ph.D

Editor-in-Chief

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EFFECTS OF GUIDED DISCOVERY INSTRUCTIONAL STRATEGY ON STUDENTS' ACADEMIC ACHIEVEMENT IN ELECTROLYSIS

BY

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Abstract

This study examined the effect of guided discovery instructional strategy on Senior Secondary II students' academic achievement in electrolysis. It also investigated school type and its interaction with instructional method. A pretest-posttest non-equivalent control-group quasi-experimental design was adopted. The population comprised 4,393 Senior Secondary II science students in Ilaje Local Government Area, Ondo State, Nigeria. A sample of 120 chemistry students from four secondary schools was selected through multistage sampling. Data were collected using a 20-item Electrolysis Performance Test validated by specialists in chemistry education and measurement and evaluation. The instrument yielded a Kuder-Richardson Formula 20 reliability coefficient of .81. The intervention lasted six weeks. Three null hypotheses were tested using analysis of covariance at the .05 level, with pretest scores entered as the covariate. Results showed that guided discovery significantly improved achievement, $F(1, 117) = 49.398$, $p < .001$. School type had no significant effect, $F(1, 117) = 1.571$, $p = .213$, while the method-by-school-type interaction was not significant, $F(1, 115) = 1.829$, $p = .179$. The study concluded that guided discovery was more effective than the conventional method and produced comparable achievement gains across public and private schools.

Keywords: academic achievement; conventional method; electrolysis; guided discovery; school type

Introduction

Chemistry contributes to scientific literacy and provides foundational knowledge for health, engineering, agriculture, environmental management and other science-based fields. Electrolysis is an important aspect of senior secondary chemistry because it requires learners to connect observable laboratory events with particle-level processes and symbolic equations. To understand electrolysis meaningfully, students must coordinate ideas about ions, electrodes, electron transfer, oxidation-reduction reactions, electrical conductivity and the products formed at the electrodes.

Recent evidence shows that electrochemistry remains conceptually demanding for learners. Students may confuse the signs and functions of the anode and cathode, assume that electrons move through an electrolyte in the same way that they move through a metallic conductor, or fail to distinguish electrolytic cells from voltaic cells (Hadinugrahaningsih et al., 2022; Nakiboğlu et al., 2024). A

systematic review of chemistry misconceptions also shows that abstract chemical concepts are particularly vulnerable to fragmented understanding when students rely mainly on memorised rules (Suparman et al., 2024). In a West African Senior School Certificate Examination report, the West African Examinations Council noted that many candidates could not identify the products formed during the electrolysis of concentrated sodium chloride solution with graphite electrodes (West African Examinations Council [WAEC], 2020). These findings provide a clear basis for investigating instructional approaches that make students reason from evidence rather than merely recall completed explanations.

Guided discovery instructional strategy is a structured learner-centred approach in which the teacher presents carefully sequenced tasks, questions, materials and feedback that enable students to derive concepts and principles. The strategy differs from unguided discovery

because the teacher remains actively involved by directing attention, providing prompts, correcting unproductive paths and consolidating the scientific principle after exploration. Inquiry-oriented learning commonly proceeds through orientation, investigation, interpretation and conclusion, with guidance helping learners to connect each phase to the intended learning outcome (Pedaste et al., 2015). A meta-analysis further showed that guidance improves inquiry activities, task performance and learning outcomes (Lazonder & Harmsen, 2016). More recent synthesis also supports combining inquiry with explicit teacher direction rather than treating the two approaches as mutually exclusive (de Jong et al., 2023).

Electrolysis is suitable for guided discovery because its central relationships can be investigated through observable changes and then explained at the symbolic and particle levels. Learners can predict electrode products, observe colour or gas changes, trace ionic movement, identify oxidation and reduction sites, write half-equations and compare their predictions with evidence. Research on electrochemistry instruction indicates that structured visual and representational activities can improve conceptual understanding when students are required to generate, evaluate and revise explanations (Lin & Wu, 2021). Guided discovery therefore creates opportunities for students to link practical observations with the underlying electrochemical processes.

School type may also shape the conditions under which an instructional strategy is implemented. Public and private schools can differ in class size, laboratory access, availability of consumables, supervision and teacher support. These contextual differences do not constitute an instructional treatment, but they may influence students' learning opportunities and the consistency with which practical strategies are implemented. Nigeria's education sector analysis identifies continuing inequalities in educational resources and learning conditions (Federal Ministry of Education, 2022). However, recent Nigerian evidence from chemistry instruction found that students taught with a guided-inquiry strategy performed better than those taught through lecture, while achievement did not differ significantly between public and private schools (Musa et al., 2025). It is therefore

useful to distinguish the main effect of instructional method from the main effect of school type and from the interaction between the two.

The problem addressed in this study is the persistent difficulty students experience in electrolysis and the limited local evidence on whether guided discovery improves achievement consistently across public and private secondary schools in Ilaje Local Government Area. Although guided discovery has demonstrated promise in science education, its effectiveness must be established with context-specific evidence and interpreted without treating school type as an experimental treatment. The study therefore compared guided discovery with the conventional method and examined the main and interaction effects of instructional method and school type on Senior Secondary II students' academic achievement in electrolysis.

Purpose of the Study

The study determined the effect of guided discovery instructional strategy on Senior Secondary II students' academic achievement in electrolysis. It also examined whether achievement differed between students in public and private schools and whether the effect of instructional method varied according to school type.

The following null hypotheses were tested at the .05 level of significance:

1. There is no significant difference in the pretest–posttest achievement mean scores of students taught electrolysis using guided discovery instructional strategy and those taught using the conventional method.
2. There is no significant difference in the pretest–posttest achievement mean scores of students in public and private schools.
3. There is no significant interaction effect between instructional method and school type on students' achievement in electrolysis.

Literature Review

Guided discovery is an inductive instructional approach in which learners encounter a problem, pattern or set of observations before the teacher consolidates the formal principle. The approach is not equivalent to leaving students to discover complex scientific ideas without support. Instead, guidance is embedded in the selection of examples, questions, representations, feedback and the

sequence of learning activities. Pedaste et al. (2015) explained inquiry learning as a cyclical process involving orientation, conceptualisation, investigation, conclusion and discussion. Within guided discovery, the teacher uses these phases flexibly and provides enough structure to keep learners focused on the intended concept.

The quality of guidance is central to the effectiveness of discovery-oriented instruction. Lazonder and Harmsen (2016) found positive overall effects of guidance on learning activities, successful task performance and learning outcomes. De Jong et al. (2023) similarly argued that inquiry and direct instruction should be combined according to the learning objective, students' prior knowledge and the complexity of the domain. For electrolysis, this means that students may investigate electrode processes and interpret observations, while the teacher supplies prompts, checks misconceptions and explicitly consolidates accepted electrochemical explanations.

Electrolysis requires learners to integrate several representations. They must connect a visible change, such as gas evolution or metal deposition, with ion movement, electron transfer and half-equations. Nakiboğlu et al. (2024) found that senior high-school students from different national contexts shared weak understanding and common alternative conceptions concerning electrolysis, current flow and electrode polarity. Hadinugrahaningsih et al. (2022) also reported misconceptions in reduction-oxidation concepts, which are prerequisite knowledge for electrochemical cells. These findings indicate that effective electrolysis instruction should require students to explain the relationships among observations, particles and symbols rather than reproduce isolated rules.

Empirical studies provide support for guided forms of inquiry and discovery in science. Egbes and Ajaja (2023) reported that secondary school students taught biology through guided discovery achieved and retained more than students taught through lecture. In chemistry, Musa et al. (2025) found that guided inquiry improved students' performance in esterification relative to lecture instruction. Lin and Wu (2021) further demonstrated that structured visualisation activities could improve high-school students' electrochemistry understanding and learning

motivation. Although these studies differ in subject matter and setting, they support the principle that students learn complex science concepts more effectively when they actively investigate evidence under structured teacher guidance.

School type is a contextual variable rather than an experimental treatment. Public and private schools may provide different levels of facilities, staffing and instructional support, but such differences do not automatically produce achievement differences after students' initial scores and the instructional method are considered. Musa et al. (2025) found no significant achievement difference between public and private school students exposed to guided inquiry. The present study therefore tested school type as a main effect and also examined whether it moderated the effect of instructional method.

Methodology

The study adopted a pretest-posttest non-equivalent control-group quasi-experimental design. The population comprised 4,393 Senior Secondary II science students in co-educational secondary schools in Ilaje Local Government Area of Ondo State during the 2025/2026 academic session. A sample of 120 SSII chemistry students was selected from four schools through a multistage sampling procedure involving stratification by school type and random selection of participating schools. Four intact classes were used, and the sample represented guided discovery and conventional-method conditions across public and private schools.

Data were collected with the Electrolysis Performance Test (EPT), a researcher-developed 20-item multiple-choice test based on the electrolysis content prescribed for SSII chemistry. Specialists in chemistry education and measurement and evaluation reviewed the instrument for face and content validity. Because the items were scored dichotomously, internal consistency was estimated using Kuder-Richardson Formula 20, which produced a reliability coefficient of .81.

Permission to conduct the study was obtained from the participating schools. The EPT was administered as a pretest before the intervention. Treatment lasted six weeks, with one 80-minute lesson per week for each group. Students in the experimental condition learned through guided questions, cooperative tasks and hands-on electrolysis activities. Students in the control condition received

conventional teacher-centred instruction through explanation, note-taking and worked examples. Both groups covered the same electrolysis content and completed the EPT as a posttest after the intervention.

Analysis of covariance (ANCOVA) tested the three null hypotheses at the .05 significance level. Posttest achievement was the dependent variable, while pretest achievement was entered as the covariate to adjust for initial differences between the intact classes. The analyses examined the main effect of instructional method, the main effect of school type and the interaction between

instructional method and school type. Results are reported with F values, degrees of freedom, p values and model R^2 .

Results

Hypothesis One: There is no significant difference in the pretest–posttest achievement mean scores of students taught electrolysis using guided discovery instructional strategy and those taught using the conventional method.

Table 1: ANCOVA of the Difference in Students' Posttest Achievement in Electrolysis by Instructional Method

Source	Type III Sum of Squares	df	Mean Square	F	Sig.
Corrected Model	477.006	2	238.503	98.710	.000
Intercept	1109.561	1	1109.561	459.219	.000
Pretest	274.991	1	274.991	113.812	.000
Method	119.355	1	119.355	49.398	.000
Error	282.694	117	2.416		
Total	15148.000	120			
Corrected Total	759.700	119			

Note. $R^2 = .628$; adjusted $R^2 = .622$.

Table 1 shows a significant main effect of instructional method on students' achievement in electrolysis, $F(1, 117) = 49.398$, $p < .001$. Since the p value is lower than .05, the null hypothesis was rejected. The adjusted posttest achievement of students taught through guided discovery was significantly

higher than that of students taught through the conventional method.

Hypothesis Two: There is no significant difference in the pretest–posttest achievement mean scores of students in public and private schools.

Table 2: ANCOVA of the Difference in Students' Posttest Achievement in Electrolysis by School Type

Source	Type III Sum of Squares	df	Mean Square	F	Sig.
Corrected Model	362.977	2	181.488	53.524	.000
Intercept	1070.158	1	1070.158	315.606	.000
Pretest	360.527	1	360.527	106.325	.000
School Type	5.326	1	5.326	1.571	.213
Error	396.723	117	3.391		
Total	15148.000	120			
Corrected Total	759.700	119			

Note. $R^2 = .478$; adjusted $R^2 = .469$.

Table 2 shows that the main effect of school type was not statistically significant, $F(1, 117) = 1.571$, $p = .213$. Since the p value is greater than .05, the null hypothesis was retained. Thus,

after controlling for pretest achievement, students' posttest achievement did not differ significantly between the public and private schools included in the study.

Hypothesis Three: There is no significant interaction effect between instructional method and school type on students' achievement in electrolysis.

Table 3: Two-Way ANCOVA of the Interaction between Instructional Method and School Type on Students' Achievement in Electrolysis

Source	Type III Sum of Squares	df	Mean Square	F	Sig.
Corrected Model	481.503	4	120.376	49.761	.000
Intercept	1100.195	1	1100.195	454.795	.000
Pretest	270.400	1	270.400	111.777	.000
Method	89.031	1	89.031	36.803	.000
School Type	.231	1	.231	.095	.758
Method $\times$ School Type	4.424	1	4.424	1.829	.179
Error	278.197	115	2.419		
Total	15148.000	120			
Corrected Total	759.700	119			

Note. $R^2 = .634$; adjusted $R^2 = .621$.

Table 3 shows that the interaction between instructional method and school type was not statistically significant, $F(1, 115) = 1.829$, $p = .179$. Since the p value is greater than .05, the null hypothesis was retained. It was therefore concluded that there was no significant interaction effect of instructional method on students' achievement in electrolysis based on school type.

Discussion

The first finding revealed a significant effect of instructional method on students' achievement in electrolysis, with students taught through guided discovery outperforming those taught through the conventional method. The finding suggests that structured investigation, teacher questioning, practical engagement and explanation helped students to develop a more coherent understanding of electrolysis. This interpretation is consistent with the evidence that inquiry is most effective when learners receive adequate guidance and when explicit explanation is integrated with investigation (de Jong et al., 2023; Lazonder & Harmsen, 2016). The result also agrees with Egbes and Ajaja (2023), who found higher achievement under guided discovery than lecture instruction, and with Musa et al. (2025), who reported an advantage for guided inquiry in chemistry. The benefit of guided discovery is especially relevant to electrolysis because the topic

requires students to coordinate macroscopic observations, particle movement and symbolic representations. During guided discovery lessons, students were not limited to receiving finished rules; they predicted products, examined evidence and related electrode changes to oxidation and reduction. This type of representational engagement is consistent with Lin and Wu's (2021) finding that structured visualisation and model revision can strengthen electrochemistry understanding. It also responds directly to the persistent misconceptions documented by Hadinugrahaningsih et al. (2022) and Nakiboğlu et al. (2024).

The second finding showed no statistically significant main effect of school type on students' achievement. This means that, after pretest achievement was controlled, the public and private school students included in the study did not differ significantly in posttest performance. The finding agrees with Musa et al. (2025), who reported no significant difference between public and private school students taught chemistry through guided inquiry. The result should not be interpreted as proof that public and private schools are identical in resources or organisation; rather, it indicates that school ownership did not independently account for a significant achievement difference in this sample.

The third finding revealed no significant interaction between instructional method and school type. Thus, the observed advantage of guided discovery did not vary significantly between the public and private schools included in the study. This finding supports the applicability of guided discovery across the two school types when the strategy is implemented with comparable content, lesson duration and instructional support. However, the absence of a significant interaction should be interpreted within the limits of the four participating schools and should not be generalised as evidence that school context can never influence implementation.

Conclusion

Guided discovery instructional strategy significantly improved Senior Secondary II students' academic achievement in electrolysis compared with the conventional method. School type did not significantly influence achievement, and the interaction between instructional method and school type was not significant. The study therefore concludes that guided discovery is an effective approach to teaching electrolysis and that its observed achievement advantage was consistent across the public and private schools included in the study.

Recommendations

1. Chemistry teachers should use structured guided discovery activities that combine prediction, practical investigation, questioning, evidence-based explanation and teacher-led consolidation when teaching electrolysis.
2. Teacher-training and professional-development programmes should include practical guidance on how to scaffold guided discovery lessons, manage cooperative laboratory activities and correct misconceptions during electrolysis instruction.
3. Public and private school authorities should provide the basic apparatus, electricity supply and consumable materials required for guided discovery activities in electrolysis.
4. Curriculum supervisors should monitor the quality of implementation in both public and private schools so that guided discovery is applied as a structured

strategy rather than as unguided experimentation.

5. Further studies should use larger samples, report adjusted group means and measure implementation fidelity, teacher characteristics and laboratory resources to clarify the conditions under which guided discovery produces the strongest achievement gains.

References

- de Jong, T., Lazonder, A. W., Chinn, C. A., Fischer, F., Gobert, J., Hmelo-Silver, C. E., Koedinger, K. R., Krajcik, J. S., Kyza, E. A., Linn, M. C., Pedaste, M., Scheiter, K., & Zacharia, Z. C. (2023). Let's talk evidence—The case for combining inquiry-based and direct instruction. *Educational Research Review*, 39, 100536. <https://doi.org/10.1016/j.edurev.2023.100536>
- Egbes, N. L., & Ajaja, O. P. (2023). Effects of guided discovery and problem-solving instructional strategies on achievement and retention of biology students in Delta Central Senatorial District, Nigeria. *European Journal of Education Studies*, 10(4), 353–372. <https://doi.org/10.46827/ejes.v10i4.4793>
- Federal Ministry of Education. (2022). Education sector analysis 2021. <https://education.gov.ng/education-sector-analysis-2021/>
- Hadinugrahaningsih, T., Rahmawati, Y., & Suryani, E. (2022). An analysis of preservice chemistry teachers' misconceptions of reduction–oxidation reaction concepts. *Journal of Technology and Science Education*, 12(2), 448–465. <https://doi.org/10.3926/jotse.1566>
- Lazonder, A. W., & Harmsen, R. (2016). Meta-analysis of inquiry-based learning: Effects of guidance. *Review of Educational Research*, 86(3), 681–718. <https://doi.org/10.3102/0034654315627366>
- Lin, C. Y., & Wu, H. K. (2021). Effects of different ways of using visualizations on high school students' electrochemistry conceptual understanding and motivation towards chemistry learning. *Chemistry Education Research and Practice*, 22(3),



- 786–801.
<https://doi.org/10.1039/D0RP00308E>
- Musa, A. A., Muhammad, B. A., & Bugaje, B. M. (2025). Effect of guided-inquiry-based instructional strategy on performance in esterification concept among secondary school students in Zaria Metropolis, Kaduna State. *Zamfara International Journal of Education*, 5(4), 152–158.
<https://doi.org/10.64348/zije.2025102>
- Nakiboğlu, C., Rahayu, S., Nakiboğlu, N., & Treagust, D. F. (2024). Exploring senior high-school students' understanding of electrochemical concepts: Patterns of thinking across Turkish and Indonesian contexts. *Chemistry Education Research and Practice*, 25(1), 42–61.
<https://doi.org/10.1039/D3RP00124E>
- Pedaste, M., Mdeots, M., Siiman, L. A., de Jong, T., van Riesen, S. A. N., Kamp, E. T., Manoli, C. C., Zacharia, Z. C., & Tsourlidaki, E. (2015). Phases of inquiry-based learning: Definitions and the inquiry cycle. *Educational Research Review*, 14, 47–61.
<https://doi.org/10.1016/j.edurev.2015.02.003>
- Suparman, A. R., Rohaeti, E., & Wening, S. (2024). Student misconception in chemistry: A systematic literature review. *Pegem Journal of Education and Instruction*, 14(2), 238–252.
<https://doi.org/10.47750/pegegog.14.02.28>
- West African Examinations Council. (2020). Chemistry Paper 2, WASSCE for Private Candidates (First Series): Question 1 observation.
<https://www.waeconline.org.ng/e-learning/Chemistry/chem230aq1.html>



LECTURERS' PERCEPTIONS OF UNDERGRADUATES' ENGAGEMENT WITH INFORMATION AND COMMUNICATION TECHNOLOGY AT FEDERAL UNIVERSITY OYE-EKITI

BY

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ABSTRACT

This study investigated lecturers' perception of tertiary education students' engagement in Information and Communication Technology (ICT) at Federal University, Oye-Ekiti. The study focused on the perceived effectiveness of ICT tools, the challenges faced in integrating these tools into teaching and the extent of students' engagement in ICT within and outside the classroom. A descriptive survey research design was adopted. The population for the study consisted of lecturers of Federal University, Oye-Ekiti from which a sample of 250 participants were randomly selected. Data were collected using structured questionnaire and were analysed using descriptive statistics. Findings revealed that lecturers generally perceived ICT as a valuable tool for enhancing instruction delivery and students learning. Several challenges such as poor internet facility, inadequate ICT facilities, inconsistent power supply among others were identified. The study also found that students actively engaged with ICT tools for academic purposes within and outside the classroom. It was concluded that ICT integration in higher education is beneficial and accepted by lecturers, overcoming infrastructural and institutional barriers is essential for maximising its impact. It was recommended that university administrators and policy makers should invest in ICT infrastructure, provide consistent training for staff and formulate clear policies to support effective ICT integration.

Keywords: Information and Communication Technology (ICT), Teachers, Students, Perception.

Introduction:

The integration of Information and Communication Technology (ICT) in education has become a crucial development in modern educational systems worldwide, which can transform the way teaching and learning occurs. Over the years, there has been a shift from the teacher-centred method of teaching to more of student-centred teaching methods. This is facilitated by the introduction of various innovative ICT tools and platforms. This shift has been observed to enhance students' engagement, facilitate better learning outcomes and enhanced access to educational resources especially the incorporation of ICT in tertiary education which has garnered significant attention from education, researchers and policy makers who aim to utilize technology to improve teaching and learning practices.

Akinyemi (2014) asserted that ICT refers to the use of digital tools such as computers,

internet, multimedia resources and mobile technologies to support teaching, learning and communication within educational settings. The potential of information and communication technology to enhance the learning experience is immense, providing students with access to vast amount of information, opportunities for collaborative learning and the ability to interact with instructions and peers in innovative ways. He further opined that ICT fosters the development of critical skills, such as problem solving, digital literacy and critical thinking which are vital in the increasingly globalised and technology-driven workforce.

ICT covers all types of computers and communication equipment and software used to create, design, store, transmit, interpret and manipulate information in its various ways. ICT originated from humble beginnings which include Abacus, many other forms of

ICT has been invented in recent years that personal computers, laptops, tablets, mobile phones, among others became popular. Information from these tools is generated, shared and must also be digital (Akinyemi 2014).

Ayo-Ogunlusi (2019) revealed that ICT will be an important part of education for the next generation because of its advantage which included; helping in facilitating the communication between the teachers and students by keeping the students updated and enhancing teachers' capacity and ability to foster good interaction between the teacher and the students through the use of e-learning, e-mail, web-based learning among others. ICT has become very powerful media for interactive participation of experts and learners and it reaches those that could have been unreachable. These new technologies have the potential to improve education across the curriculum and deliver opportunities for efficient student teacher communication in ways that are not possible before.

Teo (2014) and Ally (2016) asserted that the success of ICT adoption is significantly influenced by teachers' perspectives and engagement with technology. While some educators recognise the value of ICT in enhancing teaching and learning, others face barriers that hinder their ability to effectively integrate ICT into their teaching methods. Challenges such as inadequate infrastructure, lack of technical expertise and insufficient professional development opportunities can limit the potential impact of ICT on teaching and learning while Agbo et al;(2023), opined that teachers' perception of ICT is necessary because it will help to find out if they are favourably disposed towards it or otherwise because they are the curriculum content implementers. The perception of teachers on the use of ICT determines the technology adoption and acceptance.

Tella et al. (2025) argued that ICT not only enhances the quality of education but also prepares students for the demands of a technology-driven workforce. By incorporating ICT into academic programs, universities aim to equip students with the skills necessary to succeed in modern professional environments where digital competence is essential, and that teachers' perception on the integration

of ICT is vital for understanding how technology is adopted in the classroom.

Bandle (2016) asserted that teachers' perception of ICT plays a critical role in determining the extent to which technology is embraced in the classroom. Studies have shown that teachers who are open to the use of ICT tend to create more engaging and interactive learning environments, ultimately benefiting students' learning experiences. Moreso, teachers who are reluctant to use technology or feel unprepared to do so may struggle to integrate ICT into their teaching even when the infrastructure are available. Okogie in Agbo et al; (2023) revealed that many lecturers face significant challenges in adopting ICT in the Nigerian universities.

These challenges range from limited access to reliable internet and modern computing equipment to lack of training and technical support. As a result, some lecturers remain sceptical about the impact of ICT on student learning, while others are simply unwilling or unable to incorporate it into their teaching practices. This pattern has created a divide among institutions. On one end, some universities have made noticeable progress in integrating ICT into their curricula. These universities have introduced e-learning platforms, conducted ICT training for staff and invested in digital infrastructure. Their efforts indicate a positive shift towards digital education, aligning with global standards and improving students' digital literacy. On the other end, many universities reflect the broader national trend of inconsistent and delayed ICT integration, while some departments and individual lecturers have embraced digital tools, despite the institutional efforts remain fragmented. The research aims to explore the dynamics from the teachers' perception, focusing on how they perceive students' engagement in ICT at the Federal University, in Oye-Ekiti.

Statement of the Problem

Information and Communication Technology (ICT) has become an indispensable component

of higher education, transforming the way teaching and learning are conducted. The increasing availability of digital technologies such as computers, smartphones, educational software and internet-based resources has created new opportunities for students to actively engage in the learning process. ICT has the potential to improve access to educational materials, facilitate collaboration, enhance communication between teachers and students and also promote independent learning. Consequently, higher education institutions have continued to invest in ICT facilities to support quality teaching and learning.

Despite these developments, evidence reveals that the level and quality of students' engagement with ICT vary considerably across tertiary institutions. While some students effectively utilize ICT for academic activities such as research, online learning, assignment preparation, and collaborative learning, others primarily use these technologies for non-academic purposes, including social networking, entertainment, and gaming. Factors such as inadequate ICT facilities, poor internet connectivity, limited digital literacy, lack of institutional support, and irregular electricity supply may also hinder meaningful engagement with ICT.

Teachers, as key stakeholders in the educational process, are in a unique position to observe students' patterns of ICT use and engage and evaluate how these technologies influence learning outcomes. Their perception can provide valuable insights into the extent to which students engage with ICT for educational purposes, the challenges they encounter, and the effectiveness of current ICT integration Strategies within tertiary institutions. However, there is limited empirical evidence on teachers' perception regarding students' engagement with ICT, particularly within many tertiary institutions in developing countries. The lack of adequate information on teachers' perceptions makes it difficult for educational administrators and policymakers to design appropriate

interventions that encourage effective and productive use of ICT among students. If students are not meaningfully engaged with ICT for learning, the significant investments made in educational technologies may not yield the expected improvements in teaching quality, academic performance, and graduate employability.

It is against this background that this study seeks to investigate teachers' perception of tertiary education students' engagement with ICT. Specifically, the study aims to investigate how teachers perceive students' use of ICT for academic purposes.

Objective of the Study

The objective of the study is as follows:

1. To investigate teachers' perceptions of tertiary education students' engagement with information and communication technology.
2. To identify the factors influencing the adoption and use of ICT in teaching and learning.
3. To assess the role of ICT in fostering student engagement.

Research Questions

The following research questions were raised to guide this study

1. What are the perceptions of teachers regarding the effectiveness of ICT tools in enhancing students' learning outcomes?
2. What are the challenges faced by teachers in integrating ICT into their teaching practices?
3. To what extent do students engage with ICT both inside and outside the classroom?

Literature Review

Conceptual Review

Information and Communication Technology (ICT) encompasses a wide range of digital tools used to access, manage, and communicate information. These tools include computers, internet, mobile phones, and various software applications that support educational processes. Ogunleye et al. (2021) highlight ICT's transformative role in

education by facilitating access to learning materials, enhancing communications, and improving educational outcomes. The integration of ICT into educational settings enables more personalised, flexible, and engaging learning experiences, especially within tertiary institutions, where technology is increasingly seen as a vital component for modern education. Student engagement refers to the level of participation, enthusiasm, and involvement that students show during the educational experience.

ICT in education refers to the use of digital technologies, communication tools, and computer-based systems to support teaching, learning, research, assessments, and educational administration. It encompasses a broad range of technologies used for teaching and learning, UNESCO (2023). Koehler et al. (2024) opined that ICT has transformed education by shifting the traditional teacher-centred approach to a more learner-centred model, where students actively participate in constructing knowledge through inquiry, collaboration, critical thinking, problem-solving, among others, while the teacher only serves as a facilitator.

The integration of ICT into education has significantly improved the quality and accessibility of teaching and learning. According to UNESCO (2023), teachers can employ multimedia presentations, simulations, animations, virtual laboratories, online learning platforms, among others, to teach abstract concepts more effectively.

Moreso, ICT promotes flexible and lifelong learning by enabling students to access learning materials anytime and anywhere through online platforms such as Moodle, Google Classrooms, etc., which can allow teachers to upload course materials, administer tests, and provide feedback. This flexibility became particularly important during the COVID-19 pandemic, when many educational institutions relied heavily on online technologies to ensure continuity of education. ICT enhances communication and collaboration among students, teachers, and educational administrators. The successful integration of ICT into education depends on several factors such as availability of technological infrastructure, reliable electricity, internet connectivity, teachers' competence,

institutional support, and government policies, among others.

Empirical Review

The role of ICT in education has become increasingly significant as many universities around the world are turning to digital tools to enhance learning experiences. Teachers' perception of ICT, as well as their attitudes towards its usage, greatly influence how effectively students engage with ICT tools in the learning environment.

A considerable body of research has shown that teachers' perceptions are critical in determining the degree to which ICT is used in teaching. Many studies show that teachers with positive attitudes towards ICT and recognise its potential in improving student engagement are likely to adopt ICT tools and resources in their teaching. This has been evident in numerous studies conducted globally, where teachers who perceive ICT as beneficial and central to modern teaching and learning tend to incorporate technology-rich teaching methods. Getenet and Haeusle (2024) investigated the relationship between digital literacy, technology self-efficacy, attitude towards digital technologies, and online learning engagement among first-year pre-service teachers in Australia. The study adopted a quantitative survey design involving university students. The findings showed that students with higher digital literacy and positive attitudes towards ICT demonstrated greater engagement in technology-supported learning. The authors recommended that teacher education institutions should strengthen digital competence training to improve student engagement with ICT-supported instruction. Abubakar et al. (2024) examined the influence of technology-integrated curriculum resources on student engagement and academic achievement in tertiary institutions in Sokoto State, Nigeria. Using a descriptive survey, the researchers found that lecturers perceived ICT-integrated instructional resources as significantly enhancing students' classroom participation, collaboration, motivation, and academic performance. However, inadequate ICT facilities and poor internet connectivity remained major constraints. Pearce (2022) conducted a systematic investigation of teachers' and students' perception of ICT use in educational practices by reviewing empirical

studies. The findings revealed that teachers generally viewed ICT positively because it increased students' engagement, participation, communication, and collaborative learning. Nevertheless, inadequate ICT competence and institutional support limited the effective implementation. Bergdah et al. (2024) reviewed empirical studies conducted in higher education between 2014 and 2024 to examine factors influencing student engagement. The review found that teacher support through effective ICT integration, prompt feedback, and interactive digital learning environments significantly improved students' behavioural, emotional, and cognitive engagement.

These studies provide current evidence that teachers generally perceive ICT as a valuable tool for improving tertiary students' engagement, although challenges such as inadequate infrastructure, insufficient digital skills, and limited institutional support continue to affect its effective use.

Research Method

The study adopted a descriptive survey design. The population comprises all lecturers

Table 1: Descriptive statistics on teachers' perception on the effectiveness of ICT

S/N	ITEMS	Agree (f)	%	Disagree(f)	%
1	Students actively use ICT tools for learning	167.50	67	82.50	33
2	Most students are familiar with basic ICT tools, e.g., Word, PowerPoint.	182.50	73	67.50	27
3	ICT improves students' participation in academic activities	170	68	80	32
4	Students prefer traditional methods over ICT-based learning	80	32	170	68
5	Students are motivated to use ICT for academic research	165	66	85	34

Table 1 explores teachers' perception of students' engagement with ICT tools in enhancing learning outcomes. The table shows that teachers generally believe that students are actively using ICT tools in their learning, with 67% agreement. Similarly, most teachers (73%) perceive that students are familiar with basic ICT tools like Microsoft Word and PowerPoint, while 27 (27%) does not agree with this. When asked whether ICT improves students' participation, 68% of the teachers were in agreement, while 32% did

at Federal University, Oye-Ekiti. Simple random sampling method was used to draw 250 lecturers across faculties. A well-structured and validated questionnaire was used to collect data for this study. The questionnaire consisted of two sections. Section A was used to elicit information on biodata of the respondents, while Section B consisted of items to elicit information on the study. The questionnaire was structured on a four-point Likert type scale of Strongly Agree (SA)—4, Agree (A) —3, Disagree (D) —2, and Strongly Disagree (SD) —1. A test-retest method of reliability was employed to ascertain the reliability of the instrument. The result from the pilot testing was analysed using Pearson Product Moment Correlation (PPMC), which yielded a reliability coefficient of 0.78. The instrument was distributed to the lecturers with the help of research assistants. Data were analysed using descriptive statistics.

Results

Question 1: What are teachers' perceptions of the effectiveness of ICT tools in enhancing students' learning outcomes?

not agree. In contrast, the statement, students prefer traditional methods over ICT-based learning, had most teachers (68%) disagreeing, while only 32% were in agreement. This suggests that most teachers believe that students favour ICT-based learning over traditional methods, contradicting the idea that students resist digital tools. Regarding students' motivation to use ICT for academic research, 66% of teachers agreed. Overall, teachers perceive that students are reasonably engaged and motivated in using

ICT for academic purposes. They acknowledge students' familiarity with digital tools, increased participation through ICT, and a clear preference for technology-enhanced learning over traditional methods.

Question 2: What are the challenges faced by teachers in integrating ICT into their teaching practices?

Table 2: Descriptive statistics on ICT resources and accessibility.

S/N	ITEMS	Agree (f)	%	Disagree(f)	%
1	The university provides adequate ICT facilities for students	110	44	140	56
2	Students have regular access to the internet on campus	115	46	135	54
3	Most students own laptops or smartphones for academic purpose	170	68	80	32
4	Inadequate ICT infrastructure limits student engagement	212.5	85	37.5	15
5	Power supply is a major challenge to effective ICT usage	182.5	73	67.5	27

Table 2 shows that the major concern identified is inadequate ICT infrastructure, which teachers strongly agree limits engagement. This statement received 85% agreement, suggesting that infrastructure inadequacies are a critical barrier to effective ICT integration. Also, power supply issues are seen as a substantial challenge with 73% agreement. Teachers also largely agree that most students own laptops or smartphones for academic purposes (68% agreement). On the other hand, access to internet and availability of university-provided ICT facilities received lower percentages, with less than half of the respondents agreeing. For instance, only 44% of teachers agreed that students have regular internet access on campus. These low scores highlight

infrastructural limitation as a major institutional shortcoming.

Overall, Table 2 reveals that while students generally own ICT devices, significant institutional challenges persist, including poor ICT infrastructure, unreliable internet access, and inconsistent power supply. The responses suggest that these limitations are widely recognized by teachers and present serious obstacles to the effective integration of ICT in teaching and learning. Addressing these issues would be essential for promoting more equitable and efficient use of technology in the university setting.

Question 3: To what extent do students engage with ICT both within and outside the classroom?

Table 3: Descriptive statistics on Teacher's role and institutional support

S/N	STATEMENTS	Agree (f)	%	Disagree(f)	%
1	I encourage students to use ICT in their assignments	192.5	77	57.5	23
2	I use ICT tools (e.g., PowerPoint, Google Classroom) in my teaching	170	68	80	32
3	I have received adequate training to integrate ICT into teaching	152.50	61	97.5	39
4	The university organizes regular ICT training and workshops for academic staff	165	66	85	34
5	More support is needed from the university to enhance ICT integration.	217.5	87	32.5	13

Table 3 revealed that the highest rated statement is the need for more support from the university to enhance ICT integration, with 87% agreement. This shows a clear consensus that while progress has been made, greater institutional commitment is still required to effectively support ICT use in teaching and learning. Teachers also report actively encouraging students to use ICT in their assignments, with 77% agreement. Similarly, a majority of teachers (68%) disclosed that they use ICT tools such as PowerPoint and Google Classroom during instructions. These findings highlight the positive role teachers play in promoting ICT engagement. More so, 61% of the respondents revealed that they had received adequate training to integrate ICT in their teaching. Likewise, 66% agreed that the university organizes regular ICT workshops.

Overall, Table 3 demonstrated that teachers are actively involved in promoting student engagement with ICT, and there is a general belief that ICT is actively integrated into classroom processes. However, the call for increased institutional support and more comprehensive training is evident.

Discussions

The study examined teachers' perception on student engagement with ICT both inside and outside the classroom. Findings from this study provide meaningful insights when aligned with the research questions and existing literature.

The results from the findings reveal that a significant portion of the students regularly use ICT for academic activities during lectures. This suggests a growing integration of technology into classroom-based instruction. This finding is consistent with Teller et al. (2025) who emphasized that ICT fosters more interactive and participatory learning experience. The high level of in-class ICT engagement may also reflect the efforts of teachers who perceive technology as a useful educational tool and are thus more likely to integrate it into their instructional material, Ayo -Ogunlusi (2019).

On the issue of students using ICT tools outside the classroom, results showed a similarly high level of engagement. Many students reported using ICT for assignments,

research, communication with peers, and accessing online resources. This finding supports Akinyemi (2014) assertion that the use of digital tools such as internet, computers, multimedia resources, and mobile technologies support teaching and learning and communication within educational settings.

With respect to the extent of student engagement with ICT inside and outside the classroom, the results indicated that students who are active using ICT during classes are also likely to use it outside the class for academic purposes. This submission also supports Bandele (2016)'s result that ICT plays a critical role in determining the extent to which technology is embraced in the teaching and learning both within and outside the classroom. Also, it is also in concord with Tella (2025) who asserted that students engage more when technology use is embedded in both instructional and self-directed learning contexts and that the high level of engagement is likely influenced by teachers' positive attitude towards ICT, as teachers who value digital tools tend to adopt strategies that involve students in active technology-mediated learning. Conversely, challenges such as inadequate infrastructure or limited teacher training, as identified by Teo (2014), Ally (2016) and Agbo et al. (2023) can hinder the effective use of ICT and also reduce student interaction with technology. In summary, the study confirms that students are highly engaged with ICT both inside and outside the classroom. This engagement is significantly shaped by how teachers perceive and integrate ICT, as well as by the institutional context. Effective ICT integration, therefore, requires not only individual teacher initiative but also systemic support to ensure that students reap the full benefit of technology-enhanced learning.

Conclusion

This study concludes that ICT tools play a significant role in promoting effective teaching and active student engagement in Nigerian higher institutions. Students are not only willing but are already engaged with ICT during lectures and in personal learning activities. Teachers also perceive ICT as a powerful aid to teaching and learning, though their capacity to fully utilize it is limited by institutional challenges.

Therefore, the successful integration of ICT into university teaching and learning depends not only on student enthusiasm and teacher willingness, but also on the availability of necessary infrastructure, regular training, and continuous institutional support. Overcoming these barriers will further enhance the educational experience, drive innovation, and better prepare students for a technology-driven world.

Recommendations:

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

1. University administrations should invest in modern ICT infrastructure, including high-speed internet, digital classrooms, functional e-learning platforms, and maintenance support to ensure constant access and reliability.
2. Academic staff should be provided with regular training workshops on how to effectively use ICT tools in teaching.
3. Lecturers should be encouraged to adopt blended teaching models that combine traditional face-to-face instruction with digital tools, which has been shown to improve students' learning outcomes.
4. Programs aimed at enhancing students' digital literacy should be implemented to ensure that all students can effectively engage with ICT in academic contexts.

REFERENCES

- Abubakar, U., Ogundade, O. O., and Ibrahim, H. A. (2024). The Influence of Technology-Integrated Curriculum Resources on Student Engagement and Academic Achievement in Higher Education. *Advances in Mobile Learning Educational Research*, 4(2).
- Agbo, C. N., Ekere, A. U. & Ugo, O. S. (2023). Teacher's Perception on the Use of Information and Communication Technologies in Teaching and Learning of Social Studies in Secondary Schools in Igbo-Eze South Local Government Area, Enugu State. *International Journal of Economics Education Research*, 6(1), 75-86. <https://iafee.org/ijeer>.
- Akinyemi, A. (2014). Information and Communication Technology (ICT) and the Nigerian Education Sector. *Journal of Education and Practice*. 5(13), 109-114.
- Ally, M. (2016). Competency Profile of the Digital and Online Teacher in Future Education. *The International Review of Research in Open and Distributed Learning*, 17(2), 1-13.
- Ayo-Ogunlusi, V. A. (2019). Teacher's Perception on the Usage and Challenges of ICT Tools in Teaching-Learning Activities in Secondary Schools in Ikere Local Government Area, Ekiti State. *Journal of Capital Development in Behavioural Sciences*, 7(2), 41-53. Lead City University, Ibadan, Nigeria.
- Bande, C. V. (2016). ICT Availability and Use in Nigerian University Libraries. *Journal of Information Communication and Technologies*. Maiden Edition, 1(1), 52-58.
- Bergdahl, N., Bond, M., Sloberg, J., Dougherty, M., and Oxley, E. (2024). Unpacking Student Engagement in Higher Education Learning Analytics: A Systematic Review. *International Journal of Educational Technology in Higher Education*, 21, Article 63.
- Getenet, S., and Haeusler, C. (2024). First-year Pre-service Teachers' Understanding of Digital Technologies and Their Digital Literacy, Efficacy, Attitude, and Online Learning Engagement: Implication for Course Design Technology. *Knowledge, and Learning*, 29(4), 1359-1383.
- Koehler, M. J., Mishra, P., and Cain, N. (2024). Technological Pedagogical Content Knowledge (TPACK): Updated Perspectives for Digital Teaching and Learning. Routledge.
- Ogundele, B. Adeoye, M. A., and Eze, U. N. (2021). Technical Expertise and the Sustainability of Virtual Laboratory Projects in Nigeria. *Nigerian Journal of Technology*, 40(2); 245-256.
- Pearce, A. (2022). The Perceptions of Students and Teachers when Using ICTs for Educational Practices Matter: A Systematic Review. *Advances in Science, Technology, and Engineering Systems*, 7(6), 1-2.
- Tella, A., Dumade, A. O., Ajani, Y. A., Abdullahi, F. (2025). ICT Application in Nigerian Libraries: The Need to Look into the Direction of 4IR Technologies Following the Perspective of Diffusion of Innovation Theory. *Digital Journal of Library Information Science*, 23, 1-23.
- Teo, T. (2014). Unpacking Teachers' Acceptance of Technology: Callot Tests of Measurement Invariance and Latent Mean Differences. *Computers and Education*, 75, 127-135.
- UNESCO (2023). Global Education Monitoring Report 2023: Technology in Education- A Tool on Whose Terms? UNESCO Publishing.



EFFECTS OF ENHANCED BLENDED LEARNING ON STUDENTS' LEARNING OUTCOMES IN COMPUTER STUDIES IN SENIOR SECONDARY SCHOOLS IN EKITI STATE, NIGERIA.

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Abstract

This study investigates effects of Enhanced Blended Learning on students' learning outcomes in Computer Studies in Senior Secondary Schools in Ekiti State, Nigeria. The study adopted a two-group pre-test, post-test, control quasi-experimental research design. The sample for this study consisted of 104 (SSII) students offering Computer Studies in four schools. multi-stage sampling procedure. Computer Studies Performance Test (CSPT) and Students' Attitudinal Questionnaire in Computer Studies (SAQCS) were used to collect data for the study. The reliability of CSPT was ascertained using test-retest reliability method. Data collected were analyzed using descriptive analysis of means and standard deviation. Hypotheses were tested using a t-test at 0.05 level of significance. Findings from the study revealed a significant difference in the performance of students in the two groups after the treatment with Enhanced Blended Learning being the more effective strategy of the two. Attitude of students exposed to Enhanced Blended Learning was significantly different from that of their counterparts who were exposed to conventional method. It was recommended that the use of Enhanced Blended Learning should be encouraged in Computer Studies classroom in secondary schools as this will enhance better academic performance of the students.

Keywords: Effect, Enhanced, Learning Outcome, Computer Studies.

Introduction

Investing in education represents a commitment to the development of individuals. It is a general knowledge that a country which invests significantly in human capital, especially through education, will achieve sustainable economic success. By dedicating significant resources to education, a country can equip its population with the knowledge and skills essential for enhanced future productivity. Therefore, education empowers every citizen with the necessary information and skills to comprehend and intelligently engage in the societal activities in which they are involved. As stated by the National Council of Educational Research and Training (2014), education is the process of facilitating learning, surrounding the

acquisition of information, skills, values, morals, beliefs, and habits.

Nigeria's education system comprises three tiers: primary, secondary, and tertiary. secondary education is the intermediary phase following primary schooling and preceding tertiary studies, caters for learners aged approximately 10 to 16 years. Institutions at this level function as critical conduits for cultivating not merely an educated populace, but also a competent labor force (Adeyemi, 2020). The secondary education system is structured to accommodate variations in aptitudes, opportunities, and prospective societal functions. Secondary education instills in students' aspirations for self-betterment,

self-sufficiency, and the pursuit of excellence through disciplines that elevate scientific and technical capabilities at both individual and national levels (Ojediran, Oludipe, & Ehinola, 2020). During the educational process, various fields of knowledge are cultivated, generally dwindling into the groups of arts, social sciences, or sciences. Science education specifically involves the study of subjects such as Computer Science, Mathematics, Chemistry, Physics, Biology. It also involves using teaching methods to effectively convey scientific knowledge to individuals or communities (Omosewo, 2018).

Science is a discipline that involves human efforts meant at providing right clarifications for the events and circumstances that arise within the usual world. The meaning of science in current society cannot be inflated as it serves as a prominent instrument for comprehending the details and improvement of technology. The application of scientific values spreads across a diverse range of disciplines and intelligent pursuits, considered by shared features. Science is typically distinguished by its ability to make exact statements that can be confirmed or established (Sivakumar & Kirubanandhini, 2014). Science education has a crucial role in fostering the scientific and technological advancement of a nation. The National Policy on Education explicitly acknowledges the imperative of preparing students to thrive in the contemporary era of science and technology. This objective is identified as one of the keys aims of scientific education.

(Khader, 2016). Nigeria, as a nation, has been striving to enhance its economic development to compete globally with other countries. Consequently, there has been ongoing efforts to develop human capabilities and technological infrastructure, particularly in the realm of computer literacy and operational skills. Given that computer literacy plays a crucial role in various facets of human endeavors, it has become an indispensable skill. Computer studies, is one of the core science subjects within the secondary tier of education specifically targeted the development of technological prowess essential for the nation's progress. Computer studies are critical for the tangible advancement of nations worldwide (UNESCO 2020).

Nigeria, as a developing economy requiring scientific transformation particularly depends on this discipline for national progress. Computer studies equip learners to comprehend computers' purposes, applications, and constraints while facilitating study of modern information processing systems. In today's digital era, computational technology permeates virtually all spheres of human activity (Sefriani, R., 2022).

Computer studies delve into the intricacies of how computers process information. It goes beyond fundamental computer usage and encompasses more than just programming. This field most times involves exploring techniques for representing objects and processes, necessitating skills like problem definition, problem analysis, solution design, and the development, testing, and maintenance of programs. (Shiela, et al., 2022). From the forgoing, computer studies involve exploring the principles and practices that underpin the understanding and modeling of computation, as well as their application in the development of computer systems. It provides a comprehensive exploration of how computers and computer systems function, how they are designed, and how they are programmed.

Computer Studies furthermore, provides a robust foundation for those inclined toward further study and training in specialized areas such as computer programming, database analysis, computer science, computer education, computer engineering, software engineering, information technology, and game development (Adebayo, 2014). The fundamental essence of Computer Science lies in problem-solving, an indispensable skill applicable across various facets of life.

Despite the established significance of computer studies for national advancement and personal development, secondary school students' attitudes toward the subject remain markedly unfavorable (Uzoamaka & Ngozi, 2022). A significant proportion of secondary school students enrolled in computer studies lack adequate access to resources for effective skill application, potentially hindering their capacity to utilize computational tools in resolving context-specific challenges (Uzoamaka & Ngozi, 2022). This results in unfavorable students' learning outcome is

visible in their performance and attitude towards the subject.

Opoku Mustapha (2016). Attitude functions as a powerful determinant of individual life approach. Characterized by positivity and proactivity, it correlates strongly with enhanced productivity, improved interpersonal relationships, and better overall health. Consequently, attitude constitutes a critical and deliberately influenceable factor in both personal achievement and organizational dynamics Assylzhanova (2022). Enhanced blended learning can be envisaged to be one of these innovative teaching approach. Enhanced blended learning is an advanced blended learning strategy. This teaching learning approach generally means using more than one approach, guideline on technique in teaching and learning for offering teaching content and materials. Enhanced blended learning model seems to engage students, partially, in online delivery of content and instruction, with some degree of control over the timing, pace, and/or location of their learning. It involves the integration of both online and face-to-face instruction by integrating online educational materials and opportunities for online interaction with conventional. Anthony and Keating, (2023).

This study aims to integrate technology to support student-centered teaching learning approach and provide real-time feedback and assessment. This also encourage active learning a collaborative support, diverse learning styles and needs, to enhance access to resources and learning materials. By enhancing blended learning, educators can create a dynamic and supportive learning environment that caters to the diverse needs of students, leading to improved academic outcomes and increased student success (Ifenthaler, 2017).

In enhanced blended learning approach, students will, under the guidance of the teacher, access databases and websites containing additional information relevant to the topic being taught. The teacher will direct students to view animations, simulations, and illustrative tutorials available online that further elucidate the concepts covered in class (Adebowale et al., 2024).

When compared online classes, enhanced blended learning is more effective particularly in subject areas, such as English language

and mathematics, (Halverson et al., 2021; Ojaleye & Awofala, 2018). By combining digital instruction with face-to-face interaction simulation, enhanced blended learning allows students to independently explore new concepts, thereby allow teachers to provide individualized support to students who may require additional attention. This personalized approach enables teachers to tailor their instruction to meet the unique needs of each student, ultimately maximizing their learning potential.

Enhanced blended learning make use of collaborative digital tools and methodologies to improve engagement, effectiveness and personalization in educational settings yielding increased interactivity and improved collaboration (on- line collaboration). Online Collaboration tools are digital platforms that enable individuals to work together in real-time, regardless of their geographical location.

Online collaboration tools constitute cloud-based ecosystems enabling geographically dispersed learners and educators to co-create knowledge through synchronous and asynchronous interactions (Palloff & Pratt, 2013). These platforms facilitate multimodal communication, collective knowledge construction, and scaffolded teamwork which are essential dimensions of modern pedagogy (Garrison, 2016). Google Classroom constitutes a pedagogically architected virtual learning environment (VLE) accessible via cloud-based learning management system (LMS), purposefully designed to serve heterogeneous educational requirements. According to Weller (2020), its core functionality enables democratized access to learning communities through internet connectivity structured collaboration via embedded cognitive tools pedagogical mediation of instructor-student interactions seamless resource orchestration within unified (Vygotsky, 1978)

Statement of the Problem

A good student learning outcome in terms of the overall performance after learning computer studies for three years in senior secondary level ought to be seen in their performance at WASSCE with credit grades and in their positive attitude towards the subject. However, based on the fact that WASSCE report of students in computer

studies is fluctuating, with a decline in the credit grade level of students over a period of five years. Also, the attitude of students towards the subject has been observed to include fear and anxiety, low confidence and wrong perception of subject being hard among others. From the observation, it seems the identified challenges related to these outcomes is attributed to teachers' challenges in identifying a better teaching learning approach for Computer Studies. The deficiency in the conventional teaching and learning approach often used for Computer Studies classes, hinder active student involvement and peer interaction. This approach may have resulted in these unfavorable outcomes.

Purpose of the study

The main purpose of the study was to investigate effect of enhanced blended learning on student learning outcome in Computer Studies in senior secondary school.

- i. examines the difference in computer studies the academic performance of student before and after expose to treatment.
- ii. determine the difference in the student attitude towards the computer studies before and after exposure to treatment.

Research Questions

The following general questions were raised to guide the study.

- i. What is the difference in the performance of students in computer studies before and after treatment?
- ii. What is the difference in the attitude of students towards computer studies before and after treatment?

Research Hypotheses

The following null-hypotheses were formulated to guide the study

1. There is no significant difference in the performance of mean score of students in computer studies in experimental and the control groups before the treatment.
2. There is no significant difference between the performance mean score of students exposed to computer

studies blended learning and those exposed to conventional method.

3. There is no significant difference in the attitude of male and female students towards computer studies when exposed to enhance blended learning.

Methodology

This research employed a pretest, posttest control group quasi-experimental design. The design enabled variable manipulation, with a pre-test administered to both groups to establish baseline homogeneity in academic performance and attitudes. Specifically, evaluating effect of enhance blended learning on learning outcome of Secondary School Students. Two groups were used for the study. One experimental group exposed to Enhanced Blended Learning and a control group exposed to conventional teaching method. The design is represented thus:

Experimental group: $O_1 \quad X_E \quad O_2,$
 $O_3 \quad X_c \quad O_4$

Control group:

Where:

$O_1 \quad O_3$ = Pre-test observations

$O_2 \quad O_4$ = Post-test observations

X_E = Treatment using enhanced blended learning

X_c = Treatment using conventional method

The population for this study consisted of all the 1,125 Senior Secondary two (SSII) students offering computer studies in all the 203 public secondary schools across the 16 Local Government Areas (LGAs) of Ekiti State, Nigeria. The choice of SSII was considered appropriate because students in SSII class were not preparing for any external examination; thereby, they are more readily available for the research. The sample for this study was 104 students offering Computer Studies. This study employed a multi-stage sampling procedure to select the sample. Stage one is the random selection of one senatorial district out of the three senatorial districts in Ekiti State. This was followed by the selection of two Local Government Areas (LGAs) from the selected senatorial district, using simple random sampling technique. The next stage was the selection of two schools from each of the LGAs using purposive sampling technique. The selection was based criteria: (a) Schools offering Computer Studies at the senior

secondary level, and (b) availability of computer laboratory facilities in school. Stratified sampling was considered in selecting two schools each from rural and another two from urban. Students were selected from the four classes of computer studies students in their intact forms.

Also, the purposive sampling was done in such that from each of the two LGA, one school was selected from the rural community and another one from the urban community. one group for experimental and the other group for control. Computer Studies is not a compulsory subject for senior secondary school students hence; not all the students are offering the subject. Therefore, all the students offering Computer Studies in senior secondary school class two (SSII) in the four selected schools formed the sample for the study.

Two research instruments were used in this study. They are Computer Studies Performance Test (CSPT), and Students' Attitudinal Questionnaire in Computer Studies (SAQCS). CSPT was used to measure the performance of students in Computer Studies. The questions were drawn from the past WASSCE conducted by West African Examination Council (WAEC) for the period of five year (2018-2023). Each correct response was awarded 1 mark giving a maximum score of 30 marks which was converted to percentage. Students' Attitudinal Questionnaire in Computer Studies (SAQCS) was a self-constructed questionnaire used to measure students' attitude towards Computer Studies. SAQCS comprised two sections. Section A sought bio-data of respondents while Section B consisted of 30 items on

the attitude of students towards learning Computer Studies. SAQCS was worded on a 4-point Likert type scale ranging from Strongly Agree (SA) 4 points, Agree (A) 3points, Disagree (2) points and Strongly Disagree (SD) 1 point for positively worded items and the reverse for negatively worded items. Copies of SAQCS were given to experts in the field of Test and Measurement and experienced Computer Studies teachers for face and content validity. Computer Studies Performance Test (CSPT) comprised of questions drawn from past WASSCE conducted by West African Examination Council (WAEC), being standardized questions, had already been validated by the examination body. The reliability of SAQCS was ascertained using test-retest method of reliability which involved 20 senior secondary school two students from a school outside the sampled schools for the study. The reliability of SAQCS was determined using Cronbach Alpha while that of CSPT was determined using Kuda-Richardson 20. Reliability coefficients of 0.83 and 0.86 were obtained for the instruments respectively.

Testing of Hypotheses

Hypothesis 1: there is no significant difference in the pre-test performance of Computer Studies student exposed to enhanced blended learning and those exposed to conventional teaching learning approach.

To test hypothesis 1, pre-test of students in experimental group and those in the control group were computed and compared for statistical significance using t-test at 0.05 level. The result is presented in Table 4.

Table 4: t-test of Pretest Performance of Students in Experimental and Control Groups

Group	N	Mean	Std. Deviation	df	t	P
Experimental	53	10.71	3.685	102	1.449	0.932
Control	51	120.46	5.303			

p>0.05 (Not Significant Result)

The result in Table 4 showed that $t_{102} = 3.449$, $p = 0.932 > 0.05$. Since the *p-value* is greater than 0.05, the hypothesis that says there is no significant difference in the pretest mean scores of those exposed to enhanced blended learning and those not exposed was

not rejected. This indicated that both Experimental and Control groups performed equally prior to the commencement of the treatment. Hence the two groups were homogenous.

Hypothesis 2: There is no significant difference in the post-test performance of student in computer studies exposed to enhanced blended learning and those exposed to the conventional teaching learning approach.

In order to test this hypothesis, post-test mean scores of students in experimental group and those in the control group were computed and compared for statistical significance using t-test at 0.05 level. The result is presented in Table 5.

Table 5: t-test of Post-test Performance of Students in Experimental and Control Groups

Group	<i>N</i>	<i>Mean</i>	<i>Std. Deviation</i>	<i>df</i>	<i>T</i>	<i>P</i>
Experimental	53	18.25	5.660	102	5.643	0.000
Control	51	14.58	6.451			

*** $p < 0.05$ (Significant Result)**

The result in Table 5 showed that $t_{102} = 5.643$, $p = 0.000 < 0.05$. Since the *p-value* is less than 0.05, the hypothesis that there is no significant difference in the post-test mean scores of those exposed to enhanced blended learning and those not exposed to was rejected. This means that there was a significant difference between the performance of students in Experimental and Control groups. Students in experimental group performed better than those in the control groups.

Hypothesis 3: There is no significant difference in the attitude of student towards Computer Studies in experimental and control groups before the treatment.

In testing hypothesis 3, attitude of students in experimental and control groups before the treatment were computed and compared for statistical significance using t-test at 0.05 level. The result is presented in Table 6.

Table 6: t-test analysis of Students' attitude in Experimental and Control Groups before treatment.

Group	<i>N</i>	<i>Mean</i>	<i>Std. Deviation</i>	<i>Df</i>	<i>T</i>	<i>P</i>
Experimental	51	98.02	13.206	102	1.004	0.318
Control	53	100.80	15.041			

$p > 0.05$ (Not Significant Result)

Table 6 shows that $t_{102} = 1.004$, $p = 0.318 > 0.05$. Since the *p-value* is greater than 0.05, the hypothesis that there is no significant difference in the pre-attitude mean scores of those exposed to enhanced blended learning and those not exposed to it was accepted.

Hypothesis 4: There is no significant difference in the attitude of student towards

Computer Studies when exposed to enhanced blended learning and those exposed to the conventional teaching learning approach.

To test this hypothesis, post-attitude mean scores of students in experimental group and those in the control group were computed and compared for statistical significance using t-test at 0.05 level. The result is presented in Table 7.

Table 7: t-test of attitude of Students in Experimental and Control Groups after the treatment

Group	<i>N</i>	<i>Mean</i>	<i>Std. Deviation</i>	<i>df</i>	<i>T</i>	<i>P</i>
Experimental	53	103.63	12.619	102	0.392	0.696
Control	51	102.77	9.392			

p > 0.05 (Not Significant Result)

Table 7 showed that $t_{102} = 1.004$, $p = 0.696 > 0.05$. Since the *p-value* is greater than 0.05, the hypothesis that says there is no significant difference in the post-attitude mean scores of those exposed to enhanced blended learning and those not exposed to was not rejected. This implies that there was no significant difference in the attitude of students in the experimental and control groups. They all had same attitude towards Computer Studies.

Discussion

The research explored the effects of enhanced blended learning on student's learning outcomes in computer studies in senior secondary schools in Ekiti State. Findings from the study established the homogeneity of the two groups involved in the study before the commencement of the experiment. Findings shows that both the experimental and control groups were similar before the intervention. The two groups had varying performance mean with the control group being a little higher after the experiment the experimental group students' performance was higher than the control group. This implies that there is difference in the performance of computer studies students specifically, those taught using enhanced blended learning have better performance than those taught using conventional teaching learning approach.

This result corroborate Bawa's (2016) assertion regarding the positive impact of pedagogically appropriate instructional resources on computer Studies achievement. In similar vein, Okikiola *et al.*, (2024) study had revealed the effect of computer science in junior secondary school students' in Kwara State using non- conventional teaching learning approach for two schools in the story telling strategy. The study revealed that those taught with storytelling as a non-conventional teaching learning approach, had

enhanced conceptual understanding in Computer Studies.

Findings revealed similar result in the pretest attitudinal mean scores for both groups. This finding is in line with Opoku (2016) explore senior high school students' dispositions and attitudes toward computer education, had positive attitude in computer studies in addition to further findings, these results confirm the baseline equivalence of both groups prior to the intervention, indicating comparable initial knowledge levels. Furthermore, findings also revealed that there was a difference in the post attitudinal mean score of both groups. There was an increase in the mean score of both groups after the treatment but those taught with enhanced blended learning had higher mean those taught with conventional method.

This collaborates the study of Assylzhanova (2022) that the enhanced blended teaching application enabled the experimental group to achieve significantly higher computer scores, develop more positive attitudes, and demonstrate greater learning permeance compared to the control group. This is also consistent with the claims of Opoku (2016) who affirmed that student's attitude in Computer studies improve when the teacher uses appropriate instructional method. The findings revealed that there was no significant difference in the pretest performance of students in the experimental and control groups. In other words, it could be assumed that the knowledge criteria of the two groups involved in the study are similar. Consequently, any statistically significant post intervention differences can be confidently attributed to the experimental treatment rather than pre-existing variations or random chance. This affirms the findings of Obadiaru (2020) in River State that student performance remained consistently above average across the five year period.

In addition, there is a significant difference in the post -test performance mean scores of students taught computer studies using enhanced blended learning approach and conventional approach. Enhanced blended learning was found to be the more probable effective strategy hence; students in the experimental group performance mean score was higher their counterparts in the control group. This performance enhancement pattern substantiates the platform-agnostic Adedayo and Ajayi (2022) with conclusion that properly implemented learning management systems improve outcomes. While their study focused specifically on Google Classroom's features, our parallel results with enhanced blended learning suggest the underlying pedagogical principles transcend particular technological implementations.

The experimental procedure for the studies was in six stages: pretreatment stage (one-week) the treatment stage (six-week) and post treatment stage (one-week), the whole exercise lasted eight weeks. The data collected were analysed using descriptive and inferential statistics. The research question raised were answered using descriptive statistics such as mean, standard deviation, while the hypotheses formulated were tested using inferential statistics such as t-test. Decision was taking at 0.05 level of significance.

1. There is difference in the performance of computer studies students specifically those taught using enhanced blended learning have better performance than those taught using in conventional approach.
2. There is difference in the attitudinal mean score of students taught specifically those taught with enhanced blended learning had better mean score than those taught with conventional teaching learning approach.
3. There is no significant difference in the performance mean scores of students in enhanced blended learning and control groups prior to the treatment.
4. There is a significant difference in the performance mean scores of students taught Computer Studies using enhanced blended learning strategy and conventional method.
5. There was no significant difference in the attitudinal mean scores of students in

enhanced blended learning and control groups prior to the treatment.

Conclusion

The results of this study demonstrate that implementing an enriched blended learning approach through Google Classroom serves as a viable and efficient method for boosting students' academic achievement while also cultivating a more favorable perception of Computer Studies among senior secondary school learners. The results also revealed that the interaction between the treatment (enhanced blended learning), gender, and school location did not have a statistically significant impact on students' academic performance or their attitudes toward Computer Studies at the senior secondary level.

Therefore, the effectiveness of Google Classroom as a platform for teaching Computer Studies online is not influenced by gender or geographical location, proving equally successful in improving academic results and student perceptions in both rural and urban schools.

Recommendations

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

1. **Teacher Training Initiatives:** The State Ministry of Education, alongside relevant government agencies, should design specialized professional development programs (such as workshops, training sessions, and seminars) to enhance Computer Studies instructors' competencies in utilizing advanced blended learning platforms, including Google Classroom.
2. **Curriculum Enhancement:** To maximize educational effectiveness, curriculum planners should formally incorporate enriched blended learning strategies, particularly tools such as Google Classroom into the foundational structure of the senior secondary Computer Studies syllabus.
3. **Publishers of Computer Studies** instructional materials should prioritize the development of interactive e-textbooks specifically designed for blended learning environments. These digital resources should incorporate multimedia elements and platform compatibility to maximize



their utility in enhanced pedagogical approaches.

REFERENCES

- Adebayo, A. M. (2014). Open and distance learning in South/West geopolitical zone. *South-West Journal of Teacher Education*, 3 (1), 299-308.
- Adebowale, O. L. & Ngozi B. N. (2024). Effects of Engagement learning strategy on academic achievement of business education students in Colleges of Education in Oyo State; *Ilorin Journal of Business Education (IJBE)* 5 (4), 7-11.
- Adedayo, S. S., & Ajayi, P. O. (2022). Use of Google Classroom as participation and performance enhancer among basic science postgraduates in some universities in Nigeria. *International Journal of Research and Innovation in Social Science*, 6(7), 233-237.
- Adeyemi, T. O. (2020). State-level analysis of WASSCE failure patterns in STEM subjects. *Nigerian Journal of Educational Research*, 15(2), 45-61.
- Anthony, B., & Keating, M. (2023). Quantifying enhancement in blended learning ecosystems. *Computers & Education*, 108(2), 104-122. <https://doi.org/10.1016/j.compedu.2023.104789>
- Assylzhanova, D., Seisenbek, N., Uzakbaeva, S., & Kapalbek, B. (2022). The effect of ICT-enhanced blended learning on elementary school students' achievement in English and attitudes towards English lesson. *International Journal of Education in Mathematics, Science, and Technology*, 10(3), 632-649. <https://doi.org/10.46328/ijemst.2463>
- Garrison, D. R. (2016). *Thinking collaboratively: Learning in a community of inquiry*. Routledge. <https://doi.org/10.4324/9781315740751>.
- Graham, C. R., Borup, J., Short, C. R., & Archambault, L. (2019). K-12 blended teaching competencies. *Journal of Online Learning Research*, 5(2), 5-28.
- Halverson, L. R., Graham, C. R., Spring, K. J., & Drysdale, J. S. (2014). A thematic analysis of the most highly cited scholarship in the first decade of blended learning research. *The Internet and Higher Education*, 20, 20-34. <https://doi.org/10.1016/j.iheduc.2013.09.004>.
- Ifenthaler, D. (2017). Designing effective digital learning environments: Toward learning analytics design. *Technology, Knowledge and Learning*, 22(3), 401-404. <https://doi.org/10.1007/s10758-017-9333-0>
- Muhammed, O. J., Emmanuel, A. A., & Afolake, A.-S. N. (2024). Effect of computer science unplugged strategies on junior secondary schools students' academic performance in computer studies concepts in Kwara State. *Unilorin Journal of Lifelong Education*, 8(2), 45-52.
- Obadiaru, I. (2020). Trends in academic achievement of senior secondary school students in computer studies in Rivers State. *Journal of the Nigerian Academy of Education*, 16(2), 281-293.
- Ojaleye, K., & Awofala, A. O. (2018). Blended learning and problem-based learning instructional strategies as determinants of senior secondary school students' achievement in algebra. *International Journal of Research in Education and Science*, 4(2), 486-498. <https://doi.org/10.21890/ijres.428286>
- Ojediran, I. D., Oludipe, D. I., & Ehinola, G. B. (2020). Challenges of science education in Nigeria: The way forward. *Journal of Educational and Social Research*, 10(6), 181-192.
- Okikiola, O. J., [full authors]. (2024). Human resource management practices and engagement of employees of selected pharmaceutical firms in Oyo State, Nigeria. *Nigerian Journal of Management Sciences*, 25(1b), 15-22.
- Olorunloye, A. (2014). The relationships between student engagement and academic achievement. *International Journal on New Trends in Education and Their Implications*, 5(4), 19-27. <https://doi.org/10.2ha/dd14f>.



- Omoesewo, E. O. (2018). Views of physics teachers on the need to train and retrain physics teachers in Nigeria. *African Research Review*, 3(1), 314–325.
- Opoku, M. (2016). Understanding student attitude toward education: A survey of SHS in the Sunyani Municipality. *Academic Journal of Interdisciplinary Studies*, 5(2), 20–29.
- Oyarinde, O. N., & Komolafe, O. G. (2020). Impact of Google Classroom as an online learning delivery during COVID-19 pandemic: The case of a secondary school in Nigeria. *Journal of Education, Society and Behavioural Science*, 33(9), 53–61.
<https://doi.org/10.9734/jesbs/2020/v33i930263>.
- Palloff, R. M., & Pratt, K. (2013). *Virtual learning communities: A guide for practitioners*. Jossey-Bass.
- Sefriani, R., (2022). Technology acceptance model: The use of e-study applications in e-learning. *Journal of Education Technology*, 6(4), 704–710.
- Shiela, M. V., [full authors]. (2022). Impact of motivation and social support in online distance learning among freshmen. *International Journal of Research and Innovation in Social Science*, 8(12), 3294–3302.
- Sivakumar, R., & Kirubanandhini, M. (2014). Computer assisted instruction in chemistry. *International Journal of Teacher Educational Research*, 3(5), 10–16.
- UNESCO. (2020). *Education in a post-COVID world: Nine ideas for public action*. International Commission on the Futures of Education.
https://en.unesco.org/sites/default/files/education_in_a_post-covid_world-nine_ideas_for_public_action.pdf
- Vygotsky, L. S. (1978). *Mind in society: The development of higher psychological processes*. Harvard University Press.
- Weller, M. (2020). *25 years of Ed tech*. Athabasca University Press.
<https://doi.org/10.15215/aupress/9781771993050.01>



INTEGRATED PAYROLL AND PERSONAL INFORMATION SYSTEM (IPPIS) AND FINANCIAL ADMINISTRATION IN FEDERAL UNIVERSITIES IN SOUTHWEST NIGERIA

BY

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Abstract

This study investigated the influence of the Integrated Payroll and Personnel Information System (IPPIS) on financial administration in federal universities in Southwest Nigeria. The population comprised 2,486 principal officers, bursary staff, registry staff, internal audit staff, and ICT personnel in the seven federal universities in Southwest Nigeria. A sample of 600 respondents were selected using multistage sampling procedures involving purposive, proportionate, and simple random sampling techniques. Data were collected using the Integrated Payroll and Personnel Information System and Financial Administration Questionnaire (IPPISFAQ). The instrument was validated by experts, while its reliability was established using Cronbach's Alpha, which yielded an overall reliability coefficient of 0.87. The instrument was administered by the researcher with the assistance of seven trained research assistants. Mean and standard deviation were used to answer the research questions, while the hypothesis was tested using Structural Equation Modelling (SEM) at the 0.05 level of significance. The findings revealed that IPPIS positively influenced payroll management, personnel records management, transparency and accountability, and budgetary control in federal universities in Southwest Nigeria. The study recommended that university management and the Federal Government should strengthen the implementation of IPPIS through regular personnel data verification, continuous staff training, and effective monitoring mechanisms.

Keywords: Budgetary Control, Financial Administration, Integrated Payroll and Personnel Information System (IPPIS), Payroll Management, Personnel Records Management.

Introduction

Financial administration is essential to effective university governance as it ensures that financial resources are properly planned, allocated, utilized, monitored, and controlled. It promotes accountability, transparency, and efficiency in the use of public funds, supports the effective implementation of institutional programmes, and contributes to quality teaching, research, and public confidence in university management.

Public universities in Nigeria rely heavily on government funding for teaching, research, infrastructure, and administration (World Bank, 2019; Kristensen et al., 2019). To improve financial management, the Federal Government introduced reforms such as TSA, GIFMIS, IPPIS, IPSAS, and e-payment

systems to strengthen transparency, accountability, budget control, and reduce financial leakages (PEFA, 2019; World Bank, 2015). These reforms have improved public resource management and financial governance, although implementation challenges persist (Sani et al., 2025; Kristensen et al., 2019; PEFA, 2019).

IPPIS is a key public financial management reform that integrates personnel and payroll information through a centralized electronic platform. Introduced in 2007, it was designed to eliminate ghost workers, improve payroll accuracy, ensure timely salary payments, strengthen personnel records, and control personnel expenditure. It also promotes transparency, accountability, and prudent

financial management by reducing payroll fraud and financial leakages (Ike et al., 2023). Payroll management is a key dimension of IPPIS, covering the accurate and timely processing of salaries, allowances, deductions, pensions, and other employee benefits. IPPIS strengthens payroll controls and reduces fraud, unauthorized payments, and payroll irregularities (Kaoje et al., 2020). Personnel records management is also essential, as the centralized IPPIS database improves the accuracy, maintenance, and retrieval of employee information, thereby supporting effective payroll administration and personnel management (Ike et al., 2023).

Transparency and accountability are central objectives of public financial management reforms. Transparency refers to openness in financial transactions and accessibility of financial information, while accountability involves the obligation of public officials to explain and justify the management of public resources. Nnamani, Ochiaka, Eze, and Nwoke (2021) argued that IPPIS enhances accountability by improving payroll monitoring, strengthening financial controls, and reducing opportunities for financial irregularities. Kaoje et al. (2020) similarly noted that centralized payroll administration and enhanced audit trails improve transparency and accountability in public institutions.

Budgetary control is another important mechanism through which IPPIS contributes to financial administration. It involves planning, monitoring, evaluating, and controlling expenditure to ensure compliance with approved budgetary provisions. Reliable personnel and payroll information generated through IPPIS assists government agencies and university administrators in forecasting personnel expenditure, controlling payroll costs, monitoring budget implementation, and ensuring financial compliance. Rotimi et al. (2021) reported that public financial management tools, including IPPIS, improve financial performance by strengthening expenditure control, minimizing financial

leakages, and enhancing institutional accountability.

Financial administration in federal universities encompasses budgeting, revenue management, payroll administration, expenditure control, accounting, financial reporting, internal auditing, procurement, and compliance with government financial regulations. Effective financial administration enables universities to achieve their statutory responsibilities and utilize scarce public resources judiciously. Weak financial administration, on the other hand, may result in payroll irregularities, poor budget implementation, financial leakages, inadequate accountability, and inefficient resource utilization. Sani et al. (2025) emphasized that the success of public financial management reforms depends on effective implementation, institutional capacity, and continuous monitoring.

Despite the implementation of IPPIS across federal universities, concerns remain regarding its effectiveness in achieving the desired improvements in financial administration. Although the system has reportedly reduced payroll fraud and improved personnel verification, challenges relating to salary payment delays, personnel data management, operational difficulties, and the flexibility of centralized payroll systems in addressing the peculiar administrative needs of universities have persisted. Agbata and Oranefo (2022), however, found that IPPIS significantly improved budgeting and internal audit functions in Nigerian federal universities, suggesting that the system contributes positively to financial accountability despite implementation challenges.

A review of existing literature indicates that most previous studies examined IPPIS from the perspectives of payroll administration, accountability, and public financial management within ministries and government agencies. Few studies have specifically investigated the influence of IPPIS on financial administration in federal universities in Southwest Nigeria using payroll management, personnel records management, transparency and accountability, and budgetary control as

explanatory variables within a Structural Equation Modelling (SEM) framework. This gap provides the justification for the present study.

Against this background, this study investigates the influence of the Integrated Payroll and Personnel Information System (IPPIS) on financial administration in federal universities in Southwest Nigeria, with particular emphasis on payroll management, personnel records management, transparency and accountability, and budgetary control.

Statement of the Problem

Financial administration is essential to the effective management of federal universities because it ensures that public funds are properly planned, utilized, monitored, and accounted for. The Federal Government introduced IPPIS to automate payroll administration, centralize personnel records, eliminate ghost workers, reduce payroll fraud, strengthen budgetary control, and improve financial accountability. However, challenges such as salary payment delays, payroll discrepancies, difficulties in updating personnel records, and operational problems continue to raise concerns about its effectiveness.

Although empirical studies report improvements in payroll administration, accountability, and financial management, others identify implementation challenges. Most previous studies have focused on ministries, departments, and agencies or examined isolated aspects of IPPIS. Few have investigated the combined influence of payroll management, personnel records management, transparency and accountability, and budgetary control on financial administration in federal universities, particularly in Southwest Nigeria. The limited use of Structural Equation Modelling (SEM) to examine these relationships further reveals a research gap. Therefore, this study investigated the influence of IPPIS on financial administration in federal universities in Southwest Nigeria.

Purpose of the Study

The main purpose of this study is to investigate the influence of the Integrated Payroll and Personnel Information System (IPPIS) on financial administration in federal universities in Southwest Nigeria. Specifically, the study seeks to:

- i. examine the influence of IPPIS on payroll management in federal universities in Southwest Nigeria;
- ii. determine the influence of IPPIS on personnel records management in federal universities in Southwest Nigeria;
- iii. assess the influence of IPPIS on transparency and accountability in financial administration in federal universities in Southwest Nigeria;
- iv. examine the influence of IPPIS on budgetary control in financial administration in federal universities in Southwest Nigeria; and
- v. determine the joint influence of payroll management, personnel records management, transparency and accountability, and budgetary control on financial administration in federal universities in Southwest Nigeria.

Research Questions

The following research questions were aised to guide this study:

1. What is the influence of IPPIS on payroll management in federal universities in Southwest Nigeria?
2. What is the influence of IPPIS on personnel records management in federal universities in Southwest Nigeria?
3. What is the influence of IPPIS on transparency and accountability in financial administration in federal universities in Southwest Nigeria?
4. What is the influence of IPPIS on budgetary control in financial administration in federal universities in Southwest Nigeria?

Research Hypothesis

The following hypothesis is formulated and tested at the 0.05 level of significance:

1. Payroll management, personnel records management, transparency and accountability, and budgetary control have

no significant joint influence on financial administration in federal universities in Southwest Nigeria.

Methodology

The study adopted a descriptive survey research design. The population comprised 2,486 principal officers, bursary staff, registry staff, internal audit staff, and ICT personnel involved in the implementation and management of the Integrated Payroll and Personnel Information System (IPPIS) in the seven federal universities in Southwest Nigeria. A sample of 600 respondents was selected using a multistage sampling procedure involving purposive, proportionate, and simple random sampling techniques. Data were collected using an Integrated Payroll and Personnel Information System and Financial Administration Questionnaire (IPPISFAQ). The instrument was validated by experts in Educational Management, Measurement and Evaluation, and Financial Administration to ensure its face and content validity. A pilot testing was conducted outside the study area to establish the reliability of the instrument. The data obtained were analysed using Cronbach's Alpha, and the reliability

coefficients obtained were 0.86 for Payroll Management, 0.84 for Personnel Records Management, 0.88 for Transparency and Accountability, 0.85 for Budgetary Control, and 0.89 for Financial Administration, with an overall reliability coefficient of 0.87. The instrument was administered by the researcher with the assistance of seven trained research assistants, one from each of the selected federal universities. Consent of the respondents were sought before the administration of the instrument. Copies of the questionnaire were distributed and retrieved through direct contact with the respondents, resulting in a high retrieval rate suitable for data analysis. The data collected were analysed using both descriptive and inferential statistics. Mean and standard deviation were used to answer the four research questions, while the null hypothesis was tested using Structural Equation Modelling (SEM) at the 0.05 level of significance.

Results

Research Question 1: What is the influence of IPPIS on payroll management in federal universities in Southwest Nigeria?

Table 1: Mean and Standard Deviation on the Influence of IPPIS on Payroll Management in Federal Universities in Southwest Nigeria (N = 600)

Items	Mean	SD	Remark
IPPIS has improved the accuracy of salary computation in my university.	3.41	0.71	Agree
IPPIS has eliminated incidences of ghost workers in the university payroll.	3.35	0.78	Agree
IPPIS has enhanced timely payment of staff salaries.	3.28	0.83	Agree
IPPIS has reduced payroll errors and discrepancies.	3.32	0.75	Agree
IPPIS has strengthened payroll accountability in the university.	3.44	0.69	Agree
IPPIS has improved the efficiency of payroll processing.	3.37	0.74	Agree
IPPIS has facilitated effective monitoring of payroll transactions.	3.30	0.79	Agree
IPPIS has enhanced compliance with government payroll regulations.	3.46	0.68	Agree

The results in Table 1 showed that the mean scores for all the items ranged from 3.28 to 3.46, which were above the benchmark mean of 2.50, indicating agreement. The cluster mean of 3.37 with a standard deviation of 0.75 further indicates that respondents perceived IPPIS as having a high influence on payroll management through improved salary computation, elimination of ghost

workers, timely salary payments, reduction of payroll errors, enhanced accountability, efficient payroll processing, effective monitoring of payroll transactions, and compliance with government payroll regulations.

Research Question 2: What is the influence of IPPIS on personnel records management in federal universities in Southwest Nigeria?

Table 2: Mean and Standard Deviation on the Influence of IPPIS on Personnel Records Management in Federal Universities in Southwest Nigeria (N = 600)

S/N	Items	Mean	SD	Remark
1	IPPIS has improved the accuracy of personnel records in my university.	3.39	0.73	Agree
2	IPPIS has enhanced the updating of staff records and information.	3.34	0.76	Agree
3	IPPIS has reduced errors associated with manual personnel record management.	3.31	0.79	Agree
4	IPPIS has facilitated easy retrieval of staff information when needed.	3.43	0.71	Agree
5	IPPIS has improved the security and confidentiality of personnel records.	3.36	0.75	Agree
6	IPPIS has enhanced the management of staff promotions, transfers, and retirement records.	3.29	0.81	Agree
7	IPPIS has promoted consistency in personnel data across departments.	3.41	0.72	Agree
8	IPPIS has improved the overall efficiency of personnel records management in the university.	3.45	0.69	Agree

The results in Table 2 revealed that the mean scores for the eight items ranged from 3.29 to 3.45, all of which exceeded the benchmark mean of 2.50, indicating agreement. The cluster mean of 3.37 with a standard deviation of 0.75 suggests that respondents perceived IPPIS as enhancing the accuracy, updating, retrieval, security, and overall management of personnel records,

while reducing errors associated with manual record-keeping and promoting consistency of staff information across departments.

Research Question 3: What is the influence of IPPIS on transparency and accountability in financial administration in federal universities in Southwest Nigeria?

Table 3: Mean and Standard Deviation on the Influence of IPPIS on Transparency and Accountability in Financial Administration in Federal Universities in Southwest Nigeria (N = 600)

Items	Mean	SD	Remark
IPPIS has improved transparency in payroll and financial transactions in my university.	3.47	0.68	Agree
IPPIS has enhanced accountability in the management of personnel and financial records.	3.42	0.71	Agree
IPPIS has reduced opportunities for payroll fraud and financial malpractice.	3.38	0.76	Agree
IPPIS has strengthened compliance with government financial regulations and policies.	3.44	0.70	Agree
IPPIS has improved the traceability of payroll and personnel transactions.	3.36	0.77	Agree
IPPIS has promoted openness in salary administration and financial reporting.	3.40	0.73	Agree
IPPIS has enhanced confidence in the integrity of the university's financial administration.	3.33	0.79	Agree
IPPIS has improved overall transparency and accountability in financial administration.	3.46	0.69	Agree

The results in Table 3 showed that the mean scores for the eight items ranged from 3.33 to 3.47, all exceeding the benchmark mean of 2.50, indicating agreement. The cluster mean of 3.41 with a standard deviation of 0.73 further shows that respondents perceived IPPIS as promoting transparency in payroll and financial transactions, enhancing accountability, reducing opportunities for fraud and financial

malpractice, strengthening compliance with government regulations, improving transaction traceability, and enhancing confidence in the integrity of financial administration.

Research Question 4: What is the influence of IPPIS on budgetary control in financial administration in federal universities in Southwest Nigeria?

Table 4: Mean and Standard Deviation on the Influence of IPPIS on Budgetary Control in Financial Administration in Federal Universities in Southwest Nigeria (N = 600)

Items	Mean	SD	Remark
IPPIS has improved adherence to approved personnel budget allocations in my university.	3.43	0.71	Agree
IPPIS has enhanced effective monitoring of personnel expenditure.	3.38	0.74	Agree
IPPIS has reduced budget overruns associated with personnel costs.	3.34	0.78	Agree
IPPIS has facilitated accurate forecasting of personnel-related expenditure.	3.29	0.81	Agree
IPPIS has improved budget planning and implementation for personnel emoluments.	3.41	0.72	Agree
IPPIS has strengthened financial discipline in the utilization of personnel funds.	3.46	0.68	Agree
IPPIS has enhanced compliance with government budgetary guidelines and controls.	3.40	0.73	Agree
IPPIS has improved overall budgetary control in the financial administration of my university.	3.45	0.69	Agree

The results in Table 4 revealed that the mean scores for the eight items ranged from 3.29 to 3.46, all of which were above the benchmark mean of 2.50, indicating agreement. The cluster mean of 3.40 with a standard deviation of 0.73 further indicates that respondents perceived IPPIS as improving adherence to personnel budget allocations, enhancing expenditure monitoring, reducing budget overruns, facilitating accurate personnel expenditure forecasting, strengthening financial discipline, ensuring

compliance with government budgetary guidelines, and improving overall budgetary control in federal universities.

Testing of Hypothesis

Hypothesis 1: Payroll management, personnel records management, transparency and accountability, and budgetary control have no significant joint influence on financial administration in federal universities in Southwest Nigeria.

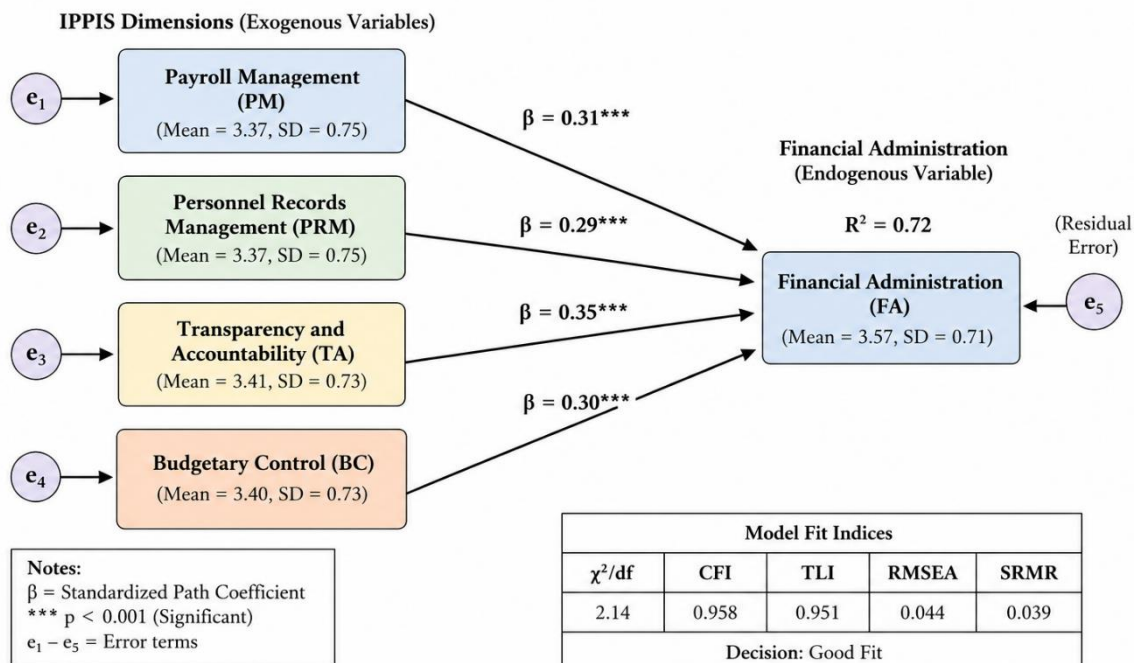
Table 5: Structural Equation Modelling (SEM) Results Showing the Joint Influence of IPPIS Dimensions on Financial Administration in Federal Universities in Southwest Nigeria (N = 600)

Path	Standardized Estimate (β)	S.E.	C.R.	p-value	Decision
Payroll Management → Financial Administration	0.312	0.047	6.638	0.000	Significant
Personnel Records Management → Financial Administration	0.286	0.044	6.500	0.000	Significant
Transparency and Accountability → Financial Administration	0.351	0.046	7.630	0.000	Significant
Budgetary Control → Financial Administration	0.297	0.045	6.600	0.000	Significant

Model Fit Indices

Fit Index	Obtained Value	Recommended Value	Decision
χ^2/df	2.14	< 3.00	Good Fit
CFI	0.958	≥ 0.90	Good Fit
TLI	0.951	≥ 0.90	Good Fit
RMSEA	0.044	≤ 0.08	Good Fit
SRMR	0.039	≤ 0.08	Good Fit

Table 5 revealed that payroll management ($\beta = 0.312$, $p < 0.05$), personnel records management ($\beta = 0.286$, $p < 0.05$), transparency and accountability ($\beta = 0.351$, $p < 0.05$), and budgetary control ($\beta = 0.297$, $p < 0.05$) each had significant positive direct influences on financial administration in federal universities in Southwest Nigeria. The model also demonstrated an acceptable fit to the data, as evidenced by the fit indices ($\chi^2/df = 2.14$, CFI = 0.958, TLI = 0.951, RMSEA = 0.044, and SRMR = 0.039). Therefore, the null hypothesis was rejected. The findings indicate that the dimensions of the Integrated Payroll and Personnel Information System (IPPIS) significantly influence financial administration in the selected federal universities.



Source: Field Survey, 2024

Figure 1 shows that payroll management, personnel records management, transparency and accountability, and budgetary control had positive and significant direct influences on financial administration in federal universities in Southwest Nigeria. Transparency and accountability had the highest influence ($\beta = 0.35$), followed by payroll management ($\beta = 0.31$), budgetary control ($\beta = 0.30$), and personnel records management ($\beta = 0.29$). The model explained 72% ($R^2 = 0.72$) of the variance in financial administration, while the model fit indices ($\chi^2/df = 2.14$, CFI = 0.958, TLI = 0.951, RMSEA = 0.044, and SRMR = 0.039) indicated that the structural model had a good fit. This implies that the effective implementation of IPPIS significantly enhances financial administration in federal universities in Southwest Nigeria.

Discussion

The findings of the study revealed that the Integrated Payroll and Personnel Information System (IPPIS) had a significant positive influence on payroll management in federal universities in Southwest Nigeria. The respondents agreed that IPPIS improved the accuracy of salary computation, minimized payroll errors, eliminated ghost workers, enhanced payroll processing, and strengthened accountability in salary administration. This finding suggests that the implementation of IPPIS has enhanced the integrity and efficiency of payroll administration in federal universities by ensuring that only duly verified employees receive salaries. The finding is consistent with Kaoje et al. (2020), who reported that IPPIS has improved transparency and efficiency in government payroll administration through the elimination of payroll fraud and enhancement of payroll accountability. Similarly, Ike et al. (2023) found that IPPIS has significantly strengthened public financial management by improving payroll administration and promoting accountability in Nigeria's public service.

The study further revealed that IPPIS had a positive influence on personnel records management in federal universities in Southwest Nigeria. The respondents agreed that the system improved the accuracy, security, accessibility, and updating of personnel records while reducing errors associated with manual record management. This finding implies that the integration of personnel information into a centralized electronic database has enhanced human resource administration and improved institutional efficiency. The finding agrees with Rotimi et al. (2021), who asserted that the adoption of digital public financial management tools enhances administrative efficiency through improved information management and institutional control. The finding also corroborates Ike et al. (2023), who observed that the successful implementation of IPPIS depends largely on the effective management of personnel data and accurate employee records.

The findings also indicated that IPPIS significantly enhanced transparency and accountability in financial administration in federal universities in Southwest Nigeria. The respondents agreed that the system improved compliance with government financial regulations, increased the traceability of payroll transactions, reduced opportunities for payroll fraud and financial leakages, and strengthened accountability in the management of public funds. This finding demonstrates that IPPIS has become an important public financial management tool for promoting transparency and accountability in federal universities. The finding is consistent with Nnamani et al. (2021), who reported that IPPIS has enhanced public accountability and transparency by strengthening payroll monitoring and reducing financial irregularities in Nigerian public institutions. Likewise, Kaoje et al. (2020) concluded that IPPIS serves as an effective mechanism for improving transparency in payroll administration and ensuring prudent management of public resources.

The study equally established that IPPIS had a positive influence on budgetary control in financial administration in federal universities in Southwest Nigeria. The respondents agreed that the system improved adherence to approved personnel budgets, enhanced monitoring of personnel expenditure, reduced budget overruns, facilitated accurate personnel cost projections, and strengthened financial discipline. This finding suggests that the integration of payroll and personnel information into a centralized system has enhanced expenditure control and improved budget implementation in federal universities. The finding supports Rotimi et al. (2021), who found that public financial management tools significantly improved financial control, budget implementation, and institutional performance in Nigeria's public sector. The finding is also in line with Sani et al. (2025), who concluded that public financial management reforms contribute significantly to improved budgetary discipline, accountability, and efficient utilization of public funds.

The Structural Equation Modelling (SEM) results further revealed that payroll management, personnel records management, transparency and accountability, and budgetary control jointly exerted a significant positive influence on financial administration in federal universities in Southwest Nigeria. The model explained 72% of the variance in financial administration, indicating that the four dimensions of IPPIS are strong predictors of effective financial administration. Transparency and accountability emerged as the strongest predictor, followed by payroll management, budgetary control, and personnel records management. This finding is consistent with Ike et al. (2023), who found that IPPIS contributes significantly to effective public financial management by promoting accountability, transparency, payroll efficiency, and prudent utilization of public resources. The finding also corroborates Rotimi et al. (2021), who concluded that the adoption of integrated public financial management tools enhances institutional financial performance

through improved accountability, expenditure control, and administrative efficiency.

Conclusion

The study established that the Integrated Payroll and Personnel Information System (IPPIS) improved financial administration in federal universities in Southwest Nigeria. Specifically, IPPIS enhanced payroll management, personnel records management, transparency and accountability, and budgetary control, thereby promoting greater efficiency, accountability, and prudent management of financial resources. The Structural Equation Modelling (SEM) results further established that these dimensions of IPPIS jointly exerted a significant positive influence on financial administration, with transparency and accountability emerging as the strongest predictor. Therefore, the study concludes that the effective implementation and continuous strengthening of IPPIS are essential for improving financial administration and promoting good governance in federal universities in Southwest Nigeria.

Recommendations

Based on the findings of the study, it is recommended that:

1. Federal universities should strengthen the implementation of the Integrated Payroll and Personnel Information System (IPPIS) to enhance payroll accuracy, eliminate payroll irregularities, and ensure timely payment of salaries.
2. University management should ensure that personnel records on the IPPIS platform are regularly updated and verified to improve the accuracy, security, and accessibility of staff information for effective personnel administration.
3. The Federal Government and university authorities should reinforce transparency and accountability mechanisms within the IPPIS framework through regular monitoring, auditing, and compliance with

established financial regulations to reduce payroll fraud and financial leakages.

4. University management should leverage the budgetary control features of IPPIS to strengthen personnel expenditure monitoring, ensure adherence to approved budgets, and promote prudent utilization of financial resources.
5. The Federal Government should provide continuous training, technical support, and periodic system upgrades for personnel responsible for IPPIS operations to enhance its effectiveness and sustain improved financial administration in federal universities.

References

- Agbata, A. E., & Oranefo, P. C. (2022). Integrated Personnel and Payroll Information System and financial accountability. *Business & Management Compass*, 1(2), 22–43.
- Ike, G. U., Inakefe, G., Bassey, V. U., & Mbonu, F. I. (2023). Integrated Personnel and Payroll Information System and public financial management in Nigeria's public service. *African Renaissance*, 20(3), 53–84. <https://doi.org/10.31920/2516-5305/2023/20n3a3>
- Kaoje, A. N., Kabir, N., Sani, I., Gambarawa, J. A., & Ubandawaki, L. I. (2020). Integrated Personnel and Payroll Information System (IPPIS) and transparency in government payroll administration in Nigerian civil service: A unique approach. *Asian Journal of Economics, Business and Accounting*, 19(3), 1–8. <https://doi.org/10.9734/AJEBA/2020/v19i330303>
- Kristensen, J. K., Bowen, M., Long, C., Mustapha, S., & Zrinski, U. (2019). *PEFA, public financial management, and good governance*. World Bank. <https://doi.org/10.1596/978-1-4648-1466-2>
- Nnamani, K., Ochiaka, D., Eze, B., & Nwoke, I. (2021). Public sector reform and public accountability in Nigeria: A study of Integrated Personnel Payroll and Information System. *University of Nigeria Journal of Political Economy*, 11(1), 103–122.
- Public Expenditure and Financial Accountability (PEFA). (2019). *Nigeria 2019 public financial management performance report*. PEFA Secretariat.
- Rotimi, O., Olusola, I. E., Olusegun, E. A., Oluwayemisi, A. M. B., Olugbenga, A. F., Rildwan, O. B., & Gbenga, A. C. (2021). Public financial management tools and performance in Nigeria public sector. *Academy of Accounting and Financial Studies Journal*, 25(7), 1–15.
- Sani, K., Akanyi, P. A., & Adda, S. A. (2025). The efficacy of public financial management (PFM) reforms in Nigeria: Problems and prospects. *Madonna Journal of Administration and Management Sciences*, 5(1), 1–16.
- World Bank. (2015). *Public finance*. <https://www.worldbank.org/en/topic/governance/brief/public-finance>

EFFECTS OF LEARNING PASSPORT ON SECONDARY SCHOOL STUDENTS' ACADEMIC PERFORMANCE IN COMPUTER STUDIES IN EKITI STATE, NIGERIA

BY

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Abstract

The study investigated the effects of Learning Passport on secondary school students' academic performance in Computer Studies in Ekiti State. The study examined the more effective strategy to teach Computer Studies between Learning Passport and conventional method, and the influence of Learning Passport on students' performance in Computer Studies based on gender. The study adopted Quasi experimental of pre-test post-test control group design. 127 JSS II students were selected using multistage sampling procedure. A researcher designed instrument "Computer Performance Test" (CPT) was used in this study. Face and content validity of the instrument was ascertained, and the reliability coefficient of 0.85 was obtained using Pearson's Product Moment Correlation. Mean and standard deviation were used to answer the research question while the hypotheses were tested using t-test at 0.05 level of significance. The finding revealed a significant difference between the post-test performance scores of experimental and control groups. Also, the finding showed that Learning Passport has no significant influence on performance based on gender. It was recommended that the use of Learning Passport should be encouraged for teaching Computer Studies in secondary schools. Also, computer laboratories in schools should be provided with internet to enhance the use of the Learning Passport.

Keywords: Education, Learning Passport, gender, Computer Studies, academic performance

Introduction

Education is regarded as the transmission of knowledge, skills, traits and characters that are required for human development (Chazan, 2022). Technological transformation has continued to affect the way we interact and our education system is not exempted. Experts maintain that African countries, including Nigeria, must prioritize integrating technology into their education systems to enhance quality, accessibility, and prepare the workforce for the digital age (ThisDay, 2024; Obiageli, 2015). For an individual to thrive in the present age, there is a need for digital literacy. Computer Studies was introduced into the national curriculum to educate learners about the basic concepts of the computer system and its applications (Oyemomilara, 2019).

Academic performance refers to the measurable outcome of a student's learning, usually determined by grades, test scores, or achievement in a teacher-made test. It is also described as the outcome of educational

process, which is influenced by a range of factors, including students' characteristics, instructional quality, and institutional context. It is commonly measured through examination or continuous assessment, and shows the extent to which students achieve the standards required by their institutions. Research has identified several factors that influence academic performance to include students' prior knowledge and experience in a subject area, students' motivation and engagement in learning; teaching and instructional quality, socio-economic status; students' learning strategies and habits, availability and accessibility of learning resources, (Brew, Nketiah, & Koranteng, 2021). Academic performance is quantified by student's grades, test scores, project performance, attendance and participation, and other academic achievements. Several factors can influence academic performance. These include intelligence, motivation, learning strategies, teaching methods, family and social-economic

factors, as well as emotional and mental health. It is important to note that one of the factors that could enhance learning outcomes is the teaching method used in the classroom.

The complete act of teaching involves more than the presentation and development of lesson materials. Before embarking on a fresh stage of instruction, teachers must be reasonably clear about the capabilities, achievements, strengths and weaknesses, background and interests of their learners, and the short and long-term objectives they anticipate to achieve in a lesson and sequences of lessons. Those curricular strategies will have to be put into effect in the light of what is known about the students and will result in the actual tactics of the teaching-learning situation. Also, technology has modified teachers' role to include digital content creation and use of online facilities as innovative tools for instruction and policy implementation to enhance learning outcomes (Abanikannda, 2023).

Learning Passport is an online learning platform developed through a partnership between UNICEF, Microsoft, and the University of Cambridge. It provides learners, teachers, and education ministries with access to curriculum-aligned and offline-capable educational content from early childhood through senior secondary levels. It functions as a portable, interoperable digital repository of learning resources that can be accessed through the internet, mobile application, or low-bandwidth channels. A core feature is learner account portability: a learner's progress, badges, and certifications remain accessible even if they move across schools, regions, or countries. The Learning Passport addresses three persistent gaps in education systems, particularly in low-resource and crisis contexts (Cambridge University Press & Cambridge Assessment, 2020). Firstly, it enables continuity of learning during disruptions such as conflict, displacement, pandemics, or climate events by providing offline-first content. This reduces learning loss during school closures. Secondly, it provides equity and access to marginalized learners, including refugees, internally displaced persons, and out-of-school children by hosting Open Educational Resources (OERs) in multiple languages and formats. Thirdly, it offers a scalable, national-level platform to

digitize and standardize curriculum delivery, teacher professional development, and learning assessment in various subjects including Computer Studies (UNICEF, 2022). Learning Passport is designed for flexible deployment across contexts with core functionalities such as curriculum-mapped lessons, videos, e-books, interactive exercises, and assessments. Content can be contextualized by countries to reflect national curricula, and downloadable for offline use on digital devices, with syncing when connectivity is available. In schools, the platform can be integrated into classroom teaching as a teaching and learning tool. It promotes self-directed learning; learners can access content independently for homework, remediation, or skill developments. Learners and teachers are required to register for a free account via web or mobile app. In offline models, content packs can be pre-loaded onto digital or storage devices.

Statement of the Problem

In spite of the potential benefits of online learning facilities, research suggests that their impact on students' learning outcomes in Computer Studies in Ekiti State remain below excellence. In Ekiti State, the adoption of online facilities for learning in secondary schools is increasing, but the effectiveness of these facilities in enhancing students' learning outcomes is largely unexplored. There is a dearth of research examining the impact of Learning Passport on students' academic performance in Computer Studies in Ekiti State. This research aims to address these gaps by conducting a study that investigates the effects of Learning Passport on secondary school students' learning outcomes in Computer Studies in Ekiti State.

The integration of online facilities into educational systems is widely regarded as a transformative approach to enhancing teaching and learning experiences. This is particularly relevant in Computer Studies, which requires a blend of theoretical knowledge and practical skills that could be effectively facilitated through online learning platforms. However, despite the availability of online facilities in some secondary schools in Ekiti State, there remains a lack of comprehensive understanding of their actual impact on students' performance in Computer Studies. Many schools in Ekiti State still face challenges such as limited access to reliable

internet, inadequate technological infrastructure, and a lack of teacher training on the effective use of online tools.

Also, the persistent decline in the academic performance of students in the last three years in the Junior Secondary School Certificate Examination in Computer Studies as evident from the analysis of results from 2018 to 2024, poses a significant challenge to education stakeholders. Despite efforts to improve education quality, the inconsistent and declining trend in students' performance warrant an investigation into the effectiveness of current teaching methods. In addition, it may also undermine the country's efforts to develop a digitally literate workforce and hinder its socio-economic development. Therefore, this study aims to investigate the effects of Learning Passport on performance in Computer Studies among secondary school students, with a view to identifying evidence-based strategy for improving teaching and learning practices in Computer Studies education.

Purpose of the Study

The main purpose of the study was to investigate the effects of Learning Passport on secondary school students' academic performance in Computer Studies in Ekiti State. Specifically, the study purported to:

- i. explore the performance of secondary school students in Computer Studies when Learning Passport is used;
- ii. examine the influence of the use of Learning Passport on secondary school students' performance in Computer Studies based on gender.

Research Questions

In this study, one research question was raised to guide the work:

1. What is the difference in the performance of students in Computer Studies before and after the treatment?

Research Hypotheses

The following null hypotheses were formulated to guide the research:

1. There is no significant difference in the pre-test performance of experimental and control groups in Computer Studies.
2. There is no significant difference in the post-test performance of the experimental and control groups in Computer Studies.

3. There is no significant difference in the post-test performance of male and female students in the experimental group.

Literature Review

Technology has changed teachers' job from old instructors to digital learning facilitators, as information and Communication Technology (ICT) has reshaped education and given academics new duties (Abanikannda, 2023). There are a lot of technological devices which teachers can use to deliver their lessons to the students. There are many ICT devices and online facilities that can be used to facilitate teaching and delivering learning to the students. Nowadays, teachers use projectors interactive smart screens and computers in the classrooms for delivering lessons to the students. With the aid of computers, projectors and interactive smart screens, teachers can use online learning platforms to present visually to the students in any location. It is assumed that these digital tools could be better used alongside the Learning Passport to produce improved performance in Computer Studies.

Concept of Computer Studies

The integration of Computer Studies in the educational system has become increasingly essential in the 21st century, driven by the global technological revolution. Okekeokosisi and Okigbo (2021) emphasize that education systems must adapt to rapid advancements by leveraging computer technologies to solve modern problems. In Nigeria, as in many other countries, the implementation of Computer Studies at the secondary school level has become an essential component of preparing students for the demands of the modern workforce and the digital age. Computer Studies is a subject offered at the primary, secondary and tertiary levels in Nigeria. It is a practical-oriented subject which involves hand-on activities and manipulations. It plays the role of equipping individuals with skills, knowledge and attitudes that would enable them engage in a life-time of productive work and retraining employees so as to fit into jobs, offering of entrepreneurial skills and development programmes. It also creates access to quality job competencies and skills needed for steady employment.

Exposure to Computer Studies has been linked to improving the performance,

particularly in subjects requiring analytical skills. Eme, Maidoh, and Onwe, (2015) found that students with computer education showed enhanced problem-solving abilities and academic achievements. Computer Studies, as a subject, serves as foundation for various career paths in the digital economy. Yusuf, Adegbola, Njoku, and Owolabi, (2021) observed that students with computer education are better prepared for careers in technology and related fields, contributing to national development. Computer Studies in Nigerian secondary schools have undergone significant developments, with increased policy support and curriculum integration. However, challenges such as infrastructure deficits, inadequate teacher training, and resource constraints linger.

Concept of Online Facilities for Teaching and Learning

The term 'online facility' generally refers to digital tools, online learning platforms, and resources that are accessed over the internet to facilitate teaching, learning, and communication. Online facility is designed to support and augment traditional face-to-face learning, allowing for flexible, accessible, and often personalized learning experiences. These facilities are digital resources or tools accessed through the internet that are utilized in educational settings to support teaching and learning activities. They encompass a broad range of technologies, including but not limited to, e-learning platforms, virtual classrooms, video-based instruction, educational software, and digital repositories of learning materials. They are designed to enhance the educational experience by providing flexible, personalized, and interactive learning opportunities (Bates, 2015). Digital learning tools and mobile technologies enable both educators and students to engage in learning activities outside the traditional classroom environment, fostering a more inclusive and diverse approach to education (Ekwu, Njoku, Ikwuanusi, & Madu, 2025; Onyema, 2021).

In Nigeria, the integration of these tools has proven essential in bridging the gap for learners in rural areas and those with special needs by providing flexible and personalized instructional materials (Nwachukwu & Musa, 2024). Overall, online facilities are seen as an indispensable aspect of modern education, offering a versatile means of supporting and enhancing both academic performance and

student engagement (Ajayi & Oyemomilara, 2025). Olaniyi and Ajayi (2020) opined that the interactivity of technologies helps students to interact without any fear and receive feedback on their performances. The prevalent use of these resources in secondary schools is increasingly important as educational systems globally strive to incorporate more technology into their curricula, especially in science and technology-related fields like Computer Studies. The effective utilization of online facilities is influenced by multiple factors that span technological, psychological, pedagogical, infrastructure, cultural and socio-economic domains.

Concept of Learning Passport

The concept of a **Learning Passport** refers to a digital or physical tool used to track, document, and assess a student's educational journey. In secondary schools, Learning Passport provides a personalized and comprehensive record of learning activities, achievements, and competencies that support continuous learning and help guide student progress. Learning passport often includes various forms of assessments, feedback, self-reflection, and evidence of skills acquired over time. Over the years, the role of Learning Passport has evolved from a basic assessment tool to a key element in fostering personalized learning experiences, especially in the digital age.

The Learning Passport is an innovative education model designed for basic and secondary level education, specifically tailored to support children who are out of school or need extra support to ensure they receive quality education (Learning Passport, 2022). This platform offers certified and free educational content, both online and offline, making it accessible to everyone. Learning Passport is powered by Microsoft and includes learner and teacher modules to facilitate better interaction and teaching material preparation (Learning Passport, 2022). It is an initiative designed to complement the conventional teaching approach. The Learning Passport was basically designed for pre-primary, primary and secondary school children but the youth, and teachers have the advantage of using it too because they can access the digitalized curriculum and provides supportive measures needed on learning

materials in all core curriculum subjects for primary one to six classes, and as well all junior and senior secondary school classes (Shehu & Sule, 2024). It is a personalized, digital portfolio that enables learners to track their progress, achievements, and skills acquired throughout their learning journey.

The Learning Passport is an innovative educational model designed for basic and secondary level education, specifically tailored to support children who are out of school or need extra support to ensure they receive quality education. This platform offers certified and free educational content, both online and offline, making it accessible to everyone (UNICEF, 2022). The Learning Passport has the capability to track different types of curriculum subjects that each student learns and guides them through additional materials, with little to no parental support. The initiative is an innovative global platform that provides localized curriculum for students around the world and it is seen as a new solution designed to close the learning poverty gap. Originally, this platform could be used online or off-line with mobile technological devices, enabling high quality and flexibility in learning. Developed countries that have this learning alternative quickly make a switch-shift and students continue learning at all stages but on the contrary in countries not equipped with this advantage their educational systems suffer throughout it and continue to grapple with challenges stemming from the pandemic period. Before the crisis, the world had an estimated 35 million children already displaced globally as a result of war, natural disasters, disease outbreaks, and other related crises. Research revealed that, in many countries, efforts to mitigate pandemic risk have separated 463 million students from school entirely due to a lack of an alternative to learning policies or a lack of devices needed at home (UNICEF, 2020).

The Learning Passport is an initiative which is one of the most recent efforts by the Federal Government of Nigeria in collaboration with United Nations International Children's Emergency Fund (UNICEF) aimed to reduce learning poverty among students and bridge gaps in regards to the digital literacy of basic education provision in the country, gave birth to its introduction and was formally launched. This initiative is a digitalized learning platform which students interact with, to access learning content based

on basic education curriculum and sequentially organized and arranged around that purpose. The interactivity with the platform to access learning content is based on a series of subjects offered in basic education which could be online or offline, at home or in the school system.

Initially, the project covered the core-north-west zone of the country that comprised Sokoto, Katsina, Kebbi and Zamfara States, this was based on the fact that the mentioned states were considered educationally disadvantaged and backward in respect to the acquisition of basic literacy education, however, the initiative has been scaled up to covered all the remaining Nigeria States including Abuja (FCT), (UNICEF, 2021) The rationale around the introduction of this novel idea is to help in the reduction of inequality and bridge the existing gaps in basic educational provisions in Nigeria, especially in the northern states. State governments were enjoyed to create an enabling circumstance and provide the additional resources and facilities to enable the initiative to flourish and be sustained by ensuring the Centre was well managed, more students were trained on the creation of ID and login process with the use of hand-held mobile technologies made available by the state government through basic education sector.

The unique advantage of the platform is that, with mobile online and offline capability learners continuously have access to quality education, therefore, given its flexibility and adaptability, it would allow states to easily and quickly adopt the platform as their learning management systems or rather use it to complement existing digital learning efforts. The suite of online and offline functions that caters for deployment in places with poor connectivity, often locations where children find themselves unable to access quality digital education. It was built to serve national curriculum content as well as global supplementary resources - OERs in supporting learners and improving learning outcomes. Nigeria's early childhood education provision, primary & secondary education, adolescent skills, and as well technical & vocational education can all benefit from it (UNICEF, 2021).

Curriculum design plays a pivotal role in shaping learning outcomes in Computer Studies. A well-structured and updated

curriculum that incorporates both theoretical and practical aspects of Computer Science can significantly improve students' knowledge and skills. Alaba and Adeyemi (2015) opined that a curriculum that integrates hands-on activities and problem-solving exercises is more effective in promoting understanding and retention of Computer Studies concepts. In their study, they found that students who engaged in practical programming tasks demonstrated better problem-solving skills and higher academic performance in Computer Studies. de Jesus, Pereira, Guterres and Goncalves (2025) evaluated how the Learning Passport Platform enhances the students' understanding of the Simple Present Tense. The objectives were to assess the impact of using the Learning Passport platform to teach the simple present tense and to identify if there was significant difference before and after its implementation. It was found that there were significant improvements after using the Learning Passport platform to teach the Simple Present Tense. The study concluded that the Learning Passport is an effective teaching tool for improving English grammar skills and introducing students to essential digital learning environments. The effectiveness of Learning Passport to enhance students' performance in Computer Studies has not been ascertained.

Methodology

A quasi-experimental of pre-test, post-test control group design was adopted for the study. The population for the study consisted of all 21651 JSS II students in public secondary schools in Ekiti State. The sample consisted of 127 students drawn from four schools in Ekiti State. The selection of the sample was done using multistage sampling procedure. One Senatorial District was randomly selected from the three Senatorial Districts in Ekiti State. Two Local Government Areas were selected from the Senatorial District selected. One rural and one urban school were selected using stratified

sampling technique from each of the Local Government Areas. Intact class was used in each of the schools selected. The schools selected were grouped into experimental and control groups and the Computer Studies teacher of each school was used as the research assistant. Computer Performance Test (CPT) was the instrument used in the study to measure the performance of the students in Computer Studies. CPT comprised 25 multiple choice questions with four options a to d. The items covered all the topics taught for six weeks. CPT was used for both pre-test and post-test. The validity of the instrument was ascertained using face and content validity through the help of a Test, Measurement and Evaluation expert and a Computer teacher. The reliability of CPT was determined by administering it on 35 students outside the sample using test re-test method. The scores were correlated using Pearson's Product Moment Correlation which yielded a reliability coefficient of 0.85, which was adjudged to be reliable and suitable for the study. The experimental procedure for the study was in three stages: the pre-treatment stage (one week), the treatment stage (six weeks) and the post-treatment stage (one week). The pre-test and post-test were administered on the students and their responses were scored and subjected to statistical analysis of mean and standard deviation for the research question and t-test for all hypotheses at 0.05 level of significance.

Results

Research Question: What is the difference in the performance of students in Computer Studies before and after the treatment?

In order to answer the question, the performance mean scores of students in the experimental and control groups were obtained and compared before and after the treatment as presented in Table 1.

Table 1: Mean and standard deviation of pre-test and post-test performance scores of Experimental and Control Groups

Treatment	Test	N	Mean	SD	Mean Difference
Learning Passport Conventional Method	Pre-test	67	27.58	9.97	-2.95
	Pre-test	60	30.53	10.02	
Learning Passport Conventional Method	Post-test	67	51.28	12.55	11.55
	Post-test	60	39.73	10.64	
Total		127			

Table 1 showed the performance of students in Computer Studies before and after treatment. The table revealed that the pre-test performance score of students exposed to Learning Passport was 27.58 while conventional method was 30.53 with their corresponding standard deviation as 9.97 and 10.02 respectively. The post-test performance score of students exposed to Learning Passport was 51.28 and conventional method was 39.73 with their corresponding standard deviations as 12.55 and 10.64 respectively. The mean difference of the experimental group was found to be 23.70 while that of the control group was 9.20. The

performance difference between the experimental and control groups before treatment was -2.95 while after treatment it was 11.55. This implied that the use of Learning Passport and conventional method had positive difference on the performance of students in Computer Studies, but the use of Learning Passport had greater difference than conventional method.

Hypotheses Testing

Hypothesis 1: There is no significant difference in the pre-test performance of experimental and control groups in Computer Studies.

Table 2: t-test analysis of the pre-test performance of experimental and control groups in Computer Studies

Variations	N	Mean	SD	df	t	p
Experimental Group	67	27.58	9.97	125	1.66	0.99
Control Group	60	30.53	10.02			

$p > 0.05$

Table 2 showed that the t value was 1.66 and the p-value was 0.99. The p-value is greater than 0.05 level of significance. This implies that the null hypothesis was not rejected. Hence there was no significant difference in the pre-test performance of students in experimental and control groups

in Computer Studies. By implication, the students in the experimental and control groups were homogenous at the commencement of the study.

Hypothesis 2: There is no significant difference in the post-test performance of students in the experimental and control groups in Computer Studies.

Table 3: t-test analysis of the post-test performance of students in experimental and control groups in Computer Studies

Variations	N	Mean	SD	df	t	p
Experimental Group	67	51.28	10.43	125	3.41	0.00*
Control Group	60	39.73	10.64			

* $p < 0.05$

Table 3 shows that the t value is 3.41 and the p value was 0.00*. It shows that p value was less than 0.05 level of significance. The null hypothesis was therefore rejected. This means that there was significant difference in the post-test performance of students in experimental and control groups in Computer Studies. The mean score shows a large difference in favour of experimental group,

an indication that Learning Passport had positive effect on the academic performance of the students in Computer Studies.

Hypothesis 3: There is no significant difference in post-test performance of male and female students in the experimental group in Computer Studies.

Table 4: t-test analysis of the post-test performance of male and female students in experimental group in Computer Studies

Variations	N	Mean	SD	df	t	p
Male	30	50.80	10.46	65	0.33	0.73
Female	37	51.68	10.53			

$p > 0.05$

Table 4 showed that the t-value was 0.33 and the p-value was 0.73. The p-value was greater than 0.05 level of significance. This implies that the null hypothesis was not rejected. Hence there was no significant difference in the post-test performance of male and female students in experimental group.

Discussion

The study investigated the effects of Learning Passport on students' learning outcomes in Computer Studies in secondary schools in Ekiti State. From the finding of this study, it was revealed that there was no significant difference in the academic performance of students taught Computer Studies with the Learning Passport and conventional method before the treatment. It also showed that there was no significant difference in the attitude of students taught Computer Studies with the Learning Passport and conventional method before treatment. Their pretest performance and attitude scores were not different from each other statistically. This is an indication that the students in the experimental and control groups were homogenous at the commencement of the study, which suggests that their academic performance and attitude baseline were statistically, equal.

This finding of this study further revealed a significant difference in the performance of students taught Computer Studies with Learning Passport and conventional method after treatment, with the students exposed to Learning Passport performing higher than those who were taught with conventional method. This indicated that the Learning Passport had positive effect on students' performance in Computer Studies. The finding agrees with previous research indicating that online learning platforms can enhance academic performance when effectively implemented. This is in line with the finding from the study of Okereke and Akinyemi (2018) who found that students in

schools with better access to computer laboratory and high-speed internet achieved significantly higher marks in Computer Studies. The finding is also consistent with the submission of de Jesus et al (2025) who found that there were significant improvements after using the Learning Passport platform to teach the Simple Present Tense.

A comparison of the performance of male and female students taught with Learning Passport after treatment revealed no significant difference. This is an indication that gender has no influence on the performance of students in Computer Studies if appropriate strategy is used. This suggests the Learning Passport was equally effective for both genders, aligning with Oyemomilara (2019) who found that gender has no effect on students' performance in Computer Studies with the use of e-learning. This agrees with the findings of Oyemomilara and Ajayi (2025) who found that the use of e-learning for teaching Computer Studies enhanced the performance of students based on gender. The finding contradicts the findings of Akinyemi and Ebimomi (2020); Chikwendu and Okeke (2020) who found that gender has significant influence on students' competence in Computer Studies.

Conclusion

Based on the findings of this study it was concluded that the experimental and conventional groups were homogenous before the commencement of the treatment. The use of Learning Passport is more effective than conventional method in enhancing secondary school students' academic performance in Computer Studies. The study also established the effectiveness of Learning Passport in teaching Computer Studies. It was also found that gender has no significant influence on students' academic performance when Learning Passport was used for teaching Computer Studies.

Recommendations

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

1. The use of Learning Passport should be encouraged in secondary schools for teaching and learning Computer Studies so as to enhance the academic performance of students.
2. Government should ensure that computer laboratories in schools across Ekiti state are not just equipped with computer systems, but also provided with internet subscriptions to enhance the use of the Learning Passport by all teachers.
3. Curriculum planners should integrate the use of Learning Passport into the Computer Studies curriculum for secondary school students.
4. School administrators, teachers and parents should encourage the use Learning Passport for teaching Computer Studies in secondary schools across Ekiti State.

References

- Abanikannda, M.O. (2023). Transforming Teaching and Learning through ICT: The Role of Academic Staff in the New Normal. *International Journal of Education and Development using ICT*, 19(1).
- Ajayi L.F., & Oyemomilara, M.F., (2025). Investigating the Influence of Online Facilities on Students' Study Habits in Computer Studies in Secondary Schools in Ekiti State Nigeria. *World Journal of Advances Research and Reviews*, 26(02), 2276-2280.
- Ajayi, P.O. (2020). Effects of Enhanced Think-Pair-Share on Senior Secondary School Students' Learning Outcomes in Physics. *International Journal of Innovative Research and Advanced Studies (IJIRAS)*, 7(5).
- Akinyemi, A.L., & Ebimomi, O.E. (2020). Influence of Gender on Students' Learning Outcomes in Computer Studies. Retrieved from [akinyemiebimomifullpaper....genderandStudentsLearningOutcomesinComputerStudies1.pdf](#) on March 30, 2025.
- Alaba, P. O., & Adeyemi, T. (2015). Curriculum Design and Students' Engagement in Computer Studies: Exploring effective strategies. *Journal of Educational Development*, 9(4), 1-12.
- Brew, E.A., Nketiah, B & Koranteng, R. (2021). A Literature Review of Academic Performance, an Insight into Factors and their influence on Academic Outcomes of Students at Senior High Schools. *Open Access Library Journal*, 8, 1 – 14doi:10.4236/oalib.1107423.
- Brew, E.A., Nketiah, B & Koranteng, R. (2021). A Literature Review of Academic Performance, an Insight into Factors and their influence on Academic Outcomes of Students at Senior High Schools. *Open Access Library Journal*, 8, 1 – 14doi:10.4236/oalib.1107423.
- Cambridge University Press & Cambridge Assessment. (2020). The Learning Passport: Research and Recommendations Report. Cambridge, UK: Cambridge University Press & Cambridge Assessment.
- Cambridge University Press & Cambridge Assessment, (2020). The Learning Passport: Research and Recommendations Report. UNICEF. Retrieved from <https://www.learningpassport.org/media/246/file/The%20Research%20and%20Recommendations%20Report.pdf>
- Chazan, B, (2022). What is "Education"? *Principles and Pedagogies in Jewish Education*. Springer International Publishing, 13-21.
- Chikwendu, O., & Okeke, J. (2020). Gender Differences in Attitudes Towards Computer Studies in Nigerian Secondary Schools. *Journal of Educational Research and Practice*, 10(2), 112-121. DOI:10.1186/s40462-020-00221-4
- de Jesus, J. M., Pereira, S., Guterres, C., & Gonzalves, J. B. (2025). Using Learning Passport platform to teach Simple Present Tense. *ISCE: Journal of Innovative Studies on Character and Education*, 9(1), 69–85.
- Eme, O. E., Maidoh, N. E., & Onwe, C. E. (2015). Computer Studies and Its impact in Secondary Schools in Umuahia-North Local Government Area of Abia State, Nigeria. *International Journal of Modern Education and Computer Science*, 7(6), 16–23. Retrieved from <https://www.mecspress.org/ijmecs/ijmecs-v7-n6/v7n6-3.html> on February 12, 2025.
- Learning Passport, (2022). Transforming Societies through Education. Retrieved from www.learningpassport.org/stories/nigeria-



- success-growing-learning-passport on 29th March, 2025.
- Learning Passport: Annual Impact Report 2020–2021. Retrieved from <https://www.learningpassport.org> on April 16, 2025.
- Obiageli, G.N. (2015). The Effect of E-Learning on Secondary School Students' Interest in Basic Statistics. The International Conference on E-Learning in the Workplace 2015, ICELW 2015 June 10th - 12th, New York, NY, USA.
- Ogunboyede, C.O. (2023). Effects of Online Learning Delivery on Senior Secondary School Students' Learning Outcomes in Computer Studies in Ekiti State, Nigeria. *Unpublished Ph.D Thesis*.
- Okekeokosisi, J. O. C., & Okigbo, E. C. (2021). Computer studies and global trends. *Unizik Journal of Educational Research and Vocational Studies (UJERSVOCS)*, 1(1). Retrieved from <https://unilaws.org/ujervs/article/download/43/43>
- Okereke, C., & Akinyemi, A. (2018). Technological Resources and their Impact on Secondary School Performance in Computer Studies. *International Journal of Educational Research*, 19(2), 1-13.
- Oyemomilara, M. F., & Ajayi, L. F. (2025). Effects of E-Learning on Secondary School Students' Academic Performance in Computer Studies in Ekiti State. *IOSR Journal of Humanities and Social Science (IOSR-JHSS)*, 30(4), 10–15.
- Oyemomilara, M.F. (2019). Effects of E-Learning on Secondary School Students' Academic Performance in Computer Studies in Ekiti State, Nigeria. *Unpublished M.Ed. Thesis*.
- Shehu, S. A., & Sule, M. (2024). Nigeria Learning Passport Initiative: Advancing Digital Literacy in Basic Education. *Faculty of Natural and Applied Sciences Journal of Mathematics, and Science Education*, 6(1), 107–112. Retrieved from <https://fnasjournals.com/index.php/FNAS-JMSE/article/view/579>
- ThisDay Live, (2024, September 5). Prioritise Integration of Technology into Education Systems, Experts Call on African Countries. ThisDay.
- UNICEF (2023, June 16). Digital Learning Platforms can increase access to quality education for children in Nigeria. Retrieved from <https://www.unicef.org/nigeria/press-releases> on April 08, 2025.
- UNICEF Nigeria, (2023). Digital Learning Expands in Nigeria through Learning Passport. Retrieved from <https://www.unicef.org/nigeria> on April 15, 2025.
- UNICEF Nigeria, (2023). Learning Passport expands to more States: A Boost for Digital Education. Retrieved from <https://www.unicef.org/nigeria> on April 15, 2025.
- UNICEF Nigeria, (2025, April 29). Nigeria Learning Passport: *Bridging the education gap*. Retrieved from <https://www.unicef.org/nigeria/stories/nigeria-learning-passport-bridging-education-gap>
- UNICEF Nigeria, (2025, February 07). *The Challenge*. Retrieved from www.unicef.org/nigeria/stories/connecting-every-child-digital-learning
- UNICEF, (2020, August 26). COVID-19 and School Closures: Are Children able to continue learning? Remote Learning reachability factsheet. Retrieved from <https://data.unicef.org/resources/remote-learning-reachability-factsheet/>
- UNICEF, (2021). Learning Passport: Annual Impact Report 2020–2021. Retrieved from <https://www.learningpassport.org> on April 16, 2025.
- UNICEF, (2022). The Learning Passport Nigeria: *Scaling digital learning for every child*. Abuja, Nigeria: UNICEF Nigeria Office.
- Yusuf, H. A., Adegbola, I. O., Njoku, C. C., & Owolabi, A. A. (2021). Computer Science Education in Nigeria Secondary Schools: Gap between Policy and Practice.



INFLUENCE OF PEER PRESSURE ON TEENAGERS' BEHAVIOURS IN SECONDARY SCHOOLS IN EKITI STATE

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Abstract

This study examined the influence of peer pressure on teenagers' behavior among secondary school students in Ekiti State, Nigeria, with emphasis on social, moral, and risk-related behaviors. A descriptive survey research design of the correlational type was adopted for the study. The population comprised 123,456 secondary school students, from which a sample of 400 students was selected using a multistage sampling technique involving random and stratified procedures to ensure adequate representation of class levels and gender. Data were collected using a structured questionnaire titled Peer Pressure and Teenagers' Behavior Questionnaire (PPTBQ), which was validated by experts and yielded a reliability coefficient of 0.70 using Cronbach's Alpha method. Data collected were analyzed using descriptive statistics such as frequency, percentages, mean, and standard deviation, while inferential statistics including Pearson correlation, independent t-test, and Structural Equation Modelling (SEM) were employed to test the hypotheses at 0.05 level of significance. The findings revealed that peer pressure significantly influenced teenagers' behavior, particularly in relation to social, moral, and risk-related dimensions. In addition, the results indicated that there was no significant gender difference in the influence of peer pressure on teenagers' behaviors. Based on the findings, the study concluded that peer pressure is a key factor in understanding adolescent behavior in secondary schools. It was therefore recommended that schools, parents, and policymakers should promote positive peer interactions, strengthen guidance and counselling services, and implement programmes that equip students with the skills needed to resist negative peer influence and make responsible decisions

Keywords: Moral behavior; Peer group influence; Peer pressure; Risk-related behavior; Social behavior; Teenagers' behavior.

Introduction

Teenagers are individuals aged 13–19 years who are in the developmental stage of adolescence, a transition between childhood and adulthood. This period is characterized by significant physical, cognitive, emotional, and social changes and is considered a critical stage for identity formation and personal development. They also become more emotionally sensitive, increasingly influenced by peers, and more independent in their behavior as they seek to establish their identity (Steinberg, 2014). These

developmental changes play an important role in shaping personality and future life outcomes.

Teenagers are individuals aged 10–19 years who are in the adolescent stage of development, a critical transition between childhood and adulthood characterized by significant physical, cognitive, emotional, and social changes (Olawade et al., 2024). During this period, adolescents experience puberty, identity formation, increasing independence, and greater influence from their social environment, particularly peers (Adewole &

Oyeniran, 2024). Peer pressure, which refers to the influence of individuals of similar age or status on one another's attitudes, values, and behaviours, is a major factor shaping adolescents' decisions and actions (Owoeye & Yara, 2023). This influence may be positive, encouraging desirable behaviours such as academic commitment and responsible conduct, thereby enhancing academic performance and school adjustment (Adebayo & Ojo, 2022). Conversely, negative peer pressure can lead to harmful behaviours such as truancy, substance abuse, bullying, cultism, and examination malpractice, which are associated with poor academic and behavioural outcomes (Ibrahim & Salihu, 2023). Peer influence is reinforced through the need for social acceptance, peer modelling, group expectations, and increasingly through social media interactions that promote comparison and conformity among adolescents (Okafor & Chukwu, 2024).

Teenagers' behaviour refers to the actions and interactions displayed by adolescents as they experience physical, emotional, cognitive, and social development. In secondary schools, such behaviour is shaped by identity formation, peer relationships, school climate, and environmental influences (Olawade et al., 2024; Okafor & Chukwu, 2024). Adolescent behaviour can be viewed in terms of social, moral, and risk-related dimensions. Social behaviour involves interactions with peers, teachers, and the school community, which may promote cooperation and academic engagement or contribute to misconduct and peer-related problems (Adebayo & Ojo, 2022; Ibrahim & Salihu, 2023). Moral behaviour reflects adolescents' ability to distinguish right from wrong and is demonstrated through honesty, responsibility, respect for rules, and academic integrity, although it may be weakened by negative peer influence and deviant norms (Owoeye & Yara, 2023). Risk-related behaviour includes activities such as truancy, substance use, bullying, cult involvement, internet misuse, and examination malpractice, often driven by peer pressure and adolescents' tendency toward experimentation (Iheanacho et al., 2023; Egga et al., 2024). These behavioural dimensions are interconnected, as peer groups can either reinforce positive values and discipline or encourage risky and antisocial conduct, highlighting the important roles of

parents, teachers, and counsellors in guiding adolescents toward positive behavioural outcomes (Okafor & Chukwu, 2024; Ibrahim & Salihu, 2023).

Peer pressure is widely explained as a key factor influencing adolescent behaviour. Peers strongly shape adolescents' behaviour, as students may adopt either positive behaviours such as discipline and academic commitment or negative behaviours such as truancy and substance abuse depending on their peer group (Adebayo & Ojo, 2022; Ibrahim & Salihu, 2023). Peer pressure operates through mechanisms such as conformity, modelling, and reinforcement, where adolescents adjust their behaviour to gain acceptance and repeat actions that attract approval. Recent Nigerian studies also show that social media has intensified peer influence through constant comparison and validation (Okafor & Chukwu, 2024). Peer influence affects attitudes and decision-making, often leading adolescents to prioritise acceptance over personal values or parental guidance.

Peer group affiliation refers to adolescents' tendency to associate with groups that share similar values and behaviours, and these groups significantly shape academic, moral, and behavioural development. Positive peer groups encourage discipline, academic effort, and responsible behaviour, often leading to better academic performance and adjustment (Adebayo & Ojo, 2022). In contrast, negative peer groups promote behaviours such as truancy, bullying, substance use, cultism, and examination malpractice, which are linked to poor academic outcomes and behavioural problems (Ibrahim & Salihu, 2023). Neutral peer groups have less consistent influence, as their impact depends on the dominant behaviours within the group. Peer group affiliation is closely linked to conformity, which refers to the tendency of individuals to adjust their attitudes and behaviours in response to group pressure. The gender perspective suggests that peer pressure affects male and female adolescents differently due to variations in socialization and culturally defined gender roles. Male students are often more exposed to peer pressure that encourages risk-taking behaviours such as aggression, truancy, and substance use, as male peer groups tend to emphasize dominance and social status (Ibrahim & Salihu, 2023). In contrast, female students

are more likely to experience peer pressure related to appearance, emotional expression, and social conformity, as female peer groups often prioritize relationships and social approval (Okafor & Chukwu, 2024). Overall, while both genders are influenced by peer pressure, boys tend to show more overt risk behaviours, whereas girls are more affected by subtle social and emotional pressures.

A review of existing literature showed that several studies had examined peer pressure and adolescent behavior in secondary schools, particularly focusing on academic performance, substance use, and general behavioral adjustment. Earlier studies had established that peer pressure is a major factor influencing adolescent behavior in secondary schools, particularly in areas such as academic performance, truancy, indiscipline, substance use, and moral conduct. In Nigeria, especially in Ekiti State, studies indicate that adolescents are strongly influenced by peer groups due to their stage of identity formation and need for social acceptance (Olawale et al., 2024; Okafor & Chukwu, 2024). Truancy is commonly encouraged by deviant peers, leading to poor academic engagement and reduced learning outcomes (Ibrahim & Salihu, 2023). Peer influence also contributes to indiscipline, including disobedience and classroom disruption, as students imitate behaviors accepted within their groups (Adebayo & Ojo, 2022). Substance use is similarly linked to peer pressure, with adolescents often introduced to drugs or alcohol for social acceptance (Egga et al., 2024). In addition, moral decline such as examination malpractice, bullying, and dishonesty is reinforced within negative peer groups, further affecting students' behavior and academic performance (Okafor & Chukwu, 2024). Studies have shown that peer influence significantly affects students' academic motivation, discipline, and engagement in risky behaviors such as truancy and drug use (Adebayo & Ojo, 2022; Ibrahim & Salihu, 2023). It also plays a key role in shaping adolescents' social interactions and school adjustment, confirming peers as important agents of socialization (Okafor & Chukwu, 2024; Olawale et al., 2024). However, there is limited empirical focus on moral behavior as a separate construct, as most studies group issues like honesty and ethical conduct under

broader categories such as indiscipline or academic misconduct. Similarly, risk-related behaviors such as bullying, cultism, and examination malpractice have not been fully examined as interconnected outcomes of peer pressure. In addition, many existing studies rely mainly on basic statistical methods, with limited use of advanced techniques like Structural Equation Modelling (AMOS), which can better explain complex relationships among variables. These gaps highlight the need for a more comprehensive study that separately examines moral and risk-related behaviors and applies SEM for deeper analysis of how peer pressure influences adolescent behavior.

Statement of the Problem

Teenagers in secondary schools appear to be undergoing a critical developmental stage characterized by emotional, social, and behavioral changes that may make them more vulnerable to peer influence. In many secondary schools in Nigeria, including Ekiti State, there have been growing concerns about behavioral challenges among students such as truancy, indiscipline, substance use, and moral decline. These behavioral patterns seem to be affecting students' academic engagement, discipline, and overall adjustment to school life. Although parents, teachers, and school administrators have made efforts to promote positive behavior among students, some adolescents still tend to engage in behaviors that may not align with school rules and societal expectations. In many cases, peer groups appear to play an important role in shaping these behaviors, as students may adjust their actions to gain acceptance or maintain belonging within their social circles. However, the extent to which peer pressure influences different aspects of behavior, particularly moral behavior and risk-related behavior, has not been fully clarified in the existing literature within the Nigerian context. Furthermore, much of the available research has tended to focus on general behavioral issues or academic performance, with relatively limited attention given to specific behavioral dimensions such as moral decision-making and risk-taking tendencies among adolescents.

Purpose of the Study

The purpose of this study is to examine the influence of peer pressure on teenagers'

behaviors in secondary schools in Ekiti State, Nigeria.

Specifically, the study:

- i. examines the forms of peer pressure experienced by teenagers in secondary schools in Ekiti State;
- ii. determines the extent to which peer pressure influences teenagers' social behaviors in secondary schools;
- iii. investigates the influence of peer pressure on teenagers' moral behaviors;
- iv. assesses the influence of peer pressure on teenagers' involvement in risk-related behaviors;
- v. examines the relationship between peer group affiliation and behavioral outcomes among secondary school students;
- vi. determines whether gender differences exist in the influence of peer pressure on teenagers' behaviors.

Research Questions

The following research questions are raised to guide this study:

1. What are the forms of peer pressure experienced by teenagers in secondary schools in Ekiti State?
2. To what extent does peer pressure influence teenagers' social behaviors in secondary schools?
3. How does peer pressure influence teenagers' moral behaviors in secondary schools?

Research Hypotheses

The following research hypotheses are raised to guide this study:

1. Peer pressure has no significant influence on teenagers' involvement in risk-related behaviors in secondary schools in Ekiti State.
2. There is no significant relationship between peer group affiliation variable and behavioral outcomes among secondary school students in Ekiti State.
3. There is no significant influence of peer pressure on teenagers' behaviors in secondary schools based on gender.

Methodology

This study adopted a descriptive survey research design of the correlational type. The design was considered appropriate because it enabled the researcher to examine the influence of peer pressure on teenagers' behaviors without manipulating any variables. It also allowed for the assessment of relationships among variables such as peer pressure, behavioral outcomes, and gender differences. The population of the study comprised of 123,456 secondary school students in Ekiti State. This included both male and female students in public secondary schools. A sample of 400 secondary school students was selected for the study using a multistage sampling technique. At the first stage, a simple random sampling technique was used to select public secondary schools from different Local Government Areas in Ekiti State. At the second stage, the selected schools were stratified based on class levels (SS1, SS2, and SS3) and gender to ensure adequate representation of all groups. At the third stage, students were selected from each stratum using a simple random sampling technique, such as balloting. The sample was proportionately distributed across the class levels, with 133 students selected from SS1, 133 students from SS2, and 134 students from SS3. Within each class level, students were further selected based on gender to ensure fair representation of both male and female students. The instrument for data collection was a structured questionnaire titled "Peer Pressure and Teenagers' Behavior Questionnaire (PPTBQ)". The questionnaire was divided into five sections: Section A contained demographic information such as age, gender, and class; Section B addressed forms of peer pressure; Section C focused on social and moral behaviors; Section D examined academic behaviors and performance; while Section E covered risk-related behaviors. Responses to the items were measured using a Likert scale format ranging from Strongly Agree to Strongly Disagree. The instrument was subjected to face and content validity by experts in educational psychology and measurement and evaluation. Their suggestions and corrections were incorporated to ensure that the instrument measured what it was intended to measure. The reliability of the instrument was determined using Cronbach's Alpha method. A pilot test was conducted among a small

group of students outside the study area, and a reliability coefficient of 0.70 obtained. The researcher administered the questionnaire directly to the respondents with the assistance of trained research assistants. The purpose of the study was explained, and confidentiality was assured. Completed questionnaires were collected immediately to ensure a high return rate. Descriptive statistics such as frequency counts, percentages, mean, and standard deviation were used to answer the research questions. Inferential statistics were employed to test the hypotheses, with Structural Equation Modeling (SEM)-based Structural Equation Modelling to provide clearer insights into these relationships. In addition, Pearson

correlation was used to test relationships between variables, while independent t-test was used to examine gender differences. All hypotheses were tested at the 0.05 level of significance. Participation was voluntary, and respondents' anonymity and confidentiality were strictly maintained. Participants were informed of their right to withdraw from the study at any time.

Results

Descriptive Analysis

Research Question 1: What are the forms of peer pressure experienced by teenagers in secondary schools in Ekiti State?

Table 1: Forms of Peer Pressure Experienced by Teenagers in Secondary Schools in Ekiti State (N = 400)

S/N	Forms of Peer Pressure	SA	A	D	SD	Mean	S.D	Remark
1	Direct peer pressure	120	150	80	50	2.85	0.89	Accepted
2	Indirect peer pressure	140	160	60	40	3.00	0.82	Accepted
3	Negative peer pressure	150	140	70	40	3.00	0.86	Accepted
4	Positive peer pressure	110	170	80	40	2.88	0.83	Accepted
5	Peer acceptance pressure	130	160	70	40	2.95	0.84	Accepted
6	Social comparison pressure	125	155	80	40	2.91	0.87	Accepted
7	Academic-related peer pressure	115	165	80	40	2.89	0.85	Accepted

Decision Rule: Mean ≥ 2.50 = Accepted; Mean < 2.50 = Rejected

Table 1 showed that all the listed forms of peer pressure had mean scores above the criterion mean of 2.50, indicating that they were commonly experienced by teenagers in secondary schools in Ekiti State. Indirect peer pressure and negative peer pressure had the

highest mean scores (3.00), indicating that they were the most prevalent forms among students.

Research Question 2: To what extent does peer pressure influence teenagers' social behaviors in secondary schools?

Table 4.2: Extent of Peer Pressure Influence on Teenagers' Social Behaviors in Secondary Schools in Ekiti State (N = 400)

S/N	Items on Social Behavior	SA	A	D	SD	Mean	S.D.	Remark
1	Peer pressure influences how I relate with others	130	160	70	40	2.95	0.84	High Extent
2	I behave differently to fit into my peer group	140	150	70	40	2.98	0.86	High Extent
3	Peer influence affects my choice of friends	150	140	70	40	3.00	0.85	High Extent
4	I engage in behaviors to gain acceptance from peers	135	155	70	40	2.96	0.83	High Extent
5	Peer pressure makes me participate in social activities	145	150	65	40	3.00	0.82	High Extent
6	I sometimes act against my values due to peer influence	120	160	80	40	2.90	0.88	High Extent
7	Peer groups influence my manner of dressing and communication	150	140	70	40	3.00	0.84	High Extent

Decision Rule: Mean ≥ 2.50 = High Extent; Mean < 2.50 = Low Extent

Table 2 indicated that peer pressure has a **high extent of influence** on teenagers' social behaviors in secondary schools in Ekiti State. All the items recorded mean scores above the criterion mean of 2.50, suggesting that students' interactions, choices, and social conduct are significantly shaped by peer influence. Items such as choice of friends,

participation in social activities, and manner of dressing recorded the highest mean scores (3.00), indicating strong peer influence in these areas.

Research Question 3: How does peer pressure influence teenagers' moral behaviors in secondary schools?

Table 3: Influence of Peer Pressure on Teenagers' Moral Behaviors in Secondary Schools in Ekiti State (N = 400)

S/N	Items on Moral Behavior	SA	A	D	SD	Mean	S. D	Remark
1	Peer pressure influences my sense of right and wrong	135	150	75	40	2.95	0.85	High Extent
2	I sometimes tell lies to gain acceptance from peers	120	160	80	40	2.90	0.88	High Extent
3	Peer influence affects my respect for school rules	140	150	70	40	2.98	0.84	High Extent
4	I engage in misconduct due to peer influence	130	155	75	40	2.94	0.86	High Extent
5	Peer pressure affects my level of honesty	125	160	75	40	2.93	0.87	High Extent
6	I disobey authority because of peer group influence	135	150	75	40	2.95	0.85	High Extent
7	Peer influence affects my moral decisions in school	140	150	70	40	2.98	0.83	High Extent

Decision Rule: Mean $\geq$ 2.50 = High Extent; Mean $<$ 2.50 = Low Extent

Table 3 showed that peer pressure influences teenagers' moral behaviors to a **high extent** in secondary schools in Ekiti State. All items recorded mean scores above the benchmark of 2.50, implying that peer influence significantly affects students' sense of right and wrong, honesty, obedience to rules, and general moral conduct.

Testing of Hypotheses

Hypothesis 1: Peer pressure has no significant influence on teenagers' involvement in risk-related behaviors in secondary schools in Ekiti State.

Table 4: Structural Equation Model Showing the Influence of Peer Pressure on Teenagers' Involvement in Risk-Related Behaviors in Secondary Schools

Path Relationship	β (Beta)	S.E.	C.R.	p-value
Peer Pressure $\rightarrow$ Risk-related Behavior	0.62	0.08	7.75	0.000

$p < 0.0$

Table showed that peer pressure has a statistically significant influence on teenagers' involvement in risk-related behaviors, as indicated by the standardized regression

weight ($\beta = 0.62$), which reflects a strong positive relationship. The critical ratio (C.R. = 7.75), which is greater than the threshold value of 1.96, further confirms that the relationship is significant. Additionally, the p-

value (0.000) is less than the 0.05 level of significance. This implies that an increase in peer pressure is associated with a corresponding increase in teenagers' involvement in risk-related behaviors in secondary schools in Ekiti State.

Hypothesis 2: There is no significant relationship between peer group affiliation variables and behavioral outcomes among secondary school students in Ekiti State.

Table 5: SEM Result Showing the Relationship between Peer Group Affiliation Variables and Behavioral Outcomes

Path Relationship	β (Beta)	S.E.	C.R.	p-value
Positive Peer Group $\rightarrow$ Behavioral Outcomes	0.64	0.06	10.67	0.000
Negative Peer Group $\rightarrow$ Behavioral Outcomes	-0.59	0.07	-8.43	0.000
Neutral Peer Group $\rightarrow$ Behavioral Outcomes	0.32	0.08	4.00	0.000

$p < 0.05$

Table 5 showed that the different variables of peer group affiliation have significant relationships with behavioral outcomes among secondary school students. Specifically, positive peer group affiliation has a strong positive relationship with behavioral outcomes ($\beta = 0.64$, C.R. = 10.67, $p = 0.000$), indicating that association with positive peers improves students' behaviors. In contrast, negative peer group affiliation shows a

significant negative relationship ($\beta = -0.59$, C.R. = -8.43, $p = 0.000$), suggesting that association with negative peers leads to poorer behavioral outcomes. Neutral peer group affiliation also has a moderate positive relationship ($\beta = 0.32$, C.R. = 4.00, $p = 0.000$). This implies that the type of peer group students belong to significantly influences their behavioral outcomes in secondary schools in Ekiti State. This is further depicted in the figure below:

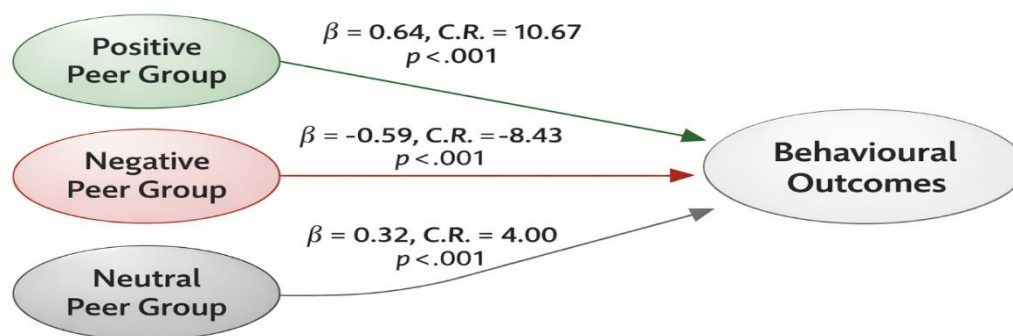


Figure 1: Path Analysis showing the relationship between peer group affiliation Variables and behavioral outcomes.

Hypothesis 3: There is no significant influence of peer pressure on teenagers' behaviors in secondary schools based on gender.

Table 6: Independent t-test Showing Gender of Peer Pressure on Teenagers' Behaviors

Gender	N	Mean	Std. Dev.	D f	t-value	p-value
Male	200	2.95	0.85	398	1.12	0.263
Female	200	2.89	0.83			

$p < 0.05$

Table 6 showed that calculated t-value is 1.12 with 398 degrees of freedom, and the p-

value is 0.263. Since the p-value (0.263) is greater than the 0.05 level of significance,

the result is not statistically significant. Therefore, the null hypothesis is not rejected, indicating that there is no significant gender difference in the influence of peer pressure on teenagers' behaviors in secondary schools in Ekiti State.

Discussion

The results indicated that peer pressure significantly influenced teenagers' behavior in secondary schools, particularly in relation to social, moral, and risk-related dimensions. This finding aligned with Steinberg (2024), who posited that adolescence is a stage of identity formation during which individuals are highly susceptible to social influences as they seek acceptance and belonging. The finding also supported Steinberg (2014), who emphasized that adolescents are more likely to engage in behaviors that are reinforced by their peer groups due to increased sensitivity to social rewards and approval.

The study further revealed that peer pressure had a strong influence on students' social behavior, including their interactions, group affiliations, and conformity to peer norms. This finding was consistent with Okafor and Chukwu (2024) who found that individuals learn behaviors through observation and imitation of others within their social environment. In a similar vein, Ibrahim and Salihu (2024) found that individuals tend to conform to group expectations even when such behaviors contradict their personal beliefs. Supporting this empirically, Owoeye and Yara (2023) found that peer influence significantly affected behavioral adjustment among secondary school students in Nigeria. With respect to moral behavior, the findings showed that peer pressure influenced students' ethical conduct, including honesty, discipline, and respect for authority. This finding supported Adewale and Oyeniran (2024) view that moral development occurs through social interaction, where adolescents internalize and negotiate societal values within peer groups. In line with this, Olawade et al. (2024) reported that moral challenges among Nigerian adolescents are often shaped by peer

group norms and expectations. Similarly, Iheanacho et al. (2023) found that peer influence could contribute to unethical tendencies when adolescents prioritize group acceptance over personal moral standards.

The study also established a significant relationship between peer pressure and risk-related behaviors such as substance use, truancy, and other forms of deviant conduct. This finding corroborated Ibrahim and Salihu (2023), who reported that peer pressure was a major predictor of risky behaviors among secondary school students in Nigeria. Likewise, Egga et al. (2024) found that substance use among adolescents was strongly linked to peer influence, particularly in peer environments where such behaviors were normalized. Okafor and Chukwu (2024) further explained that peer interactions, including those mediated through social media, reinforce risk-taking behaviors through social validation and comparison.

In addition, the findings indicated that peer group affiliation significantly shaped behavioral outcomes among students. This supported Eggs et al. (2024), who posited that individuals derive part of their identity from group membership and tend to adopt behaviors consistent with group norms. Empirically, Adebayo and Ojo (2022) found that peer group influence significantly affected students' academic motivation and behavioral patterns, while Adewole and Oyeniran (2024) also reported that peer groups strongly influenced adolescent behavior in Nigerian secondary schools.

Furthermore, the study revealed that there was no significant influence of peer pressure on teenagers' behaviors. This finding suggested that both male and female students were similarly susceptible to peer influence despite possible differences in the forms such influence may take. This result aligned with the findings of Okafor and Chukwu (2024), who indicated that peer influence affects both genders, although its expression may vary. Similarly, Ibrahim and Salihu (2023) observed that peer pressure remains a strong predictor of adolescent behavior across gender groups.

This implies that peer influence operates as a universal social factor among adolescents, affecting behavioral outcomes regardless of gender.

Conclusion

The study established that peer pressure is a significant factor influencing teenagers' behavior in secondary schools. It showed that adolescents are strongly affected by their peer groups, which play a major role in shaping their social interactions, moral conduct, and involvement in risk-related behaviors. The study also established that the type of peer group students belongs to determines whether the influence is positive or negative, as students tend to adopt the norms and behaviors of their peers. In addition, it revealed that peer pressure operates through mechanisms such as conformity, social interaction, and the desire for acceptance. Furthermore, the study established that there was no significant gender difference in the influence of peer pressure on teenagers' behaviors, indicating that both male and female students are similarly affected by peer influence in the school environment.

Recommendations

Based on the findings of the study, it is recommended that:

1. School authorities should promote positive peer group activities such as group learning, academic clubs, and mentorship programmes that encourage constructive behaviors among students.
2. Guidance counsellors should be strengthened in secondary schools to provide regular counselling services that help students understand and manage peer pressure effectively.
3. Teachers should be trained to identify early signs of negative peer influence and adopt classroom management strategies that discourage indiscipline and promote positive interactions among students.
4. Parents should be encouraged to monitor their children's peer

relationships and provide appropriate guidance at home to reinforce positive values and behaviors.

5. Schools should organize seminars, workshops, and awareness programmes to educate students on the effects of peer pressure, particularly on moral behavior and risk-related activities.
6. Government and educational stakeholders should develop policies and intervention programmes aimed at reducing negative peer influence and promoting healthy social environments in schools.
7. Students should be encouraged to develop self-confidence and decision-making skills that enable them to resist negative peer pressure and make independent, responsible choices.

References

- Adebayo, T. O., & Ojo, M. A. (2022). Peer group influence and academic motivation among secondary school students in Southwest Nigeria. *Journal of Educational Development in Africa*, 14(2), 88–102.
- Adewole, F. O., & Oyeniran, G. (2024). Peer pressure and adolescent behavior among secondary school students in Nigeria. *Journal of Adolescent Behavior Studies*, 8(2), 45–58.
- Egga, D. K., Ibrahim, A., & Musa, H. (2024). Substance use patterns among secondary school students in Nigeria. *African Journal of Health and Social Behavior*, 12(1), 101–115.
- Ibrahim, H. K., & Salihu, A. M. (2023). Peer pressure and adolescent risky behaviors in Nigerian secondary schools. *African Journal of Psychology and Education*, 18(1), 55–70.
- Iheanacho, R. A. E., Oyo-Ita, M. E., Ofoegbu, J. U., & Akpan, N. A. (2023). Family psychological wealth, peer pressure, and corruption tendencies of adolescent students in Nigeria. *Humanities and Social Sciences Communications*, 10, 535. <https://doi.org/10.1057/s41599-023-01835-3>



- Okafor, C. U., & Chukwu, P. N. (2024). Social media and peer influence on adolescent behavior in Nigeria. *Nigerian Journal of Guidance and Counselling*, 20(1), 112–128.
- Olawade, D. B., et al. (2024). The realities of adolescent behaviors in Nigeria: A narrative review. *Nigerian Journal of Social Sciences*, 19(3), 210–225.
- Owoeye, J. S., & Yara, P. O. (2023). Social influence and behavioral adjustment among secondary school adolescents in Nigeria. *International Journal of Educational Research in Africa*, 9(3), 45–60.
- Steinberg, L. (2014). *Age of opportunity: Lessons from the new science of adolescence*. Boston: Houghton Mifflin Harcourt.



LECTURER'S PERCEPTION ON THE CONTENT KNOWLEDGE SUITABILITY AND APTNESS OF ENTREPRENEURIAL EDUCATION CURRICULUM AND GRADUAND EXPLOIT FOR SELF-EMPLOYMENT IN NIGERIA TEACHER EDUCATION PROGRAMME

BY

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Abstract

Entrepreneurship Education is very vital owing to its capacity to sustain economic growth; hence, the Federal Government pays special attention to the subsector through various initiatives. This paper, therefore, x-rayed lecturers' perception of the suitability and aptness of entrepreneurial education curriculum content, knowledge, and graduand exploit for self-reliance roles as embedded in the Nigerian Colleges of Education Minimum Standard blueprint. All Colleges of Education in Nigeria formed the population for the study, using a multistage sampling procedure. All Federal Colleges of Education in the South-West geo-political zone formed a sample for the study, while a purposive sampling technique was used to select Principal Lecturers and Chief Lecturers in General Studies Education (GSE), where the courses were domiciled, to form the focus group. A mixed research design was adopted. Average weighted mean was used, and themes generated from the open-ended questionnaire were coded into subthemes and nodes, and analyzed using Nvivo 11 statistics. Findings revealed that content knowledge, as sequenced and packaged, was inadequate and incongruous, with self-employment roles therein being merely theoretical and graduates deficient in content application. It is recommended that the prescribed entrepreneurial education content, knowledge, and self-reliance skills curriculum cut across all Nigeria Certificate in Education levels through graduation, as opposed to the present arrangement.

Keywords: Entrepreneurial Education, Teacher Education, Graduand, Suitability and Aptness of Curriculum, Self-employment

Introduction

Entrepreneurial Education is considered a lifelong learning process that shapes competitiveness within any economy. The emphasis of entrepreneurial education is on starting, growing, and running a business. The primary purpose of the entrepreneurial education curriculum is to develop in the learner entrepreneurial capacities and mindsets that would assist graduand recognize business opportunities, mobilize resources, and exploit the opportunity for self-employment. However, In fulfillment of one of the goals of education in Nigeria as stated in the National Policy on Education (NPE, 2013), that the development of appropriate skills such as mental, physical, social abilities and competencies to empower the individual to live in and contribute positively to the society, the Federal Government as a way of providing functional education to meet the needs, yearning and aspiration of Nigerian in

global competitiveness through the Federal Ministry of Education and National Commission for Colleges of Education (NCCE) made entrepreneurship education as one of the compulsory General Studies for students in Colleges of Education nationwide as the value system has change due to transition from school to work and to earn a living.

The General Studies Education in tertiary education is designed to expose students to a variety of knowledge across disciplines. It is aimed at enabling students to appreciate the inter-relationship among disciplines in an integrated world, which is fast becoming one big village. Advances in science and technology are daily breaking down traditional boundaries in human knowledge and communication. General Studies Education (GSE), therefore, offers the potential for bridging gaps in human knowledge, thereby preparing the students to

meet the challenges of the changing world adequately. At the Colleges of Education level, the Introduction to Entrepreneurship Education GSE 224 curricula offered are aimed at empowering the graduand with appropriate approaches for self-employment, self-reliance, poverty reduction, making a viable feasibility study of a business idea, wealth creation strategies, different funding windows, digital marketing, and being equipped with fundamental business law. (NCCE, 2020)

Teacher education procedures were designed to equip prospective teachers with the content knowledge, attitude, behaviors, and skills they require to perform their tasks effectively in the classroom, school, local, and wider society. Content refers to the bodies of organized worthwhile knowledge that consist of skills, concepts, values, facts, ideas, principles, theories, generalizations, and techniques that have been accumulated over time in a particular field of study, which learners need to be exposed to in school.

Entrepreneurial Education comprises three interrelated objectives: to produce enterprising graduates, enabling graduates to become effective learners and practitioners, and to generate students who are motivated, self-driven, and prepared to start and develop successful businesses (Oyebode, 2021). Ereh, Anthony and Ikpo, (2019) and Emmanuel; Peter & (Dodo, 2020) in their separate studies established that students have not acquire basic entrepreneurial skills such as creativity, innovation, problem solving, time management skills to be useful to themselves, and the society after graduation, therefore, this study seek to find out the suitability and aptness of Entrepreneurship Education curriculum towards NCE graduand self-sustainable drive

Objective of the Study

The main objective of this study was to critically examine entrepreneurial education curriculum content knowledge as domiciled in the School of General Studies Education (GSE) in Colleges of Education. However, the study is guided by the following specific objectives.

- I. Find out lecturers' perception on the suitability of the entrepreneurship

education curriculum content knowledge for graduates acquiring self-employment skills, as presented

- II. Find out lecturers' perception on the aptness of the transacted curriculum on graduand acquisition of wealth creation skills as prescribed
- III. Find out the causes of discrepancies between the prescribed and transacted curriculum

Research Questions

The following research questions guide the study

- I. How do Lecturers perceive the suitability of entrepreneurship education curriculum content knowledge as a tool for building self-employment capacity in Colleges of Education graduates?
- II. How do Lecturers perceive the aptness of the transacted entrepreneurial education curriculum on Colleges of Education graduates' wealth creation skills acquisition?

Methodology

The study used a mixed research design that involved using techniques such as open-ended and structured questionnaires to obtain statistics and information about lecturers' perceptions of the suitability and aptness of entrepreneurship education curriculum content knowledge towards graduate entrepreneurship capacity building in self-employment and wealth creation skills. Average weighted means through structured questionnaires and thematic analysis converted into nodes from respondents' reactions to open-ended questionnaires form the basis for decision making. All academic staff in Colleges of Education in Nigeria formed the population for the study, while all Federal Colleges of Education in the South-West geo-political zones formed the sample for the study. Purposively, stratification based on School and lecturers' ranks was used to select the School of General Studies, with Principal Lecturers and Chief Lecturers as focus groups. School of General Studies was selected because the course is domiciled herein, while the Principal Lecturer and Chief Lecturers handling the course were selected because of their accumulated wealth of experience.

Open-ended instruments titled "Perception of Lecturers on the Suitability and Aptness of Entrepreneurship Curriculum Content Knowledge". (PLSAECCK) was used to collect data from the focus group in the Department of General Studies Education. The second instrument measures discrepancies using the average weighted mean and standard deviation. Face and content validity for the instrument were determined through experts' advice on measurement and evaluation. Item-by-item analysis of the questions was done to remove unnecessary questions, while the reliability of an instrument was assessed through Cronbach's alpha statistics, which shows the extent to

which the results obtained from an instrument can be relied upon as the true measure. Internal consistency values were 0.72 and 0.76, respectively.

Results

RQ 1: How do Lecturers perceive the suitability of entrepreneurship education curriculum content knowledge as a tool for building self-employment capacity among the graduates of Colleges of Education?

Table 1: Summary of responses of focus group on lecturer's perception of the suitability of entrepreneurial education curriculum content, knowledge, and graduand self-employment capacity

Respondent suitability	content suitability	Respondents	content
R2	inadequate		R1
adequate			
R4	unsuitable		R3
sufficient in content			
R6	not related		R8
attainable			
R7	disconnected from objective		R12
realistic			
R5	not practical oriented		
R9	ambiguously packaged		
R10	not adequate enough		
R11	inappropriate		
R13	not relevant		

Focus group constituents tagged R2, R4, R6, R7, R5, R9, R10, R11, and R13 perceived entrepreneurial education curriculum content knowledge in relation to graduand self-employment capacity at the Colleges of Education in Nigeria as inadequate, unsuitable, not related, disconnected from main objectives, not practically oriented, ambiguously packaged, not adequate, inappropriate, and not appropriate, respectively. However, R1, R3, R8, and R12 perceived entrepreneurial education curriculum content knowledge in relation to graduand self-employment capacity at the Colleges of Education in Nigeria as adequate, sufficient in content, attainable, and realistic, respectively. The focus group highlighted factors responsible for discrepancies between

preset and transacted content knowledge, including limited lecture hours, high lecturers-learners rate in General classes, poor admission policy, learners' lackadaisical attitude towards learning, poor commitment from the lecturers due to poor remuneration and welfare packages, and ineffective supervision from within and agencies saddled with the overall monitoring of college effectiveness

Fig 1: Causes of discrepancies between prescribed and transacted entrepreneurial education curriculum content knowledge in Colleges of Education as perceived by the focus group

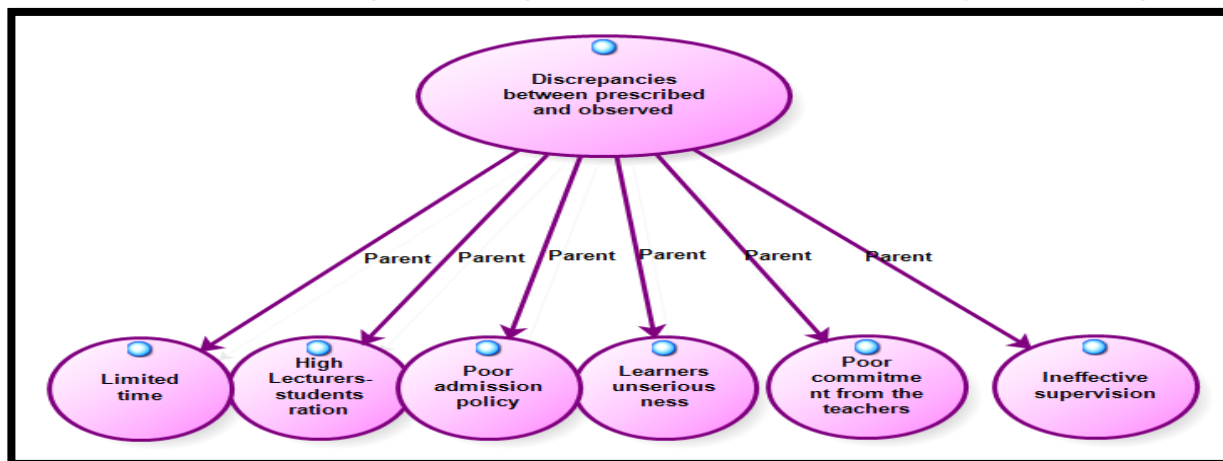


Table 2: Average weighted mean score on the suitability of the entrepreneurial curriculum content knowledge, and graduand self-employment capacity as perceived by the focus group in the Department of General Studies Education in Nigerian Colleges of Education

S/N	Suitability of entrepreneurial curriculum content knowledge as perceived by the focus group in the GSE department Entrepreneurship Education curriculum is suitable in - - -	Mean	Std.	Remarks
1	assisting students to develop key competencies in	1.39	.61	SE
2	writing a real business plan and business execution assisting students to develop competencies in Small	2.18	.69	LE
3.	and the Medium Enterprises ideology framework equipping students to develop skills in conducting	0.92	.53	VSE
4.	feasibility study on business master plan providing graduates with SWOT principles in business	1.27	.66	SE
5.	prepare students with technicality of e-marketing strategies skills	0.74	.52	VSE
6.	expose student to the practical application of wealth creation	0.68	.50	VSE
7.	expose student to business venture experience attachment	0.95	.54	VSE
8.	equipping students with skills in creating a brand, trademark, service delivery model and intellectual property right	1.37	.63	SE
9.	assist student in developing competencies in financial book keeping, final account, and bank reconciliation	2.60	.75	LE
10	expose student to business funding institutions in Nigeria	2.84	.79	LE
	Average Weighted Score	1.49		SE

Benchmark for average weighted mean scores: From 4.0 to 3.1 Very Large Extent (VLE); From 3.0 to 2.1 Large Extent (LE); From 2.0 to 1.1 Small Extent (SE), and from 1.0 to 0.1 Very Small Extent (VSE)

Table 2 revealed that 13 Principal Lecturers and Chief Lecturers are the respondents who formed the focus group, while the cumulative findings revealed that, to a small extent, entrepreneurial curriculum content knowledge in Colleges of Education is suitable for self-employment, as the

mean score was 1.49, which falls within the rating scale of from 2.0 to 1.1, indicating a small extent.

RQ2: How do Lecturers perceive the aptness of the transacted entrepreneurial education curriculum content on Colleges of Education graduands' wealth creation skills acquisition?

Table: 3

Summary of responses by the focus group on the aptness of entrepreneurial education curriculum content, knowledge, and graduand wealth creation capacity

Respondents	Inaptness	Respondents
Content Knowledge Aptness		
R2	not closely	R1
apposite		
R3	not orderly	R5
related		
R4	unsuitable	R11
suitable		
R6	not appropriate	
R7	disjointedly sequenced	
R8	deficiency in practical content	
R9	incorrect	
R10	not incompatible	
R12	incongruity	
R13	unmatched	

Focus group with code R2, R3, R4, R6, R7, R8, R9, R10, R12 and R13 perceived entrepreneurial education curriculum content knowledge towards graduand acquiring wealth creation capacity in Colleges of Education as not closely related, not orderly placed, unsuitable, not appropriate, disjointedly sequenced, deficiency in practical content, incorrect, incompatible, incongruity and unmatched respectively while on the other hand R1, R5 and R11 perceived entrepreneurial education curriculum content knowledge towards graduand acquiring wealth creation capacity in Colleges of Education as apposite, related and suitable for the accomplishment of the predetermined ideas.

Table 4: Average weighted mean scores on the aptness, entrepreneurial education curriculum content knowledge, and graduand wealth creation capacity as perceived by the focus group in the Department of General Studies Education in Nigerian Colleges of Education

S/N	Aptness of the entrepreneurial curriculum content for graduate to possess wealth creation capacity					Mean	Std.	Remarks
a.	Evaluation	of	business	ideas		2.43	.58	LE
b.	procedure	for	starting	an	enterprise	1.20	.51	SE
c.	common	problem	of	SMEs		2.24	.52	LE
d.	feasibility	study	and	study	plan	1.53	.51	SE
e.	harnessing		SWOT	principles		1.25	.50	SE
f.	final	account	and	relevant	financial documents	0.88	.44	VSE
g.	marketing			strategies		2.62	.53	LE
h.	business	regulatory	and	supervisory	laws	1.50	.52	SE
i.	Dynamism		in	e-marketing		1.90	.53	SE

j.	Business 13	funding	institution	2.23	.57	LE
k.	Intellectual 13	property	right	2.21	.56	LE
Average Weighted Mean Score				1.81		SE

Benchmark:

From 3.1 to 4.0 Very Large Extent (VLE); From 2.1 to 3.0 Large Extent (LE); From 1.1 to 2.0 Small Extent (SE), and from 0.1 to 1.0 Very Small Extent (VSE)

Table 4 above revealed the average weighted mean scores for all 13 respondents who are the participants and the focus group for the study. The questionnaire was designed to seek the perception of the targeted sample on the aptness of the entrepreneurial education curriculum, content knowledge, and graduates' wealth creation capacity. The results revealed that the curriculum content of Introduction to Entrepreneurship, as contained in the NCCE minimum standard, is to a small extent appropriate to equip graduates with wealth creation capabilities because the average weighted mean score of the small extent range stood at (1.10 to 2.00), and the average weighted mean score calculated was 1.81, which is within the small extent threshold.

Discussion of findings

The study revealed that the suitability of the entrepreneurial education curriculum content knowledge to achieve graduand self-employment capacity is just to a small extent feasible with a value of average weighted mean of 1.49 while respondents perceived the items within the course content as inadequate, disjointly sequenced and incompatible in themes and orientation as there is a disconnection between content prescribed and curriculum transacted owing to poor supervision within and from the supervisory agencies. The findings of this study is agreement with Oyeboode (2021), who established that the content and method of implementing entrepreneurship education curriculum are inadequate for solving graduate unemployment confronting the nation. The findings of this study are consistent with the findings of Israel and Israel (2020), where it was established that the NCE curriculum is overcrowded and overloaded with activities and programmes in their core teaching

subject area, hence transacted content was affected negatively. The finding of the study also aligned with Ereh, Anthony & Ikpo (2020) where it was established that despite the established roles of the tertiary institutions and emphasis by the federal government on entrepreneurship education, it seems students have not still been able to acquire the basic skills such as, creativity, innovation, and problem-solving, time management and communication skills, to become useful to themselves or the society after graduating from school. On the contrary, the finding of this study is not in agreement with Oseni (2017), who earlier reported that the entrepreneurship education curriculum is adequate as it prepare graduand to acquire a variety of skills that can make them responsible and enterprising individuals by engaging themselves in real-life learning experiences where they can take risks, manage the results, and learn from the outcomes.

The study further revealed that the introduction to entrepreneurship content knowledge in Colleges of Education lacks practical orientation, which further buttresses earlier findings of Olorundare & David (2014) and Hafiz (2015). However Okolocha & Ifeanyi (2021) found out curriculum content were adequate for the acquisition of entrepreneurial capacities as perceived by students in College of Education in Edo and Delta State as the standard deviation of all the course titles and curriculum contents for the acquisition of entrepreneurship skills range from 0.33 to 0.96 with an overall standard deviation of 0.65 showing that the standard deviation for all course titles are within the same range indicating that the respondents are not wide apart in their mean ratings

Focus group labelled R2, R4, R6, R7, R5, R9, R10, R11, and R13 perceived entrepreneurial education curriculum content knowledge in relation to graduand self-employment capacity at the Colleges of Education in Nigeria as not suitable because it is shallow in practical content and orientation. The respondents identify limited

time with overloaded course content, instructional facilities deficit, high student-teacher ratio at the GSE unit, poor admission policy, unseriousness on the part of the learners, and ineffective internal and external supervision as the causes of discrepancies between the prescribed and transacted curriculum

The study further revealed the inaptness of the introduction to entrepreneurship (GSE 224) curriculum towards graduate wealth creation capacity skills in Colleges of Education as preset. The outcome of this study substantiates the findings of Amos & Onifade (2018) and Mwinjuma, (2020), where it was established that the introduction to entrepreneurship content points to many deficiencies about educators, learning environments, curriculum inappropriateness, teaching processes, and availability of instructional materials. The findings of the study also support earlier studies by Isa & Jaana (2018), where it was stated that it is a widespread knowledge that entrepreneurship education in pre-service teacher training is either absent, inappropriately and inaptly outlined, or insufficiently executed. Isa & Jaana (2018) further stated that the results are quite normal because neither educators nor the current learning environments have adequate backgrounds and/or infrastructures to put entrepreneurship into practice

Focus group with code R2, R3, R4, R6, R7, R8, R9, R10, R12, and R13 perceived entrepreneurial education curriculum content knowledge towards graduates acquiring wealth creation capacity in Colleges of Education as inappropriate in terms of themes and direction. The findings are in line with earlier studies by Ossai & Nwalado (2018) where it was established that achieving wealth creation skills, it requires actions within and outside the school system, not only content-knowledge driven. Within the school, a supportive environment needs to be created which will enable lecturers to put into practice their entrepreneurial education experience; and outside the school, mechanisms need to be put in place to facilitate the structured involvement of the entire community, businesses, social enterprises, and parents, as in-service teachers are frequently unprepared in terms of both theoretical knowledge and in-classroom experience. The findings of this

study also corroborate the earlier position held by Oyeboade (2021) where it was established that there is a need to revise the entrepreneurship curricula so that they include practical application of concepts on the specifics of enterprise and entrepreneurial skills development for pre-service teachers rather than broad-based general entrepreneurship courses. This process will help distinguish between Education for Entrepreneurship, which is generic, and Entrepreneurship for Education, which is specific

Conclusion

The urgent need to embrace entrepreneurship education is recognized by the Government across the board, as the Nation's economy depends on new generations of entrepreneurs who must come up with ideas and make them a reality. The motive for the introduction of entrepreneurship education curriculum into tertiary education curriculum was to reinforce youth empowerment and harness graduate potential and intellectual creativity for job creation. The focus group perception on the suitability of entrepreneurship education curriculum content knowledge for graduand self-employment capacity through qualitative and quantitative approaches revealed that the curriculum content knowledge is not suitable enough as the content is deficient in themes sequencing and orientation while discrepancies exist between preset and taught curriculum owing to limited lecture hour, overloaded course content, high teacher-students ratio, poor admission policy at the teacher training colleges, learners unseriousness, instructional facilities deficits and ineffective internal and external supervision. On the aptness of the course content to inculcate in graduates' wealth creation capacity as the core mandate of entrepreneurship education, the study discovered that the items listed on the course outline are not adequate to achieve wealth creation capacity in graduates, as it must involve the institution, host community, Government, and parents.

Recommendations

Based on the findings, discussion, and conclusion of the study, the following are recommended

- I. Practical application of themes, concepts, and thoughts should be incorporated into the (GSE 224) curriculum sequentially



- II. Centre for Entrepreneurship Education be established within the College to monitor the implementation of Introduction to Entrepreneurship Education (GSE 224), domiciled in the School of General Studies Education
- III. Course content of Introduction to Entrepreneurship (GSE 224) needs to be reviewed to reflect the needs of society and those of preservice teachers across level.

References

- Amaechina, O.U, Olisaemeka,E.O & Okeke,N.F (2021). Entrepreneurship and Teacher Education for National Development. *Unizik Journal of Educational Research and Policy Studies*.6(1) retrieved from <https://unijerps.org>
- Amos, A., & Onifade, C. A. (2013). The perception of students on the need for entrepreneurship Education in a teacher's education programme. *Global Journal of Human-Social Science Research*, 13(3), 75-80.
- Anyago, R.O (2019). Managing entrepreneurship education at tertiary level: A panacea to unemployment. *African Journal of Educational Research and Development*,3(2), 99-107.
- Charles, A., & Comfort, E (2013). University Lecturers' perception in Entrepreneurship Education as an empowerment strategy for graduate self-employment in South-South, Nigeria. *International Journal of Asian Social Science*, 3(5), 1180-1195
- Ereh, C. E; Anthony, E.I; & Ikpo, P. A (2020). Entrepreneurship education curriculum content: Beyond literacy and numeracy for functional education in tertiary institutions in Nigeria. *American Journal of Education and Learning*, 4(2), 191-199
- FGN (2020). *Minimum standard for Nigeria Certificate in Education*, Abuja: NCCE.
- Hafiz, H., &Sa'ad, G. (2015). Assessing the richness of entrepreneurship education curriculum content: Empirical evidence. *Journal of Research & Method in Education*, 5(2), 107-114
- Isa, D & Jaana,S (2018). Review of Entrepreneurship Education in Teacher Education. *Malaysian Journal of Learning and Instructions*, 15(1), 105-148
- Israel, P.C & Israel, H.C (2020). Assessment of Curriculum Load of the National Commission for Colleges of Education's Minimum Standard for the Nigeria Certificate in Education. *Journal of Research and Opinion*, 7(1) DOI: 10.15520/jro. v7i1.43
- Ojeifo, S. Aide (2012). Entrepreneurship education in Nigeria. *Journal of Education and Practice*, 3(14),78-82.
- Okolocha,C.C & Efanimjor, I (2021). Assessment of the adequacy of business education Curriculum content for the acquisition of office technology, management, and entrepreneurship skills in Colleges of Education in Edo and Delta State. *NAU Journal of Technology and Vocational Education*, 6(1), 132-148
- Olorundare, A.S & David, J.K (2014) Entrepreneurship Education in Nigeria Universities: A tool for National Transformation. *Asia Pacific Journal of Educators and Education*. 29(1), 155-175 <https://www.researchgate.net/publication/280641730>
- Omosewo, O.K., Akanmu, B.V. & Asebiomo, E.T. (2013). Entrepreneurial education: A panacea for youth unemployment in Nigeria. *International Journal of Small Business and Entrepreneurship Research*. 3(5), 11-22.
- Okunloye, R. (2014). Selection and organization of learning experiences. In R. Lawal, A. Oladosu, A. Jekayinfa, & S. Olajide, *Fundamentals of curriculum development*. Ilorin: Bamitex Publishes.
- Onuma, N. (2016). Rationale for students' participation in entrepreneurship education in the face of global economic crisis in Nigeria. *Journal of Education and Practice*,7(12), 200-204.



- Ossai, A.G & Nwalado, E.N (2018). Entrepreneurship in Teacher Education: Issues, trends, and prospect. *Journal of assertiveness*,13(1), 75-86
- Oseni, E. F. (2017). The relevance of entrepreneurship education to the development of Micro, Small and Medium Enterprises (MSMEs). *International Journal of Small Business and Entrepreneurship Research*, 5 (5), 1-8.
- Oyebode, S.O (2021). Analysis of Entrepreneurship Education policies and curricula for teachers education in Nigeria. <https://www.researchgate.net/publication/354597420>



EFFECTS OF CONCEPT-MAPPING AND JIGSAW INSTRUCTIONAL STRATEGIES ON STUDENTS' LEARNING OUTCOMES IN BIOLOGY IN SENIOR SECONDARY SCHOOLS IN OSUN STATE

BY

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Abstract

This study investigated the effects of concept-mapping and jigsaw instructional strategies on students' learning outcomes in biology in senior secondary schools in Osun State. The study employed the pre-test, post-test quasi-experimental design. The population for the study comprised all senior secondary school students in secondary schools in Osun State. A multistage sampling procedure was employed to select the sample for the study. From the three senatorial districts in Osun State, one senatorial district was selected using simple random sampling technique from which one Local Government Area (LGA) was chosen. Three secondary schools were selected from the chosen LGA through simple random sampling, and were randomly assigned to two experimental groups and one control group. Two research instruments were used for the data collection of this study, which are Biology Performance Test (BPT) and Biology Students' Self-Efficacy Questionnaire (BSSEQ). The data collected were analyzed using descriptive statistics (mean and standard deviation) and inferential statistics (ANCOVA). The results revealed that there was a significant effect of concept-mapping and jigsaw instructional strategies on senior secondary students' academic performance and self-efficacy in Biology. The study concluded that concept-mapping and jigsaw instructional strategies significantly improved students' learning outcomes in Biology.

Key words: *Concept-Mapping instructional strategy, Jigsaw instructional strategy, Academic performance, Self-efficacy*

Introduction

Science education is defined as the application of educational principles to the understanding, teaching and learning of science. It therefore means that science education involves the study of some science in- depth and in addition, educational disciplines that relate specially to how scientific knowledge and concepts are learnt and verified; how scientific concepts are programmed for understanding and how science curricula can be meaningfully

evaluated (Bednarowska-Michael & Uprichard, 2026). Science education can be said as an applied field which derives its authenticity from the fact that science as a field of endeavour is fundamental to human survival and hence must be seen as the right of every individual to learn. Kleickmann, et. al. (2020) outline three related strands of science education: learning science (the development of conceptual and theoretical understanding); learning about science (understanding science,

its nature, processes, and societal impacts); and doing science (science inquiry and problem-solving). All of these dimensions are essential to the advancement of society, including developing scientific literacy and equipping the next generation with the knowledge, skills and attitudes they need to survive in an increasingly complex and changing world. science education covers a range of topics including Physics, Chemistry, Earth Sciences and Biology, all of which have their own specific areas of interest that help to build a science education that is comprehensive. Biology is considered to be a basic science in relation to other disciplines on account of its study of complexity of life and its processes.

According to Honra and Monterola (2026) biology is defined as the science of life. It is an important and imperative science subject and serves as a basis for several other science courses such as medicine, pharmacy, nursing, biochemistry, genetic, agriculture etc., which are of great economic importance in a nation. Being a science of life, Biology is one of the science subjects most preferred by many students in secondary schools due to its less mathematical calculations compared to Physics and Chemistry and easier to deal with than abstract subjects (Čipkovč et al., 2019). In spite of this importance and students' interest in Biology, studies have shown erratic performance of the students in Biology at the external examinations (Chukwu & Arokoyu 2019; Yaki, 2022; Kinta & Philip 2025). This unsatisfactory and fluctuating academic achievement of students in Biology in internal and external examinations over years can be linked to the poor students' attitude, inadequate instructional materials poor teacher quality and poor instructional strategies (Olajide, et. al, 2024; Obikiezie, et. al., 2022; Adewumi, et. al., 2024). The essential criterion for good teaching and learning of Biology is the employment of suitable ways of passing on knowledge to ensure that all the important ideas are conveyed to the learner without being pushed into the background. The shortcomings of traditional teaching methods employed by teachers lead to a search for effective and reliable instructional strategy such as concept-mapping and jigsaw instructional strategies where students will be actively involved in the teaching learning process which will in turn enhance their learning outcomes in Biology

(Roeth, et. al., 2019; Maikano & Simon, 2025; Abdulrahim, et. al., 2025; Essien, et. al., 2026).

The concept map was first used in the 1960s by Joseph D. Novak, of Cornell University. Concept maps have their origin in the learning movement called constructivism. It shows how to think, how to relate ideas to knowledge. The teacher who builds concept maps for students is concerned with students' learning of relationships among facts, rather than just knowing facts. One more way is a concept map that is a graphic representation in which concepts are represented by links (points or vertices) and relationships are represented by cross links (arcs or lines). Concept maps are representations and organization of knowledge, they consist of concept which are generally represented by circles or boxes of some types and relationship between concept and preposition between two concepts. (Propositions are statement about some object or statement in the universe either naturally occurring or constructed). They have two or more ideas related by words that make a sense. According to Novak and Cacas in Schicchi *et al.* (2026), concept map is a tool that promotes meaningful learning as opposed to rote learning. A concept map is a two-dimensional, visual representation of the relationship between key ideas. It demonstrates our thinking process and introduces affinities and association that may not be apparent. According to Abdulrahim, et. al. (2026) Concept Mapping is especially useful in science learning to make a science concept that is hard to learn through the reading of books in the lecture method become easy to understand. Likewise, Essien, et. al. (2026) found that students who were instructed with Concept Mapping outscored the students who were instructed with conventional teaching. They found out that the use of Concept Mapping helps students think critically, see connections between scientific concepts, and transfer their knowledge to new contexts, all of which help enhance their academic performance. To support this, Horton et al. (2018) conducted a meta-analysis on the effectiveness of concept mapping as an instructional tool and found that Concept Mapping has positive effects on scientific knowledge comprehension, problem-solving and knowledge retention. They also commented

that concept maps can be used as diagnostic tools for students' understanding. The strategy enables students to connect and integrate disjointed bits of information into meaningful, organized, and integrated knowledge structures, thereby enhancing their conceptual understanding and academic success (Kinchin, 2020).

Likewise, the jigsaw approach has become well-known throughout the world for its ability to improve instructional techniques and raise students' academic achievement in a variety of courses and fields. The Jigsaw Instructional Strategy is a cooperative learning approach that encourages active participation, interdependence, and collaboration of learners in the learning process (Ewuola, 2025). It was initially created in the early 1970s by Aronson and his colleagues in order to decrease racial tension and promote cooperation in the classroom (Aronson et al., 1978). The strategy is to split a class into smaller groups, and give each group member a part of the learning content they will have to learn and then share with the rest of the group. All students are given an opportunity to become "experts" on a specific subtopic and then share what they know with their "home group" which means that each student will learn the entire lesson through peer instruction. Awoyale and Olajide (2025) argued that the principle of positive interdependence is the basis of the Jigsaw strategy, which means that the success of the students in the group depends on the contribution of all the students in the group. This feeling of responsibility drives pupils to work hard, achieving well and being more engaged. Obafemi, et. al. (2023) argued that Jigsaw learning not only enhances academic achievement but also fosters social and communication abilities, as students require dialogue, questioning, and explanation to ensure that the group grasps the concepts. The results of the research have been consistent in showing that the Jigsaw strategy has a positive impact on students' academic achievement. They further concluded that students who were taught using Jigsaw technique achieved higher academic outcomes and higher self-esteem than those being taught through lectures. Similarly, Slavin (2014) reported that cooperative learning techniques such as the Jigsaw method resulted in more academic success due to the increased motivation, peer assistance, and

responsibility for successful learning. Awoyale and Olajide (2025) investigated the impact of Jigsaw Instructional Strategy on the Achievement of Students in Biology in Nigeria, and they discovered that the Jigsaw Instructional Strategy outdid the traditional approach in students' performance in Biology. The researchers drew a conclusion that the part of the peer teaching of Jigsaw teaching method can help students learn by explanation, and explanation will promote the understanding and retention of students. Similarly, Ibe and Nwosu (2017) found that the use of Jigsaw technique also improved students' mastery of abstract biology concepts and the use of scientific principles when they solved problems. In addition, Achor et. al. (2019) described the Jigsaw approach as having the effect of fostering learner autonomy and responsibility, where each learner is responsible for his/her own learning but also for sharing his/her specific knowledge with other learners. This independence fosters self-motivation and self-confidence, which in turn leads to improved academic performance. The use of Instructional strategies, specifically Concept-Mapping and Jigsaw in the process of teaching and learning, not only made it easier for knowledge to be shared in class but also gave opportunities to students to be responsible for their own learning. This active engagement and reflection is important in building student's confidence and self-efficacy such that students start to feel they can contribute meaningfully and can learn new content.

Self-efficacy is the person's ability to plan and implement the necessary sequence of actions to achieve a desired result. Wang, et. al. (2024) suggested that self-efficacy is a belief that springs from thinking; and is a completely different thing from knowing what to do. Self-efficacy is one of the most important factors in motivation, learning and achievement, defined as a belief in one's ability to perform a task and achieve a goal (Zhang, et. al, 2025). It is a sense of self-efficacy in his/her abilities to achieve success and complete tasks, based on four sources of information: mastery experiences, vicarious experiences, social persuasion and emotional states (Bandura, 1997). Self-efficacy has been consistently found to be a factor that affects academic success and professional success, and there are links between self-efficacy and

overall well-being and life satisfaction. Furthermore, self-efficacy has been found to play a crucial role in motivation, learning, and achievement, and is considered a key factor in personal and professional development (Chen, et. al., 2025; Dong, 2025).

It is worth noting that the learning outcomes of students (academic achievement and self-efficacy in Biology) showed inconsistency (Achor et al., 2025). This leads to questions about the suitability of teaching and learning strategies to ensure pupils acquire the required knowledge, skills and attitudes and retain them to prepare them for success in learning biology. Some researches have been done to find appropriate teaching methods which can maximize the achievement in science subjects but some of the results were still limited. Biology as one of the broad discipline of science in the Nigerian Educational Curriculum is very important to every student irrespective of academic disposition, either science or Arts. Therefore, it is essential to create good teaching-learning processes to improve the quality of student learning so that the students can easily enter the high education institution for further study in Biology-related fields. Based on the above, the study is geared towards finding out the impact of concept mapping and Jigsaw Instructional strategies on the learning achievement of Secondary students in Senior Secondary schools in Osun State.

Experimental group I (Concept Mapping) O_1
Experimental group II (Jigsaw) O_3
Control Group (Lecture Method) O_5

O_1 , O_3 and O_5 are pre-tests observations

O_2 , O_4 and O_6 are post-tests observations

X_1 represents treatment for experimental group I

X_2 represents treatment for experimental group II

X_3 represents treatment for control group

The population of this study comprised all senior secondary school students in public secondary schools in Osun State. The target population of this study consisted of Senior Secondary School Two (SSS II) students of one Local Government Area (LGA) of the state. The sample for this study consisted of 3 intact classes of 45 Senior Secondary School Two (SSS II) Biology students, who were selected through a multistage sampling procedure. From the three senatorial districts in Osun State, one senatorial district was

Objectives of the Study

- investigate the effects of Concept Mapping and Jigsaw Instructional strategies on Senior Secondary School Students' academic performance in Biology in Osun State; and
- examine the effects of Concept-mapping and Jig-saw instructional strategies on Senior Secondary School Students' self-efficacy in Biology in the study area

Research Hypotheses

H01: There is no significant effect of concept-mapping instructional strategy and jigsaw instructional strategies on senior secondary school students' academic performance in Biology.

H02: There is no significant effect of concept-mapping instructional strategy and jigsaw instructional strategy on students' self-efficacy in Biology.

Methodology

This study adopted pre-test, post-test, quasi-experimental research design, non-equivalent control group design.

The design of the research is represented as follows:

X_1	O_2
X_2	O_4
X_3	O_6

selected using the simple random sampling technique. From the selected senatorial district, one Local Government Area (LGA) was selected using this simple random sampling technique. From the selected LGA, three secondary schools were selected through simple random sampling technique. The selected schools were randomly assigned into two experimental groups and one control group. The experimental groups were subjected to concept-mapping and jigsaw instructional strategies respectively, while the



control group was subjected to conventional method.

Two instruments were used to collect data for the study which are: Biology Achievement Test (BAT) and Biology Students' Self-Efficacy Questionnaire (BSSEQ). The BAT is a Biology test question that was developed by the researcher. The test questions were carefully selected from the past West Africa Senior School Certificate Examination (WASSCE), National Examination Council (NECO) Biology questions which the researcher is hoped to test the academic performance of the students. The test consisted of two sections; A and B. Section A contains students' personal details while section B contained a 25-item multiple-choice test developed by the researcher to measure students' achievement in Biology. The items covered the topics, Digestive System and Excretory System. Each item had four options (A-D) with one correct answer. The instrument was employed as a pre-test to ascertain the equivalence of ability of students, as post-test to determine the effect of the treatment on the students.

Likewise, the Biology Students' Self-Efficacy Questionnaire was designed by the researcher to determine students' self-efficacy towards Biology. BSSEQ consists of two sections, A to B. Section A elicited responses in demographic of students while sections B consists of 15 items designed to measure students' self-efficacy in Biology. The instrument was structured on a four-point Likert scale, which includes Strongly Agree (4), Agree (3), Disagree (2), Strongly Disagree (1).

The BAT was administered on twenty (20) SSS (II) Biology students in a school outside the study area. The data collected was subjected to item analysis and a reliability test. Items were maintained based on their difficulty index (P) and discrimination index (D). Specifically, items with a difficulty index between 0.25 and 0.75, and a discriminating index between 0.2 and 0.8 were retained. The reliability of the BAT was assessed by employing the Kuder-Richardson Formula 21 (KR-21). The KR-21 value for the BAT was 0.85.

Likewise, for the BSSEQ, the data collected from the pilot study was subjected to reliability tests. The Cronbach's Alpha

reliability estimate value of 0.81 was obtained from the result.

In this study, the researcher obtained a permission letter from the Head of Science and Technology Education department to teach senior secondary school II Biology students in three (3) different schools in the selected Local Government Area for a period of four weeks. The purpose of the research is contained in the letter. Upon approval, the researcher proceeds in the study. Each school represented a treatment group. The first school received instruction using the Concept Mapping strategy, the second school was taught using the Jigsaw strategy, while the third school served as the control group. The topics covered during the intervention were Digestive System and the Excretory System as outlined in the Senior Secondary School Biology curriculum.

In week one, prior to the commencement of instruction, the two instruments; BAT and BSSEQ were administered to all participants across the three schools as pretest to establish students' entry behavior and ensure equivalence among the groups. After the pretests, classroom instruction commenced in the three schools simultaneously. In the first school, lessons on the digestive system were introduced using concept mapping, where students were guided to brainstorm concepts, construct hierarchical concept maps, and link sub-concepts together under the teacher's supervision. In the second school, the jigsaw cooperative learning approach was used. Students were divided into expert groups to study subtopics of the digestive system, after which they returned to their home groups to teach their peers. In the third school, conventional method was employed, where the teacher explained the topic in a teacher-centered manner using chalk-and-talk and textbook references. Lessons continued throughout the first week using the respective strategies.

In week two, instruction on The Digestive System continued across the three schools using the respective teaching methods.

In Week Three, instruction on the Excretory System commenced in all three schools. The concept mapping group constructed maps showing the structure of the kidney, nephron, and processes of urine formation, refining their maps as lessons progressed. The jigsaw group was re-organized into new expert

groups to study subtopics such as kidney structure, nephron function, osmoregulation, and excretory disorders, after which they reconvened to share knowledge with their peers. The control group continued illustrations as in the previous weeks. Lessons were delivered in line with the scheme of work and at the same pace across the three schools.

In Week Four, instruction on The Digestive System and Excretory system was concluded. At the end of Week Four, immediately after the completion of instruction, the post-tests were administered to all participants in the three schools. These included the BPT (post-test) to measure students' cognitive achievement, and the Biology Students' Self-Efficacy Questionnaire (BSSEQ post-test) to assess changes in self-efficacy. All data collected from the three instruments were compiled and for analysis.

The data collected were analyzed using both descriptive and inferential statistics. Mean and

Standard Deviation were used to answer the research questions. Analysis of Covariance (ANCOVA) was used to test the null hypotheses at the 0.05 level of significance,

Results

Research Hypothesis One: There is no significant effect of concept-mapping instructional strategy, jigsaw instructional strategy on senior secondary school students' academic performance in Biology

To test this hypothesis, the post-test scores of the Biology Performance Test (BPT) for students in the Concept Mapping, Jigsaw, and Control group were compared using Analysis of Covariance (ANCOVA). The pre-test scores served as a covariate to control for any initial differences in students' prior knowledge before the treatment. Results are presented in Tables 1 and 2 below:

Table 1: Post-test Mean Scores and Standard Deviations of Students' Achievement in Biology by Group

Group	N	Mean ($\bar{x}$)	SD
Concept Mapping (Experimental I)	15	22.53	2.11
Jigsaw (Experimental II)	15	21.93	3.64
Control	15	13.73	4.47
Total	45	19.40	5.21

Source: Author's Field Survey, 2025

From the above results as shown in Table 1, the students who used the Concept Mapping strategy in teaching Biology got the highest mean score of ($M = 22.53$, $SD = 2.11$) followed by the students of Jigsaw strategy who got ($M = 21.93$, $SD = 3.64$). The students in the Control group, who were instructed through the traditional method had the lowest mean score ($M = 13.73$, $SD = 4.47$).

This result indicates that the Concept Mapping and Jigsaw strategy were significantly better than the traditional lecture

to enhance students' learning outcomes in Biology. The group with the relatively smaller standard deviation also shows that the performance of the learners in this group is uniform. The descriptive results indicate that both Concept Mapping and Jigsaw methods of conceptual visualization and collaborative learning led to better learning gains in terms of concepts comprehension and retention compared to the expository approach for Biology concepts.

Table 2: ANCOVA Summary of Students' Post-test Achievement Scores in Biology

Source	Sum of Squares	Df	Mean Square	F	p	Remark
Corrected Model	512.86	3	170.95	28.73	.000	Significant
Pre-test (Covariate)	36.52	1	36.52	6.14	.017	Significant
Group	476.34	2	238.17	39.99	.000	Significant
Error	253.91	41	6.19			
Total	15470.00	45				

Source: Author's Field Survey, 2025
S = Significant at $p < 0.05$

The results of ANCOVA in Table 2 show that the main effect of the instructional strategy is statistically significant in students' academic performance in Biology ($F = 39.99$, $p = .000$). This suggests that the type of teaching had a notable impact on students' achievement when taking into account pre-test differences. Thus, the null hypothesis was rejected. The covariate (pre-test) was also significant ($p = .017$) indicating that students' prior knowledge had a slight but meaningful effect on post-test results. The resulting mean scores after the covariate was adjusted were: Concept Mapping (22.70); Jigsaw (21.80); Expository (13.90). The results indicated that the experimental groups (Concept Mapping and Jigsaw) had higher scores than the control group, which confirmed that student-centered instruction was more effective than

traditional instruction for enhancing academic achievement.

Research Hypothesis Two: There is no significant effect of concept-mapping instructional strategy, jigsaw instructional strategy on students' self-efficacy in Biology. To test this hypothesis, data from the Biology Students' Self-Efficacy Questionnaire (BSSEQ) were analyzed. The instrument measured students' confidence, motivation, and perceived competence in learning Biology. The pre-test scores were used as a covariate to adjust for initial differences among the groups, while the post-test scores were used to determine the effect of the instructional strategies after the intervention. Results are presented in Tables 3 and 4 below:

Table 3: Post-test Mean Scores and Standard Deviations of Students' Self-Efficacy in Biology by Group

Group	N	Mean ($\bar{X}$)	SD
Concept Mapping (Experimental I)	15	47.87	3.14
Jigsaw (Experimental II)	15	46.93	3.68
Control (Expository Method)	15	38.73	4.56
Total	45	44.51	4.46

Source: Author's Field Survey, 2025

The mean score of self-efficacy of the students taught with Concept Mapping strategy was 47.87 (SD = 3.14), followed closely by the students taught with Jigsaw strategy (M = 46.93, SD = 3.68) as seen in Table 4.5. The Control group had the lowest mean self-efficacy score (M = 38.73, SD = 4.56). This indicates that students who were taught with Concept Mapping and

Jigsaw strategies were more confident, motivated, and self-efficacy in learning effectively Biology than students who were taught using Conventional teaching strategy. The results are a result of the motivating effect of participative and collaborative learning environments.

Table 4: ANCOVA Summary of Students' Post-test Self-Efficacy Scores in Biology

Source	Sum of Squares	Df	Mean Square	F	p	Remark
Corrected Model	624.74	3	208.25	25.19	.000	Significant
Pre-test (Covariate)	41.39	1	41.39	5.00	.031	Significant
Group	583.35	2	291.67	35.29	.000	Significant
Error	338.91	41	8.27			
Total	18860.00	45				

Source: Author's Field Survey, 2025

The results of the ANCOVA presented in Table 4 show that there was a significant main effect of instructional strategy on students' self-efficacy in Biology (F = 35.29, p = .000). This indicates that the type of teaching strategy applied made a significant difference in the students' confidence and motivation to learn Biology even after the pre-existence self-efficacy levels were controlled. Thus, the null hypothesis was rejected. The covariate (pre-test) was also a significant variable (p = .031), showing that the students' pre-test confidence levels did have some effect on their post-test scores.

Discussion

The study showed that students from the two groups who were taught Biology with the concept mapping and the jigsaw strategies were significantly better than the students from the conventional method group. This demonstrates that both strategies have a positive impact on students' learning outcomes. The effectiveness of concept mapping is directly related to the visual and logical organization of ideas to create meaningful learning and serve Novak's (2010) constructivist view of the integration of knowledge. Likewise, the jigsaw strategy is

effective because of the cooperative learning environment that encourages group collaboration, sharing of information and more detailed learning by interpersonal interaction. This is in line with results reported by Adeyemi and Ajibola (2021) and Ogunleye and Afolabi (2020) which reveal that cooperative learning enhances students' achievement, motivation and problem-solving skills. The results also corroborate the studies conducted by Yusuf and Aina (2019) which found that visual and interactive methods were effective in improving comprehension in science. They differ from Eze and Okoro (2018) who obtained no significant improvement which could be attributed to the poor management of the group. The current study emphasizes the need for good teacher training, class sizes of not more than twenty learners and the effective implementation of learner-centered approaches to maximize the effective teaching and learning of Biology.

It was also found that the students who were taught by Concept Mapping and Jigsaw Instructional Strategies had a significantly higher level of confidence, motivation, and self-belief to learn Biology as compared to the students who were taught conventionally.

This means that learner-centered approaches make students feel responsible for their own learning, involved in the learning process, and validate their competence in learning. The findings support the contributions of Okeke and Nwachukwu (2022) that the use of concept mapping boosts students' confidence because it helps to give students a visual representation of the scientific relationship that makes it easier to handle. In the same vein, Aliyu and Hassan (2020) concluded that cooperative learning models such as Jigsaw technique increased the students' self-efficacy and students participation in science class by encouraging students to interact with each other and problem solving together. Similarly, in another study, Egbunu and Adewale (2023) noted that students who were given interactive learning environments showed high academic confidence and motivation as compared to those who were exposed to the traditional lecture method of teaching. However, Bamidele and Olorunsola (2019) concluded that there was no significant difference between self-efficacy of students that were exposed to concept mapping and those who did not when students' prior knowledge was inadequate and they were not trained in concept mapping. Similarly, Yakubu (2021) stated that sometimes, the less vocal students in the group lose their self-confidence as a result of group dominance and unequal participation in the cooperative learning. Despite the various opinions, the present study confirms that both the Concept Mapping and Jigsaw techniques have a positive impact on students' self-efficacy in Biology through the active engagement, achievement and social reinforcement, that contribute to strengthening the students' belief in their capability to be successful in their studies.

Conclusion

It was concluded from the study that concept mapping and jigsaw teaching strategies had a significant effect on the students' learning outcomes in Biology. Both methods enhanced academic achievement, self-efficacy and science process skills. Students used concept mapping to organize ideas and create meaningful conceptual connections. Jigsaw encouraged students to work co-operatively, learn from each other and be actively involved

Recommendation

The use of concept mapping and jigsaw strategies in the classroom will enhance students' achievement and engagement in Biology. These strategies are recommended especially for abstract topics and topics that have interconnections. In addition, educational authorities should conduct workshops and seminars for the training of Biology teachers in the application of cooperative learning methods like jigsaw strategy as well as concept mapping. In addition, schools should develop facilitating contexts for group learning and collaborative inquiry, ensuring sufficient resources, space and time are available for interactive learning sessions.

References

- Abdulrahim, B., Shehu, A., Yahaya, Q., Salawu, S., Yusuf, M., & Ahmed, R. (2026). Effects of Computer-based Concept-mapping and Jigsaw Instructional strategies on Academic performance of Secondary School Basic Science Students in Ilorin, Kwara State. *Impact International Journals and Publications*, 2(2), 581-591.
- Achor, E. E., Imoko, B. I., & Uloko, E. S. (2019). Effect of jigsaw instructional strategy on students' achievement and interest in Mathematics. *Journal of Education and Practice*, 10(5), 1-9.
- Achor, E. E., Odoh, C. O., & Omale, M. O. (2025). Science self-efficacy and meta-variables as correlates of academic performance of students in biology. *Learning*, 10(2), 281-297.
- Adewumi, G. S., Akanbi, A. A., & Muraina, K. O. (2024). Effect of two instructional strategies on students' achievement at selected abstract concepts: a case study on Biology learning in Kwara State, Nigeria. *Journal of Pedagogy and Education Science*, 3(02), 140-151.
- Adeyemi, T. O., & Ajibola, A. F. (2021). Effects of cooperative learning strategies on students' academic achievement and problem-solving skills in Biology. *Journal of Science Education and Practice*, 2(2), 45-56.
- Awoyale, O. O., & Olajide, S. O. (2025). Effectiveness of Flow-map and Jigsaw Instructional Strategies on Junior Secondary School Students' Learning Outcomes in Basic Science and Technology in Ile-Ife, Osun State. *International Journal of Contemporary*

- Issues in Integrated Science*, 1(1), 219-230.
- Bamidele, E. F., & Olorunsola, S. A. (2019). Concept mapping and self-efficacy: The role of prior knowledge and training. *Journal of Science Education Research*, 8(1), 3448.
- Bednarowska-Michaiel, Z., & Uprichard, E. (2026). Bringing interdisciplinary data science education challenges into the classroom. *Journal of Statistics and Data Science Education*, 34(1), 72-87.
- Chen, C., Hu, W., & Wei, X. (2025). From anxiety to action: exploring the impact of artificial intelligence anxiety and artificial intelligence self-efficacy on motivated learning of undergraduate students. *Interactive Learning Environments*, 33(4), 3162-3177.
- Chukwu, J., & Arakoyu, A. A. (2019). Effects of Jigsaw-Puzzle Instructional Strategy on Secondary School Students Performance on Growth as a Concept in Biology in Abia State. *Advances in Research*, 20(1), 1-6.
- Čipkov, E., Karolčnik, Š., Dudov, N., & Nagyv, S. (2018). What is the students' interest in biology after the biology curriculum modification?. *The Curriculum Journal*, 29(3), 370-386.
- Dong, D. (2025). Self-determination theory perspectives on the influence of digital learning engagement on motivation in extracurricular learning activities: Considering the mediating role of digital self-efficacy. *Learning and Motivation*, 90, 102135.
- Egbunu, F. E., & Adewale, J. G. (2023). Interactive learning environments and academic confidence. *Journal of Educational Development*, 27(1), 55-70.
- Essien, J. B., Ekim, R. E. D., Inyang, F. N., & Aghachi, J. J. (2026). Comparative effect of Jigsaw II Cooperative, Concept mapping and Expository Learning Strategies on Chemistry Students' Academic Achievement in Secondary Schools in Ikot Abasi Local Government Area. *International Journal of Multidisciplinary Research and Growth evaluation*. 7(2), 509-515.
- Ewuola, W. O. (2025). Mind-mapping and Jig-saw Instructional Strategies as Panacea to Improving Senior Secondary School Students' Performance and Skill Acquisition in Agricultural Science in Osun State, Nigeria. *International Journal of Contemporary Issues in Integrated Science*, 1(1), 183-203.
- Gyamfi, M., & Ayaaba, D. A. (2026). Understanding the nature of science in biology education: A meta-analysis of students' and teachers' views in senior high schools. *Eurasian Journal of Science and Environmental Education*, 6(1), 1-5.
- Honra, J. R., & Monterola, S. L. C. (2026). Enhancing biology students' cognitive flexibility through problem-based learning moderated by transdisciplinary thinking. *The Journal of Educational Research*, 119(1), 129-139.
- Horton, P. B., McConney, A. A., Gallo, M., Woods, A. L., & Senn, G. J. (2018). An investigation of the effectiveness of concept mapping as an instructional tool. *Science Education*, 77(1), 95-111.
- Ibe, E., & Nwosu, A. A. (2017). Effect of jigsaw technique on students' mastery of abstract Biology concepts. *Journal of Science Education*, 10(2), 45-58.
- Kinchin, I. M. (2020). Visualizing powerful knowledge to develop the expert student: A knowledge structures perspective on teaching and learning at university. Brill.
- Kinta, M. J., & Philip, J. (2025). Effects of inadequate laboratory resources on academic achievement and learning attitudes in Biology among senior secondary school students in Kontagora, Niger State, Nigeria. *KONTAGORA JOURNAL OF SCIENCE AND TECHNOLOGY*, 18 (1-2), 154-159.
- Kleckmann, T., Steffensky, M., & Praetorius, A. K. (2020). *Quality of teaching in science education. More than three basic dimensions?* (pp. 37-55).
- Maikano, S. P., & Simon, K. (2025). COMPARATIVE EFFECTS OF JIGSAW AND CONCEPT-MAPPING PEDAGOGIES ON STUDENTS ACHIEVEMENT IN BIOLOGY IN TARABA STATE, NIGERIA. *International Journal of Science Education and Innovation*. 9(2) 1-10.
- Novak, J. D. (2010). *Learning, creating, and using knowledge: Concept maps as facilitative tools in schools and corporations* (2nd ed.). Routledge.
- Novak, J. D., & Cacas, A. J. (2006). The Theory Underlying Concept Maps and How to Construct and Use Them. In: *Technical Report IHMC CmapTools 2006-01 Rev 01-2008*
- Obafemi, K. E., Fajonyomi, A. A., & Ola-Alani, E. K. (2023). Effect of jigsaw



- IV Instructional strategy on pupils' academic achievement in mathematics in Kwara State, Nigeria. *International Journal of Academic Pedagogical Research (IJAPR)*, 7(1), 48-52.
- Obikezie, M. C., Okpala, C. C., & Amobi, U. V. (2022). Biology Teachers' Level of Utilization and Awareness of Innovative Teaching Strategies in the Teaching and Learning of Biology in Secondary Schools. *Journal Plus Education/Educatia Plus*, 30(1).
- Ogunleye, A. O., & Afolabi, F. M. (2020). Influence of collaborative learning approaches on students' interest and motivation in science education. *African Journal of Educational Research*, 24(3), 112-125.
- Olajide, S. A., Animola, P. M., & Oyesomi, O. K. (2024). Availability and utilization of Biology teaching resources in Ife Central Local Government Area. *Nigerian Journal of Educational Research and Development*, 24(1), 88-102.
- Roeth, K., Williams, J., & Perlis, S. (2019). Active learning strategies to enhance student learning outcomes. *Journal of Effective Teaching*, 19(2), 45-60.
- Schicchi, D., Limongelli, C., Monteleone, V., & Taibi, D. (2026). A closer look at ChatGPT's role in concept map generation for education. *Interactive Learning Environments*, 34(1), 276-296.
- Slavin, R. E. (2014). Cooperative learning and academic achievement: Why does groupwork work? *Anales de Psicologia*, 30(3), 785-791.
- Wang, X., Gao, Y., Wang, Q., & Zhang, P. (2024). Relationships between self-efficacy and teachers' well-being in middle school English teachers: The mediating role of teaching satisfaction and resilience. *Behavioral Sciences*, 14(8), 629.
- Yaki, A. A. (2022). Fostering Critical Thinking Skills Using Integrated STEM Approach among Secondary School Biology Students. *European Journal of STEM Education*, 7(1), 6.
- Yakubu, N. (2021). Group dynamics and self-confidence in cooperative learning settings. *International Journal of Collaborative Learning*, 14(1), 101-115.
- Zhang, G., Feng, W., Zhao, L., Zhao, X., & Li, T. (2024). The association between physical activity, self-efficacy, stress self-management and mental health among adolescents. *Scientific Reports*, 14(1), 5488.



FLIPPED CLASSROOM PEDAGOGY AND ACADEMIC ACHIEVEMENT AMONG UNDERGRADUATE CHEMISTRY STUDENTS IN SOUTH-WEST NIGERIA

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Abstract

The study examined how flipped classroom pedagogy influences the academic achievement of undergraduate chemistry students across Oyo, Ogun, and Lagos States in South-West Nigeria. The continued underperformance of students in chemistry has frequently been attributed to the predominance of traditional lecture-based methods, which constrain active engagement and inhibit deeper conceptual learning a situation that underscores a critical void in the deployment of innovative teaching strategies, particularly flipped classroom pedagogy, within Nigerian universities. A quasi-experimental design employing pre-test and post-test measures with non-equivalent control groups was adopted for the investigation. The study population comprised undergraduate chemistry students, from whom a sample of 1,500 participants (500 per state) was drawn using a multi-stage sampling procedure. A validated Chemistry Achievement Test served as the primary data collection instrument. Descriptive and inferential statistical tools including mean, standard deviation, independent sample t-test, and ANCOVA were applied to analyse the data at a 0.05 significance level. The results demonstrated that students in the flipped classroom recorded significantly higher achievement scores than their counterparts in the conventional lecture setting. ANCOVA analysis confirmed a statistically significant effect of instructional method on academic outcomes ($p < 0.05$). The study concluded that flipped classroom pedagogy constitutes an effective approach to enhancing chemistry students' academic performance. Accordingly, it was recommended that university chemistry lecturers should embrace flipped classroom instruction as a means of deepening student engagement and improving learning outcomes.

Keywords: Academic achievement, Chemistry education, Conventional lecture method, Flipped classroom pedagogy, Undergraduate chemistry students



Introduction

As one of the core disciplines within the natural sciences, chemistry occupies a pivotal position in driving technological progress, supporting industrial development, advancing medical research, improving agricultural productivity, and addressing challenges of environmental sustainability. At the tertiary level of education, the study of chemistry is instrumental in equipping undergraduates with analytical reasoning, problem-solving capabilities, and hands-on laboratory skills essential for scientific innovation and broader national development. In recent decades, *Makinde et al. (2025)* have increasingly championed the adoption of innovative pedagogical approaches as a means of boosting student engagement and academic outcomes in science education. Flipped classroom pedagogy as one of the learner-centred instructional model has attracted scholarly attention in recent times. This model involves students engaging with instructional content including recorded lecture videos, Powerpoint slides, podcasts, and digital notes outside the formal class setting, while in-class time is redirected towards collaborative activities, problem-solving exercises, discussions, experiments, and other forms of interactive learning. This configuration effectively inverts the conventional instructional pattern wherein teachers deliver direct instruction during class sessions while learners complete tasks independently at home.

On a global scale, flipped classroom pedagogy has earned widespread recognition as a potent instructional strategy capable of elevating students' academic performance in science disciplines. Empirical evidence indicates that the flipped classroom pedagogy enhances conceptual understanding, increases student motivation, and classroom participation, improves retention of learned content, and promotes self-regulated learning (Strelan et al., 2020). In chemistry education, flipped classroom pedagogy enables learners to revisit and master difficult concepts at their

own pace through digital learning resources prior to engaging in practical and discussion-based activities during formal class sessions. This iterative engagement with content has been shown to deepen comprehension of otherwise abstract chemical concepts while simultaneously boosting overall academic performance. Udu and Mbamalu (2025) underscored that technology-integrated instructional frameworks yield measurable improvements in students' capacity for self-regulated learning and academic achievement in chemistry education.

Within the Nigerian educational context, the uptake of flipped classroom pedagogy in higher institutions has witnessed a gradual but notable rise, driven by growing access to educational technologies, improved internet connectivity, and an intensifying institutional appetite for student-centred instructional models. Nigerian researchers have documented various positive outcomes arising from the deployment of flipped classroom strategies in science education. Isa and Bukar (2023) established that chemistry students exposed to flipped classroom instruction recorded markedly improved academic achievement and exhibited stronger content retention relative to those who received instruction through conventional lecture approaches. Consistent with these findings, Nja et al. (2022) documented that the flipped classroom strategy exerted a favourable influence on both the academic achievement and the attitudinal disposition of chemistry students in higher education settings.

Recent evidence from studies conducted in South-West Nigeria has strengthened the argument for integrating flipped classroom pedagogy into undergraduate chemistry instruction. Adelakun et al. (2025) found that chemistry undergraduates in Oyo State perceived flipped classroom learning as useful, engaging, and supportive of self-directed learning. Similarly, Makinde et al. (2025) reported that the adoption of flipped classroom instruction significantly improved



students' engagement and active participation during chemistry lessons. These findings suggest that flipped classroom pedagogy can serve as an effective response to the persistent challenges of low academic achievement and passive learning behaviours among chemistry undergraduates in Nigerian universities.

Academic achievement remains a key indicator of students' success in educational institutions, reflecting the extent to which learners attain prescribed educational objectives through examinations, assignments, tests, and practical activities. Among undergraduate chemistry students, achievement is influenced by several factors, including instructional methods, learning environments, technological support, motivation, and classroom engagement. However, the conventional lecture method, which remains dominant in many Nigerian universities, often promotes passive learning, rote memorization, and limited classroom interaction, thereby constraining students' academic performance. Consequently, there is an increasing need for innovative instructional approaches, such as the flipped classroom, that can enhance students' understanding, participation, and academic achievement in chemistry.

The university settings across Oyo, Ogun, and Lagos States present an especially appropriate context for empirically investigating the impact of flipped classroom pedagogy. These states are home to a substantial number of universities characterized by diverse student populations and a progressive if still emergent integration of educational technologies into their pedagogical processes. Yet, notwithstanding the growing global momentum behind flipped classroom pedagogy, focused empirical inquiry into its applicability and effectiveness among undergraduate chemistry students in South-West Nigeria remains considerably sparse. The preponderance of available studies has been conducted at the secondary school level or within other subject areas, leaving a significant empirical gap regarding the efficacy

of flipped classroom instruction on undergraduate chemistry students' academic performance across universities in Oyo, Ogun, and Lagos States. Against this backdrop, the present investigate the effect of flipped classroom pedagogy on academic achievement among undergraduate chemistry students in South-West Nigeria, with particular focus on the states of Oyo, Ogun, and Lagos.

Statement of the Problem

Notwithstanding the centrality of chemistry as a fundamental science discipline in tertiary education, the academic performance of undergraduate chemistry students across Southwest Nigeria particularly within Oyo, Ogun, and Lagos States continues to raise serious concern. A significant proportion of students persistently fall short of expected achievement benchmarks in chemistry, a situation largely attributable to an enduring over-reliance on traditional lecture-based approaches that encourage passive participation, restrict student engagement, and foster only surface-level conceptual understanding. This predicament is further compounded by the realities of overcrowded lecture halls, the inherently abstract character of much chemistry content, and a scarcity of opportunities for practical, interactive, and exploratory learning experiences. Collectively, these conditions leave many students ill-equipped to master foundational chemical principles, culminating in poor academic outcomes and diminishing interest in the subject.

Although flipped classroom pedagogy has been broadly acknowledged as a learner-centred instructional strategy with the potential to significantly improve engagement, comprehension, and academic performance, its actual uptake and consistent application in undergraduate chemistry education within Nigerian universities remain limited and uneven. The existing body of research has been predominantly directed at secondary school populations or other science subjects, with comparatively little empirical investigation focused on undergraduate chemistry students

in South-West Nigeria. Consequently, a substantial knowledge gap persists regarding the actual effectiveness of flipped classroom pedagogy in raising academic achievement in chemistry at the university level particularly across Oyo, Ogun, and Lagos States. This gap necessitates rigorous empirical inquiry into whether flipped classroom pedagogy can produce meaningful and statistically significant improvements in the academic outcomes of undergraduate chemistry students in this region.

Purpose of the Study

This study examined the effect of flipped classroom pedagogy on academic achievement among undergraduate chemistry students in South-West Nigeria, specifically in Oyo, Ogun, and Lagos States. The specific objectives were to:

- determine the effect of flipped classroom pedagogy on the academic achievement of undergraduate chemistry students in Oyo, Ogun, and Lagos States;
- compare the academic achievement of undergraduate chemistry students taught using flipped classroom pedagogy and those taught using conventional lecture methods; and
- examine the influence of flipped classroom pedagogy on students' engagement and understanding of chemistry concepts among undergraduate students in South-West Nigeria.

Research Questions

- What is the effect of flipped classroom pedagogy on the academic achievement of undergraduate chemistry students in Oyo, Ogun, and Lagos States?
- What is the difference in academic achievement between undergraduate chemistry students taught using flipped classroom pedagogy and those taught using conventional lecture methods?

Hypothesis

H₀: There is no significant difference in the academic achievement of undergraduate chemistry students taught using flipped classroom pedagogy and those taught using the conventional lecture method in Oyo, Ogun, and Lagos States.

Literature Review

Flipped Classroom Pedagogy

Flipped classroom pedagogy constitutes a learner-centred instructional framework wherein direct teaching is relocated from the formal classroom to the home environment and delivered through digital platforms, including video recordings, presentation slides, and online learning resources. In-class sessions are consequently repurposed for active discourse, problem-solving tasks, and collaborative group activities. Contemporary research consistently attests that this inverted instructional model cultivates active learning engagement, amplifies student involvement, and strengthens higher-order cognitive capacities within science education (Budhi et al., 2025). In chemistry, flipped learning has demonstrated an enhanced capacity to support conceptual understanding by granting students repeated access to instructional content before they participate in applied laboratory and analytical classroom tasks (Nsabayezu et al., 2025). Isa and Bukar (2023) reported that undergraduate chemistry students who received instruction through flipped classroom Pedagogy exhibited significantly superior levels of academic achievement and content retention when compared to those exposed to traditional lecture-based instruction.

Notwithstanding these positive findings, certain recent empirical studies caution that the efficacy of flipped classroom pedagogy is not unconditional. Evidence suggests that its success may be contingent upon the quality of implementation, students' preparedness, and the depth of learner engagement. Czarnowske et al. (2025) observed that while flipped classroom approaches may enhance student motivation and self-perception of competence, they do not invariably generate significant gains in formal examination performance when implementation is inadequate. This suggests that the impact of flipped classroom pedagogy on academic achievement is context-sensitive and is fundamentally conditioned by sound

instructional design and robust mechanisms for holding students accountable for their preparatory learning. Academic achievement denotes the degree to which learners successfully accomplish prescribed educational goals, with performance typically assessed through formal tests, examinations, assignments, and practical evaluations. Within chemistry education, academic achievement specifically captures students' mastery of abstract and conceptually demanding subject matter including chemical bonding, stoichiometric calculations, chemical equilibria, and reaction kinetics. Emerging scholarly literature underscores that academic performance in chemistry is profoundly shaped by the quality of pedagogical strategies employed, the conduciveness of the learning environment, and the degree of student engagement in the instructional process (Shittu & Olorundare, 2025).

Evidence indicates that learner-centred approaches among which flipped classroom pedagogy is particularly well-evidenced contribute substantially to improvements in chemistry students' academic achievement.

Ajala (2025) reported that students in Osun State who received instruction via flipped classroom methods obtained significantly higher post-test scores compared to those in traditional instructional settings. Similarly, Udu and Mbamalu (2025) demonstrated that ICT-assisted instructional approaches, including flipped learning, facilitate the development of students' self-regulatory learning competencies, which in turn bear a direct and positive relationship with improved academic performance in chemistry. These cumulative findings underscore that academic achievement is not merely a reflection of inherent cognitive capacity but is substantially mediated by the instructional approach the teacher adopts. Undergraduate chemistry students are tertiary-level learners engaged in the formal study of chemical sciences spanning organic, inorganic, physical, and analytical chemistry, and are expected to cultivate both theoretical knowledge and

practical laboratory proficiency in preparation for scientific and professional careers. Innovative instructional models notably flipped classroom pedagogy have been identified as particularly well-matched to the learning needs and challenges of this population, as such approaches actively encourage peer-based collaboration, foster independent inquiry, and facilitate the attainment of deeper conceptual understanding (Nsabayezu et al., 2025).

The academic benefits of flipped learning for undergraduate chemistry students, in terms of both improved achievement and enhanced content retention, have been consistently documented in the literature (Isa & Bukar, 2023). The capacity of flipped classroom pedagogy to improve students' academic outcomes has been demonstrated most prominently in science disciplines, with chemistry representing one of the most frequently investigated contexts. This arrangement has been found to substantially enhance learners' grasp of complex scientific concepts, particularly through the combined benefits of self-paced learning and repeated access to instructional resources. In the context of chemistry education specifically, the flipped classroom model has been shown to promote greater conceptual clarity and stronger academic performance, most notably in areas characterized by abstraction and mathematical complexity (Nsabayezu et al., 2025). Isa and Bukar (2023) provided empirical confirmation that undergraduate chemistry students exposed to flipped classroom instruction achieved significantly higher scores on formal achievement tests relative to those who received conventional lecture-based teaching.

A growing body of comparative research has systematically examined the relative instructional efficacy of flipped classroom pedagogy and traditional lecture-based teaching, with findings that are broadly consistent across contexts. Conventional lecture-based instruction has attracted sustained criticism for its tendency to elicit passive learning behaviour, minimise

meaningful student-teacher interaction, and promote only surface-level understanding of subject matter. The flipped classroom model, by contrast, actively foregrounds collaborative engagement, peer-assisted learning, and the deep cognitive processing of content. Budhi et al. (2025) provided corroborative evidence that learners in flipped classroom settings consistently outperform those in lecture-centred environments across a range of science subjects, with the performance advantage attributable primarily to greater learner agency and elevated engagement with instructional material. Shittu and Olorundare (2025) further substantiated this claim by establishing that learner-centred instructional approaches generate significantly superior chemistry performance outcomes relative to the teacher-directed lecture model.

Among the various markers of instructional effectiveness in chemistry education, student engagement and conceptual understanding occupy a central position. Engagement encompasses the active participation, sustained attentiveness, and interactive relationship that students maintain with learning materials and their peers, while conceptual understanding denotes the capacity to meaningfully interpret and apply scientific principles in varied contexts. Nsabayezu et al. (2025) reported that learners within flipped classroom settings exhibit substantially higher motivation and engagement than those in conventional instructional environments. Udu and Mbamalu (2025) complemented these findings by demonstrating that ICT-supported flipped instruction strengthens students' capacity for self-regulated learning a disposition that directly underpins deeper and more durable understanding of chemistry concepts. Ajala (2025) further observed that the combined effect of repeated content exposure and interactive classroom engagement, both hallmarks of the flipped classroom model, meaningfully enhances students' comprehension of abstract topics in chemistry.

Constructivist Learning Theory

Constructivist Learning Theory, advanced by Piaget and Vygotsky, posits that learners actively construct knowledge through interaction, collaboration, reflection, and experience rather than through passive reception of information. The theory provides a strong foundation for flipped classroom pedagogy because it promotes learner-centred environments where students actively engage with content and solve problems collaboratively. According to Kumar et al. (2025), constructivist principles encourage active participation and deeper conceptual understanding, which align closely with the structure of flipped learning. Similarly, Shen et al. (2025) argued that flipped classrooms foster cognitive engagement, motivation, and metacognitive awareness, all of which are central to constructivist learning. In chemistry education, Nsabayezu et al. (2025) found that constructivist-based flipped classroom approaches enhance students' engagement and conceptual understanding by providing opportunities for inquiry, discussion, and collaborative knowledge construction.

Self-Determination Theory (SDT)

Self-Determination Theory (SDT), developed by Deci and Ryan, explains how the psychological needs for autonomy, competence, and relatedness influence motivation and learning. The theory is widely applied in flipped classroom research because it helps explain how learner autonomy and intrinsic motivation contribute to academic success. According to Sancar-Tokmak and Dagli (2025), SDT is particularly relevant to flipped learning environments as it clarifies the motivational processes that enhance student engagement and achievement. In a flipped classroom, students exercise autonomy by controlling the pace of pre-class learning, develop competence through adequate preparation before class, and experience relatedness through collaborative in-class activities. Studies have shown that these factors strengthen engagement, self-efficacy, and academic performance (Chen & Shih,

2025; Zhou & Zhang, 2025). In undergraduate chemistry, where students often encounter complex and abstract concepts, SDT provides a useful framework for understanding how flipped instruction can promote sustained motivation and improved learning outcomes.

Methodology

The study employed a pre-test, post-test non-equivalent control group quasi-experimental research design. The independent variable was flipped classroom pedagogy, while the dependent variable was the academic achievement of undergraduate students in chemistry. The study was conducted in purposively selected universities across Oyo, Ogun, and Lagos States in South-West Nigeria. The target population comprised 1,500 undergraduate students enrolled in general science courses across the three selected states, with 500 students representing each state. The selection of 500 students from each state was considered appropriate because chemistry was offered as part of the general science course structure in the participating institutions. Thus, the 500 students selected from each state constituted a purposeful representation of the wider population of 1,500 students across the three states.

A multi-stage sampling procedure was employed. At the first stage, one accredited university offering chemistry as part of its general science course was purposively selected from each of Oyo, Ogun and Lagos States. At the second stage, students offering the relevant general science course were identified, and a total of 500 students were purposively selected from each state, giving an overall sample of 1,500 student respondents. At the third stage, the participating students were organised into intact classes, which were assigned to either the experimental or control group. The experimental group was exposed to flipped classroom pedagogy, while the control group was taught using the conventional teaching approach. The use of 1,500 student

respondents, comprising 500 students from each of the three purposively selected states, was therefore justified by the overall population structure and the inclusion of chemistry within the general science course curriculum.

The experimental group received instruction through the flipped classroom pedagogy, while the control group was exposed to conventional lecture-based instruction. Research instruments comprised instructional packages designed for both conditions and a validated Chemistry Achievement Test. Expert validation was undertaken to establish the content validity of both instruments, and reliability was determined using the test-retest method with an appropriate reliability coefficient. Data gathered from the pre-test and post-test administrations were subjected to both descriptive and inferential statistics. Mean scores and standard deviations were computed to answer the research questions, while independent sample t-tests and Analysis of Covariance (ANCOVA) were employed to test the stated hypothesis at a 0.05 significance level. Pre-test scores were incorporated as covariates within the ANCOVA framework to statistically control for initial performance differences between groups. The null hypothesis was evaluated to determine whether a significant difference existed in academic achievement between students taught through flipped classroom pedagogy and those instructed via the conventional lecture method. All analyses were executed using appropriate statistical software, with decisions to reject or retain the null hypothesis based on the 0.05 criterion for statistical significance.

Results and Discussion

Table 1: Pre-test and Post-test Mean Scores of the Experimental Group (Flipped Classroom)

State	N	Pre-test Mean (X)	SD	Post-test Mean (X)	SD	Mean Gain
Oyo	500	42.35	6.21	71.80	5.44	29.45
Ogun	500	41.90	6.05	70.65	5.60	28.75
Lagos	500	43.10	6.30	72.40	5.10	29.30
Total	1500	42.45	6.19	71.62	5.38	29.17

Source: Author's Field Survey, 2026

As presented in Table 1, undergraduate chemistry students who received instruction through flipped classroom pedagogy demonstrated considerable improvement in their academic performance across all three states Oyo, Ogun, and Lagos as reflected in notably elevated post-test mean scores relative to their pre-test baseline measures. The aggregate mean gain of 29.17 attests to the substantial positive impact of the intervention on student performance, indicating that structured engagement with pre-class learning materials, combined with active in-class participation, significantly deepened students' comprehension of chemistry content. The comparatively reduced standard deviation values recorded at the post-test stage further suggest a convergence of performance levels among learners following the treatment period, implying that

flipped classroom instruction contributed to a measurable reduction in achievement disparities within the student population. These outcomes resonate with the findings of Isa and Bukar (2023), Ajala (2025), and Nsabayezu et al. (2025), all of whom documented that flipped classroom pedagogy enhances academic achievement through its facilitation of active learning engagement, self-regulatory behaviour, and deeper conceptual understanding. The results also lend credence to the broader position that learner-centred instructional frameworks outperform traditional didactic methods in fostering academic achievement in chemistry, particularly at the undergraduate level where the abstract complexity of content demands more interactive and student-driven pedagogical approaches.

Table 2: Independent Sample t-test of Post-test Mean Scores of Academic Achievement of Undergraduate Chemistry Students Taught Using Flipped Classroom Pedagogy and Those Taught Using the Conventional Lecture Method

Group	N	Mean (X)	SD	Df	t-calculated	p-value	Decision
Flipped Classroom (Experimental)	1500	71.62	5.38	2998	38.52	0.000	Significant
Conventional Lecture (Control)	1500	55.40	6.10				

Source: Author's Field Survey, 2026

The independent sample t-test findings presented in Table 2 revealed a statistically significant disparity in academic achievement between undergraduate chemistry students instructed through flipped classroom pedagogy

and those who received conventional lecture-based instruction. Students in the flipped classroom group attained a markedly higher post-test mean score ($\bar{X} = 71.62$, $SD = 5.38$) in comparison to the conventional

lecture group ($\bar{X} = 55.40$, $SD = 6.10$), with a computed t-value of 38.52 and a corresponding p-value of 0.000 ($p < 0.05$). This outcome indicates that learners exposed to flipped classroom instruction significantly outperformed their counterparts in the traditional teaching condition in chemistry. The performance advantage demonstrated by the flipped classroom group can be ascribed to the inherently learner-centred structure of this instructional model, which empowers students to engage independently with teaching materials prior to class and subsequently redirects formal class sessions towards meaningful discourse, conceptual clarification, and problem-resolution activities processes that deepen understanding and promote the long-term retention of complex chemistry content. This finding is

substantiated by the recent scholarship of Isa and Bukar (2023), Ajala (2025), and Nsabayeze et al. (2025), who collectively demonstrated that flipped classroom pedagogy promotes superior academic achievement through its facilitation of active learning, peer collaboration, and the cultivation of self-regulated learning habits. The results equally reinforce the prevailing argument that conventional lecture-based methods are comparatively less effective at fostering the depth of conceptual understanding demanded by university-level chemistry, relative to innovative pedagogical strategies that actively position students as agents of their own learning.

Table 3: ANCOVA Summary of Post-test Scores by Instructional Method (Covariate: Pre-test) of the Effect of Instructional Method on the Academic Achievement of Undergraduate Chemistry Students after Controlling for Pre-test Scores

Source of Variation	Sum of Squares	df	Mean Square	F-calculated	p-value	Decision
Covariate (Pre-test)	1240.56	1	1240.56	18.72	0.000	Significant
Instructional Method	8450.30	1	8450.30	127.65	0.000	Significant
Error	19840.20	2997	6.62			
Total	29531.06	2999				

Source: Author's Field Survey, 2026

The ANCOVA findings displayed in Table 3 confirmed a statistically significant effect of instructional method on the academic achievement of undergraduate chemistry students, even after accounting for pre-test performance as a covariate. The analysis indicated that the covariate students' pre-test scores exerted a significant independent influence on final post-test outcomes ($F = 18.72$, $p < 0.05$), affirming that initial ability levels meaningfully contributed to students' eventual achievement. Of greater importance for the study's central objective, however, was the finding that instructional method itself produced a highly significant effect on academic performance (F

$= 127.65$, $p = 0.000 < 0.05$). The findings indicate that the achievement difference between students exposed to flipped classroom instruction and those taught through the conventional lecture method was statistically significant, even after controlling for prior academic performance. This suggests that the superior performance of students in the flipped classroom group was attributable to the instructional approach rather than to pre-existing differences in ability. The effectiveness of the flipped classroom may be linked to its emphasis on pre-class preparation, active classroom participation, collaborative learning, and deeper engagement with chemistry concepts. These findings are

consistent with the studies of Isa and Bukar (2023), Ajala (2025), and Nsabayeze et al. (2025), which reported that flipped classroom pedagogy enhances academic achievement by promoting self-regulated learning and conceptual understanding. The results further demonstrate that although prior knowledge influences learning outcomes, it does not diminish the effectiveness of the flipped classroom, thereby confirming its superiority over the conventional lecture method in improving undergraduate chemistry students' academic achievement.

Conclusion

In summary, this study provided robust empirical evidence that flipped classroom pedagogy exerts a significant and beneficial influence on the academic achievement, learning engagement, and conceptual understanding of undergraduate chemistry students in Oyo, Ogun, and Lagos States, South-West Nigeria. The evidence consistently indicated that students who received instruction through the flipped classroom model surpassed their counterparts in the conventional lecture condition, as reflected in higher post-test mean scores and statistically significant group differences corroborated by both the independent sample t-test and ANCOVA analyses. Critically, the superiority of flipped classroom instruction persisted even after controlling for pre-existing differences in students' academic ability, affirming its effectiveness as a remedy to the well-documented limitations of traditional teacher-centred pedagogy. On the basis of this evidence, flipped classroom pedagogy is affirmed as a demonstrably more effective instructional approach for cultivating meaningful chemistry learning and supporting undergraduate academic success.

Recommendations

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

- University lecturers with responsibility for chemistry instruction are strongly

encouraged to incorporate flipped classroom pedagogy into their regular teaching practices. The evidence presented demonstrates that this approach produces significant gains in students' academic achievement by fostering active learning, promoting richer conceptual understanding, and sustaining higher levels of learner engagement in chemistry lessons.

- Chemistry educators across universities in Oyo, Ogun, and Lagos States should pursue the systematic and consistent integration of flipped classroom pedagogy within their instructional repertoire. Given the demonstrated superiority of this model over conventional lecture-based delivery, its broader adoption is warranted as a means of enhancing both student engagement and the long-term retention of chemistry concepts.
- University lecturers are further advised to implement flipped classroom pedagogy as a sustained and deliberate component of their instructional planning. The present study affirms that this approach delivers meaningful improvements in academic achievement independently of students' prior ability levels, by cultivating collaborative learning dispositions, promoting active engagement, and deepening conceptual understanding of chemistry content.

References

- Adelakun, T.A., Olorundare, S.A., & Makinde, S.O.(2025): Perception of undergraduate Students on the use of flipped classroom for teaching chemistry in Oyo State. *Journal of Education Research and Practice*, 9(8).<http://doi.org/10.70382/ajerlp.v9i8.042>
- Ajala, O. O. (2025). Effect of flipped classroom strategy on students' academic performance in chemistry in Osun State tertiary institutions. *Journal of Science Education and Technology Development*, 12(1), 45–58.
- Budhi, W., Wiji, L., & Mulyani, S. (2025). Flipped classroom learning model in



- science education: Impacts on student engagement and achievement. *International Journal of Educational Innovation*, 9(2), 112–125.
- Chen, Y., & Shih, R. (2025). Self-regulated learning and academic outcomes in flipped classroom environments. *Journal of Educational Psychology and Technology*, 18(3), 201–215.
- Isa, A. M., & Bukar, T. M. (2023). Effect of flipped classroom instructional strategy on chemistry students' achievement and retention in tertiary institutions in Nigeria. *International Journal of Science Education Research*, 7(2), 88–101.
- Kumar, P., Sharma, R., & Devi, S. (2025). Constructivist learning theory and its application in modern classroom practices. *Asian Journal of Educational Research*, 14(1), 33–47.
- Nsabayezu, E., Uwimana, J., & Habimana, F. (2025). Enhancing chemistry learning through flipped classroom approach: A constructivist perspective. *African Journal of Science and Mathematics Education*, 11(1), 59–74.
- Makinde, S.O., Adelakun. T.A., Olorundare, S.A., Bolaji. H.O.,(2025): Effect of Flipped Classroom Strategy on Undergraduate Chemistry Students 'Engagement in Oyo State.CUSTECH, *International Journal of Education*, 2(1), 140-149.
- Sancar-Tokmak, H., & Dagli, G. (2025). Self-determination theory in flipped learning environments: A review of motivational outcomes. *Computers & Education Review*, 16(4), 150–166.
- Shen, L., Wang, J., & Liu, H. (2025). Designing effective flipped classroom models for higher education: Cognitive and motivational perspectives. *Journal of Higher Education Learning*, 20(2), 77–92.
- Shittu, M. A., & Olorundare, A. S. (2025). Instructional strategies and students' academic performance in chemistry in Nigerian universities. *West African Journal of Educational Studies*, 9(1), 25–39.
- Strelan, P., Osborn, A.J., & Palmer, E. (2020). The Flipped classroom : A meta Analysis of effects on student performance across disciplines and education levels. *Educational Research Review*, 30,100314.<http://doi.org/10.1016/j.edurev.2020100314>
- Udu, T. J., & Mbamalu, E. C. (2025). ICT-supported instruction and self-regulated learning in chemistry education. *Journal of Science and Technology Education*, 13(2), 140–155.
- Zhou, Y., & Zhang, X. (2025). Motivational models and flipped classroom effectiveness in higher education. *Educational Technology Research and Development*, 73(1), 98–114.



EFFECTS OF MOTHER TONGUE AS SUPPLEMENTARY MEDIUM OF INSTRUCTION ON SECONDARY SCHOOL STUDENTS' ACADEMIC PERFORMANCE IN BIOLOGY IN EKITI STATE NIGERIA

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Abstract

This study investigated the effects of mother tongue as a supplementary medium of instruction on secondary school students' academic performance in Biology in Ekiti State, Nigeria. A pre-test, post-test, control group quasi-experimental research design was adopted. The population comprised 12,513 SS II Biology students in public secondary schools. A sample of 120 students was selected through a multistage sampling procedure. Data were collected using a researcher-developed Biology Achievement Test (BAT), validated by experts and found reliable with a KR-20 coefficient of 0.84. The experimental group was taught Biology using mother tongue (Yoruba) alongside English, while the control group received instruction through the conventional method. Mean and standard deviation were used to answer the research question, while independent samples t-test and Analysis of Covariance (ANCOVA) tested the hypotheses at the 0.05 level of significance. The findings revealed that students taught with mother tongue as a supplementary medium of instruction performed significantly better than those taught using the conventional method. No significant difference existed between the groups before the treatment, while no significant gender difference was found among students exposed to the treatment. It was recommended that Biology teachers should integrate learners' mother tongue with English when explaining difficult concepts.

Keywords: Mother Tongue, Supplementary Medium of Instruction, Academic Performance

Introduction

Education is universally acknowledged as a vital instrument for individual empowerment, socio-economic transformation, and national development. It equips learners with the knowledge, skills, attitudes, and competencies required to function effectively in an increasingly knowledge-driven society. The quality of education received by learners is influenced by several factors, among which the language of instruction occupies a central position. Language serves as the primary medium through which knowledge is transmitted, ideas are exchanged, and learning is facilitated (Cummins, 2021). Consequently, the language used during classroom instruction significantly influences learners' comprehension, participation, academic achievement, and overall educational

outcomes (Tai, 2022). In multilingual countries such as Nigeria, where English is the official language of instruction while indigenous languages constitute learners' first languages, concerns continue to be raised regarding the effectiveness of English as the sole language of instruction, particularly in science classrooms (UNESCO, 2024).

Biology is one of the major science subjects taught in senior secondary schools in Nigeria and occupies a strategic position in the nation's educational system. It provides students with knowledge of living organisms, their structure, functions, evolution, ecology, genetics, and interactions with the environment. Biology also serves as a prerequisite for admission into several science-

based disciplines, including Medicine, Nursing, Pharmacy, Agriculture, Environmental Science, Microbiology, Biotechnology, and Veterinary Medicine. Consequently, students' academic performance in Biology has significant implications for national scientific advancement and manpower development (Federal Republic of Nigeria [FRN], 2014). Despite its importance, students' achievement in Biology has continued to fluctuate over the years, as reflected in reports of the West African Examinations Council (WAEC, 2023; WAEC, 2024). Several researchers have attributed the persistent poor performance to factors such as ineffective instructional methods, inadequate laboratory facilities, poor mastery of scientific concepts, shortage of qualified teachers, and language barriers during classroom instruction (Aiyedun et al., 2023; Tai, 2022).

Language plays a crucial role in science education because scientific knowledge is communicated through specialized terminologies, explanations, observations, and classroom discussions. Students who have limited proficiency in the language of instruction often experience difficulty understanding scientific concepts, interpreting examination questions, and expressing scientific ideas appropriately (Cummins, 2021). In Nigeria, English language is the official medium of instruction from the upper primary school level onwards, although it is a second language for the majority of learners (FRN, 2014). Many students communicate predominantly in their indigenous languages outside the classroom and only encounter English extensively within the school environment. This linguistic situation creates communication barriers that may hinder effective teaching and learning of Biology, especially in rural and semi-urban communities where exposure to English language is relatively limited.

Mother tongue refers to the first language acquired naturally by a learner from birth and the language through which initial socialization and cognitive development occur (Cummins, 2021). In Ekiti State, Yoruba is the predominant indigenous language spoken by most students. Mother tongue as a supplementary medium of instruction involves the strategic use of learners' indigenous language alongside English to explain difficult concepts, interpret scientific terminologies,

reinforce learning, encourage classroom interaction, and clarify misconceptions without replacing English as the official medium of instruction (Tai, 2022). This instructional approach recognizes the importance of English for academic communication while simultaneously utilizing learners' linguistic background to enhance conceptual understanding and meaningful learning.

The theoretical foundation for using mother tongue as a supplementary medium of instruction is rooted in constructivist and sociocultural perspectives of learning, which emphasize that learners construct new knowledge by connecting new experiences with their existing cognitive structures and prior linguistic knowledge (Cummins, 2021). Learners tend to understand abstract scientific concepts more effectively when explanations are linked to familiar linguistic experiences. The strategic use of the mother tongue also promotes active classroom participation, strengthens teacher–student interaction, reduces communication anxiety, and facilitates critical thinking during instruction (Tai, 2022). Consequently, multilingual instructional practices have increasingly gained recognition as effective pedagogical approaches capable of improving students' learning outcomes across science disciplines.

Several recent empirical studies have reported positive effects of mother tongue and multilingual instructional strategies on students' academic achievement. Aiyedun et al. (2023) found that the use of mother tongue instructional strategy significantly improved upper basic school students' achievement in Basic Science in Kwara State, Nigeria. Similarly, Tai (2022) reported that translanguaging practices in science classrooms enhanced students' conceptual understanding, participation, and confidence in learning scientific concepts. UNESCO (2024) also emphasized that multilingual education enables learners to understand classroom instruction better, enhances participation, improves academic achievement, and promotes inclusive quality education. These findings demonstrate that integrating learners' indigenous language into classroom instruction can facilitate effective learning, particularly in subjects involving abstract scientific concepts such as Biology.

Despite the growing body of evidence supporting multilingual instructional approaches, the use of mother tongue as a

supplementary medium of instruction remains relatively uncommon in many secondary school Biology classrooms in Nigeria, including Ekiti State. Most Biology teachers continue to rely almost exclusively on English language during instruction despite the linguistic challenges experienced by many students. Consequently, students often memorize scientific facts without fully understanding the underlying concepts, leading to poor retention and unsatisfactory academic performance (UNESCO, 2024; Tai, 2022). Furthermore, although previous studies have examined the role of mother tongue in language education and Basic Science, relatively few studies have investigated its effectiveness as a supplementary medium of instruction in senior secondary school Biology within the context of Ekiti State. This creates a gap in empirical literature that requires further investigation.

It is against this background that this study investigated the effects of mother tongue as a supplementary medium of instruction on secondary school students' academic performance in Biology in Ekiti State, Nigeria. Specifically, the study examined whether the use of mother tongue alongside English language would improve students' academic performance in Biology compared with the conventional English-only instructional approach. The study also determined whether gender influenced students' academic performance when exposed to mother tongue as a supplementary medium of instruction. The findings of the study are expected to contribute to the growing body of knowledge on multilingual education and provide useful information for Biology teachers, curriculum developers, educational planners, policymakers, and other stakeholders seeking to improve science teaching and learning in Nigerian secondary schools.

Statement of the Problem

Biology is one of the core science subjects offered in secondary schools in Nigeria and serves as a prerequisite for admission into many science-related courses in tertiary institutions. Despite its importance, students' academic performance in Biology has continued to generate concern among teachers, parents, school administrators, and other stakeholders in education. This concern stems from the observation that many students appear to experience difficulties in

understanding some Biology concepts, which may affect their academic performance. Several factors have been suggested as possible contributors to students' performance in Biology. These include teaching methods, availability of instructional materials, learning environment, students' interest, teachers' competence, and the language used during classroom instruction. In most Nigerian secondary schools, English language is the official medium of instruction. However, for many students, English is not their first language, while their mother tongue remains the language they use most frequently for communication outside the classroom. This situation raises questions about whether the exclusive use of English language during Biology instruction may influence students' understanding of scientific concepts.

The use of mother tongue as a supplementary medium of instruction has been proposed as an instructional approach that may assist teachers in explaining difficult concepts and facilitating classroom interaction while maintaining English as the official language of instruction. Although studies have examined the role of mother tongue in teaching and learning, there appears to be limited empirical evidence on its use as a supplementary medium of instruction in the teaching of Biology among secondary school students in Ekiti State. In addition, it is not clear whether the use of this instructional approach produces different learning outcomes for male and female students. It is against this backdrop that this study investigated the effects of mother tongue as a supplementary medium of instruction on secondary school students' academic performance in Biology in Ekiti State, Nigeria.

Purpose of the Study

The main purpose of the study was to examine the effects of mother tongue as supplementary medium of instruction on secondary school students' learning outcomes in Biology in Ekiti State Nigeria. The study specifically:

- i. examined the effects of mother tongue as supplementary medium of instruction on students' performance in Biology;
- ii. explored which of the treatments (mother tongue and conventional) have better effects on students' performance in Biology;

- iii. found out whether or not there is difference in the performance of male and female students using mother tongue as supplementary medium of instruction in Biology; and

Research Questions

The following research questions are raised for this study.

1. What is the performance of students in the experimental and control groups respectively in Biology before and after the treatment in Biology?

Research Hypotheses

The following research hypotheses are formulated for this study

1. There is no significant difference in the performance of students in the experimental and control groups respectively before the treatment.
2. There is no significant difference in the performance of students in the experimental and control groups respectively before and after the treatment.
3. There is no significant difference in the performance of male and female students exposed to mother tongue as supplementary medium of instruction in Biology.

Methodology

The study adopted a pre-test, post-test, control group quasi-experimental research design to examine the effects of mother tongue as a supplementary medium of instruction on secondary school students' academic performance in Biology in Ekiti State, Nigeria. The population comprised 12,513 Senior Secondary School II (SS II)

students offering Biology in public secondary schools in Ekiti State. A sample of 120 SS II students was selected from four public secondary schools using a multistage sampling procedure. Two schools were assigned to the experimental group, while the remaining two schools served as the control group using intact classes. Data were collected using a researcher-developed Biology Achievement Test (BAT), consisting of 40 multiple-choice items based on the SS II Biology curriculum. The instrument was validated by experts in Biology Education, Tests and Measurement, and Language Education, while its reliability was established through a pilot study using the Kuder-Richardson Formula 20 (KR-20), which yielded a reliability coefficient of 0.84. The treatment lasted for six weeks, during which the experimental group was taught selected Biology topics using mother tongue (Yoruba) as a supplementary medium of instruction alongside English, whereas the control group was taught the same topics using the conventional method with English as the sole medium of instruction. A pre-test was administered before the treatment and a post-test after the treatment. Data collected were analysed using mean and standard deviation to answer the research question, while independent samples t-test and Analysis of Covariance (ANCOVA) were used to test the hypotheses at the 0.05 level of significance.

Results

Research Question 1: What is the performance of students in the experimental and control groups respectively in Biology before and after the treatment in Biology?

Table 1: Mean and Standard Deviation of Students' Pre-test and Post-test Performance in Biology

Group	N	Pre-test Mean	Pre-test SD	Post-test Mean	Post-test SD	Mean Gain
Experimental (Mother Tongue Supplementary Instruction)	58	42.06	6.12	76.84	6.85	34.78
Control (Conventional Method)	62	41.73	6.47	62.58	7.39	20.85

Table 1 revealed Before the treatment, students in the experimental group obtained a pre-test mean score of 42.06 (SD = 6.12), while those in the control group recorded a pre-test mean score of 41.73 (SD = 6.47).

The similarity in the pre-test mean scores suggests that both groups had comparable levels of academic performance before the commencement of the treatment. Following the treatment, students in the experimental

group who were taught Biology using mother tongue as a supplementary medium of instruction achieved a post-test mean score of 76.84 (SD = 6.85), compared with a post-test mean score of 62.58 (SD = 7.39) for students in the control group who were taught using the conventional method. The experimental group recorded a mean gain of 34.78, whereas the control group recorded a mean gain of 20.85. The results indicate that although both groups improved in their Biology performance after instruction, the improvement was considerably greater among students exposed to mother tongue as a supplementary medium of instruction. This

implies that integrating students' mother tongue alongside English language in Biology instruction enhanced their understanding of concepts and improved their academic performance more effectively than the conventional method of instruction.

Testing of Hypotheses

Hypothesis 1: There is no significant difference in the performance of students in the experimental and control groups respectively before the treatment.

Table 2: Independent Samples *t*-Test Showing the Difference in the Pre-test Performance of Students in the Experimental and Control Groups

Group	N	Mean	SD	df	<i>t</i>	<i>p</i> -value
Experimental	58	42.06	6.12	118	0.29	0.772
Control	62	41.73	6.47			

$p > 0.05$ (Not Significant)

Table 2 revealed that the experimental group had a mean score of 42.06 (SD = 6.12), while the control group recorded a mean score of 41.73 (SD = 6.47). The analysis yielded a df of 118, a calculated *t*-value of 0.29, and a *p*-value of 0.772. Since the *p*-value is greater than the 0.05 level of significance ($p > 0.05$), the null hypothesis was not rejected. The result indicates that there was no significant difference in the pre-test performance of students in the experimental and control groups before the

treatment. This implies that both groups were statistically equivalent in their Biology performance at the commencement of the study, confirming that they were comparable prior to the administration of the treatment.

Hypothesis 2: There is no significant difference in the performance of students in the experimental and control groups respectively before and after the treatment.

Table 3: ANCOVA Showing the Difference in the Post-test Performance of Students in the Experimental and Control Groups Using Pre-test Scores as Covariate

Source	Type III Sum of Squares	df	Mean Square	F	Sig.
Corrected Model	6628.471	2	3314.236	65.427	.000
Intercept	15483.624	1	15483.624	305.584	.000
Pre-test (Covariate)	684.392	1	684.392	13.505	.000
Group (Treatment)	5812.764	1	5812.764	114.712	.000
Error	5927.438	117	50.662		
Total	586540.000	120			
Corrected Total	12555.909	119			

$p < 0.05$ (Significant)

Table 3 showed that the treatment effect was statistically significant ($F(1,117) = 114.712$, $p < .05$). Since the probability value ($p = .000$) is less than the 0.05 level of significance, the null hypothesis was rejected. The finding revealed that there was a significant difference in the post-test performance of students in the experimental and control groups after the treatment. Students exposed to Biology instruction using mother tongue as a supplementary medium of instruction performed significantly better than those

taught using the conventional method. This suggests that the use of mother tongue as a supplementary medium of instruction had a positive and significant effect on students' academic performance in Biology.

Hypothesis 3: There is no significant difference in the performance of male and female students exposed to mother tongue as supplementary medium of instruction in Biology.

Table 4: Independent Samples *t*-Test Showing the Difference in the Performance of Male and Female Students Exposed to Mother Tongue as a Supplementary Medium of Instruction in Biology

Gender	N	Mean	SD	df	<i>t</i>	<i>p</i> -value
Male	27	77.41	6.54	56	0.81	0.421
Female	31	76.08	6.01			

$p > 0.05$ (Not Significant)

Table 4 showed that male students obtained a mean score of 77.41 ($SD = 6.54$), while female students recorded a mean score of 76.08 ($SD = 6.01$). The analysis yielded a *df* of 56, a calculated *t*-value of 0.81, and a p -value of 0.421. Since the p -value is greater than the 0.05 level of significance ($p > 0.05$), the null hypothesis was not rejected. The result indicates that there was no significant difference in the academic performance of male and female students exposed to mother tongue as a supplementary medium of instruction in Biology. This implies that the instructional approach was equally effective for both male and female students, implying that gender did not influence students' academic performance when mother tongue was used as a supplementary medium of instruction.

Discussion

The findings of this study revealed that students exposed to mother tongue as a supplementary medium of instruction recorded higher post-test mean scores and greater mean gains in Biology than their counterparts taught using the conventional method. Although both groups demonstrated improvement after instruction, the experimental group showed a more remarkable increase in academic performance. This suggests that the use of the learners'

mother tongue alongside English language enhanced comprehension of Biology concepts, promoted active classroom participation, reduced language-related learning difficulties, and facilitated meaningful learning. The finding supports the view that students learn scientific concepts more effectively when complex ideas are explained in a familiar language. This finding is consistent with the findings of Aiyedun et al. (2024), who reported that the use of mother tongue as an instructional strategy significantly improved students' achievement in Basic Science irrespective of gender. The finding also agrees with Tai (2022), who found that translanguaging and the strategic use of learners' first language in science classrooms improved conceptual understanding, participation, and learning outcomes among students in English-medium instruction settings.

The study further found that there was no significant difference in the pre-test performance of students in the experimental and control groups before the treatment. This indicates that the two groups were academically comparable prior to the commencement of the experiment and that any differences observed after the treatment could reasonably be attributed to the instructional strategy rather than to initial differences in students' abilities. The finding

confirms the effectiveness of the quasi-experimental design in establishing group equivalence before the intervention. This finding is consistent with the recommendations of Fraenkel et al. (2019) that experimental and control groups should demonstrate comparable baseline performance before treatment in order to enhance the internal validity of quasi-experimental studies. Furthermore, the study established a significant difference in the post-test performance of students in the experimental and control groups after the treatment. Students who received Biology instruction through mother tongue as a supplementary medium of instruction significantly outperformed those taught using only the conventional English-medium approach. This finding demonstrates that supplementing English with students' mother tongue enhances understanding, retention of scientific knowledge, and overall academic performance in Biology. The finding corroborates the systematic review by Nkurunziza et al. (2022), which concluded that language barriers contribute substantially to poor Biology learning in Sub-Saharan Africa and recommended bilingual instructional approaches to improve conceptual understanding and academic achievement. It also aligns with UNESCO (2024), which emphasized that multilingual education based on learners' mother tongue improves comprehension, participation, and learning outcomes across science and other school subjects.

Finally, the study found no significant difference in the academic performance of male and female students exposed to mother tongue as a supplementary medium of instruction in Biology. This implies that the instructional strategy benefited both male and female students equally, suggesting that gender did not influence the effectiveness of the treatment. The finding indicates that when students are provided with an enabling language environment that promotes comprehension, both sexes are capable of achieving comparable learning outcomes. This finding agrees with Aiyedun et al. (2024), who found that mother tongue instructional strategy significantly enhanced students' achievement in Basic Science without significant gender differences. It also supports the position of UNESCO (2024) that multilingual instructional approaches promote

equitable learning opportunities and improve educational outcomes for all learners irrespective of gender or linguistic background.

Conclusion

The study concluded that the use of mother tongue as a supplementary medium of instruction significantly enhances secondary school students' academic performance in Biology in Ekiti State, Nigeria. Students who were taught Biology using mother tongue alongside English language performed significantly better than those taught through the conventional English-only method. The study also established that the experimental and control groups were comparable before the treatment, indicating that the improvement in students' performance was attributable to the instructional strategy. Furthermore, the findings revealed that the effectiveness of mother tongue as a supplementary medium of instruction was not influenced by gender, as both male and female students benefited equally from the approach. Therefore, the study concludes that integrating learners' mother tongue into Biology instruction as a complementary medium can improve students' understanding of scientific concepts, enhance classroom participation, and promote better academic achievement in Biology.

Recommendations

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

1. Biology teachers should adopt mother tongue as a supplementary medium of instruction alongside English language, particularly when explaining difficult concepts, scientific terminologies, and abstract ideas, to improve students' understanding and academic performance.
2. The Ministry of Education and relevant educational agencies should develop and implement policies that encourage the appropriate use of mother tongue as a supplementary medium of instruction in the teaching of Biology and other science subjects in secondary schools.
3. Curriculum developers should incorporate guidelines for the effective integration of mother tongue into Biology instruction and provide standardized translations of key

scientific concepts and terminologies in indigenous languages.

4. School administrators should organize regular workshops, seminars, and in-service training programmes to equip Biology teachers with the knowledge and skills required to effectively integrate mother tongue as a supplementary medium of instruction during classroom teaching.
5. Authors and publishers of Biology textbooks should produce supplementary instructional materials, including bilingual glossaries and teaching guides, to facilitate the effective use of mother tongue alongside English language in Biology instruction.
6. Researchers should conduct further studies on the use of mother tongue as a supplementary medium of instruction in other science subjects and at different levels of education to provide broader empirical evidence for educational policy and classroom practice.

education is key to intergenerational learning. UNESCO.

UNESCO. (2024). *Multilingual education: Why is multilingual education important?* UNESCO.

References

- Aiyedun, E. O., Ogundairo, D. A., & Ajibola, A. S. T. (2023). Effect of mother tongue instructional strategy on Basic Science students' performance in upper basic schools in Ilorin Metropolis, Kwara State, Nigeria. *Zaria Journal of Educational Studies*, 23(2), 1–10.
- Fraenkel, J. R., Wallen, N. E., & Hyun, H. H. (2019). *How to design and evaluate research in education* (10th ed.). McGraw-Hill Education.
- Tai, K. W. H. (2022). Translanguaging as inclusive pedagogical practices in English-medium instruction science and mathematics classrooms for linguistically and culturally diverse students. *Research in Science Education*, 52(3), 975–1012. <https://doi.org/10.1007/s11165-021-10018-6>
- UNESCO. (2024). *Bridging cultures and minds: The transformative impact of mother tongue integration in curriculum design.* UNESCO International Bureau of Education.
- UNESCO. (2024). *International Mother Language Day: Why multilingual*

BILATERAL WILMS TUMOUR IN A MALE CHILD WITH ACUTE URINARY RETENTION AND URETHRAL MEATAL MASS

BY

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ABSTRACT

Wilms Tumour is a childhood renal tumour that develops from embryonic renal tissue. It is often discovered inadvertently by parents in the home environment either when bathing or dressing up a child. The index case presented at the hospital on account of acute urinary retention with a urethral mass at the penile meatus. The study is a case of incidental finding of bilateral Wilms Tumor in a 2 year old male child who was brought by the parents to the children's emergency room on account of urethral meatus mass and acute urinary retention with discomfort and irritable excessive cry. Abdominal Ultrasound and CT scan was requested by the managing team. The clinical presentation, imaging findings and management are hereby discussed.

Keywords: Wilms Tumour, Renal mass, Acute urinary retention, Urethral meatal mass

Introduction

Wilms tumour or Nephroblastoma is a common childhood tumour that is intimately linked to early kidney development and is often associated with persistent embryonal renal tissue and other kidney abnormalities and syndromes (Liu & Suson, 2020)

Multiple genetic foci have been linked to wilms tumourigenesis(Liu & Suson, 2020), WT1 is the first gene found to be inactivated in wilms tumour; it encodes a transcription factor that functions as both a tumour and a critical regulator of renal organogenesis,while the risk of wilms tumour varies in different WT1 associated conditions(Welter et al., 2023).

The majority are sporadic and occur in otherwise normal children, and about 9 out of 10 kidney cancers in children are wilms tumour. Most cases are unilateral while about 5% of cases are bilateral(Pater et al., 2021), unilateral form present at an earlier age in males(mean age 42 months) than in females(mean age 47 months) while the mean age of presentation of bilateral wilms tumour

is lower, seen at 30 months and 33 months respectively.

The incidence of wilms tumour is 1:10,000(Bernardo et al., 2019), while the frequency is slightly higher in blacks than in whites but is considerably lower in Asians than in whites; children of African descent may have slightly higher rates of wilms tumour, peak age is 3 to 4 years, while most cases occur before 10 years. There is no recognized gender predilection, however presentation is a little later in females

Clinically affected children present with a painless, palpable abdominal mass, abdominal pain, nausea and vomiting, loss of appetite, fever and high blood pressure especially if synchronous or metachronous bilateral kidney involvement(Asfour et al., 2025).

Diagnosis is by physical examination of a painless abdominal mass and also via imaging modalities like ultrasound, computed tomography or magnetic resonance imaging(Ikhuoriah et al., 2023). Most often diagnosis is made before metastasis to other organs

CASE REPORT

F.A is a 2 year old male, fifth child of the parents, referred from a health facility on account of inability to pass urine 6hours duration, and protrusion of solid substance from the urethra meatus.

The child was managed by the urology unit on account of the presenting complaint above.

The urethra meatus solid tissue was extracted and sent for histopathological analysis, sections of which reveal fragments of necrotic tissue, epithelial cells and glandular structures and diagnosis of necrotic tissue was made. Child also had ultrasound done, which shows bilateral solid renal masses involving two-thirds and one-third of both left and right kidneys respectively with moderate hydronephrosis. A formal diagnosis of bilateral Wilms tumour, to exclude Rhabdoid tumour of kidney and Nephroblastomatosis was made.

The patient was transferred to the pediatric surgical unit from the urology unit based on the ultrasound findings after relieving the acute urinary retention.

On examination the patient was ill looking, pale (pcv 20%), dyspneic, anicteric, febrile, acyanosed, abdomen was distended and moved with respiration. The child was transfused with 280mls of packed red blood cells.

Several other investigations were requested and done; these include abdominopelvic

computed tomography, chest radiograph, echocardiography, liver function test, urine m/c/s, E/U/Cr.

Abdominal ultrasound showed hypoechoic soft tissue masses in both renal parenchyma with associated hydronephrosis (Figures 1a and 1b). CT scan show bilateral hypodense renal masses with right moderate hydrocalicosis (Figures 2a and 2b), chest radiograph was normal, Echocardiography revealed left ventricular hypertrophy(LVH) with ejection fraction of 70% and good ventricular function, Liver function test shows mildly elevated ALP(449iu/L) otherwise normal, Urine m/c/s show leucocytosis, klebsiella oxytoca was cultured and sensitivity to colistin, Tieceycline, resistant to cephalosporin, E/U/Cr were essentially normal.

Initial working diagnosis was bilateral wilms tumour with acute urinary retention secondary to necroturia from sloughed tumour tissue (Figures 3 and 4). Definitive diagnosis of stage v wilms tumour was based on histopathological analysis of renal mass biopsy.

The child was transfused severally based on clinical findings and prior to chemotherapy. Chemotherapy started with 2 courses and then a single course a week later. SIOP regimen was given (Vincristine, actinomycin, doxorubicin). The patient took a total of four courses of chemotherapy and absconded from the ward till date. Parents have not responded to calls by the doctors.

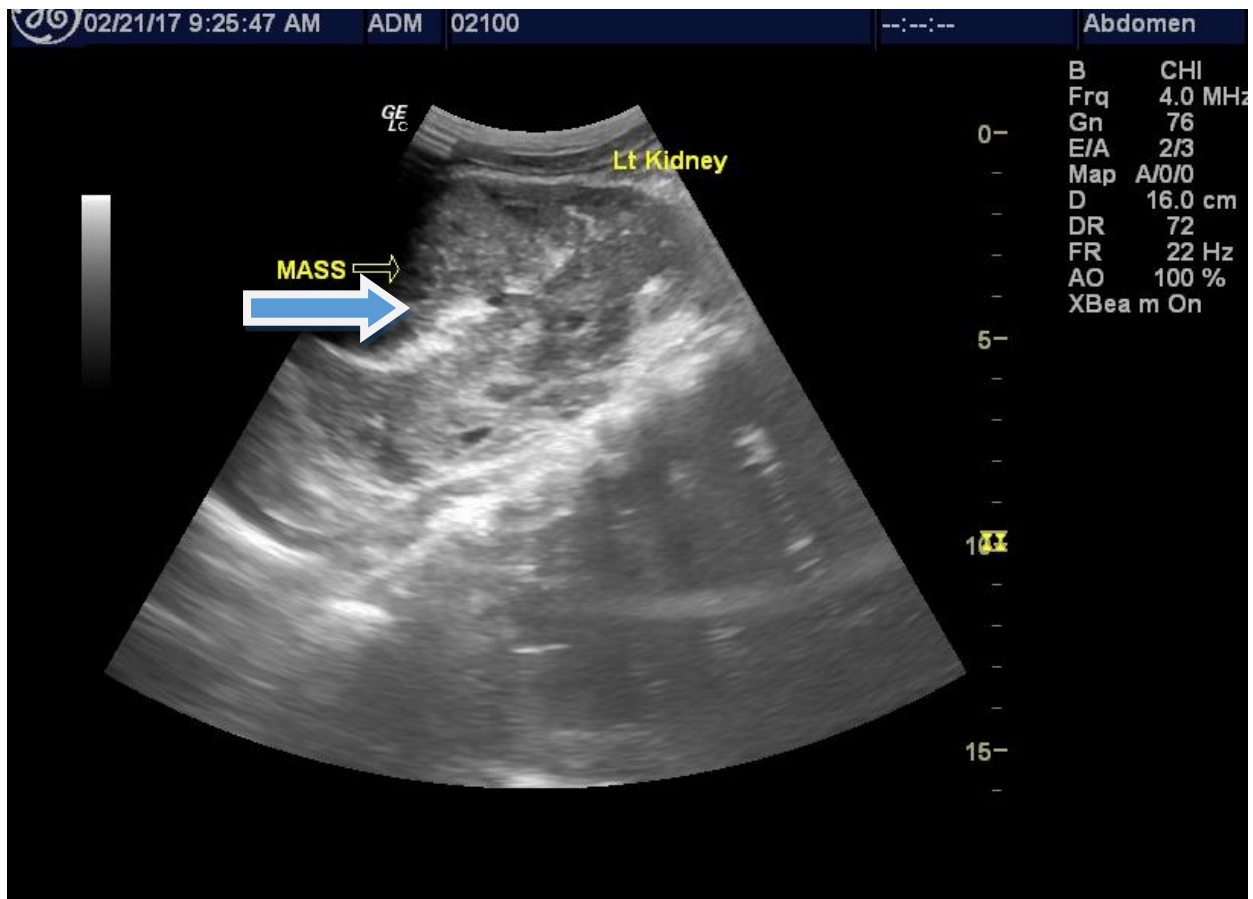


Figure 1a: Abdominal ultrasound longitudinal image shows a left renal mass(blue arrow)

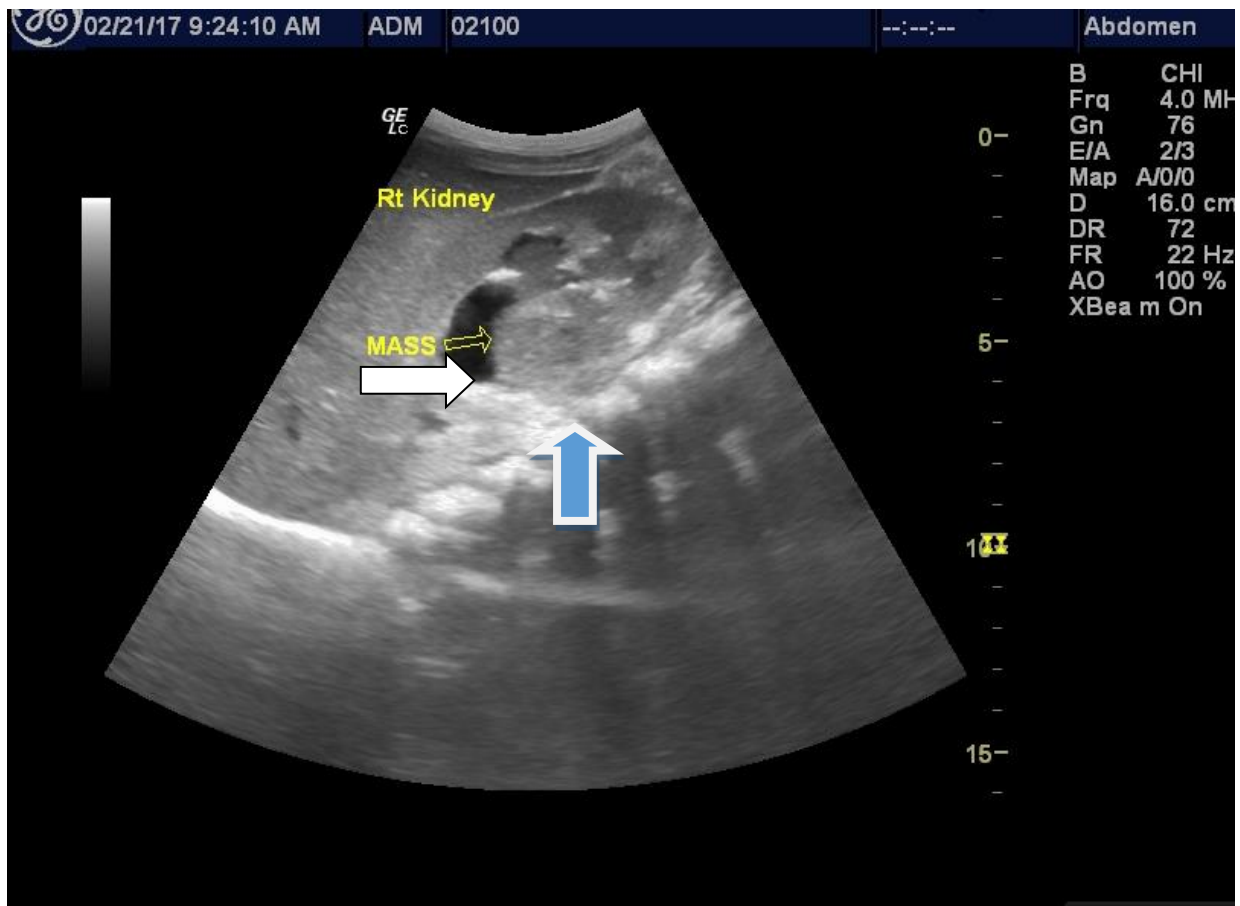


Figure 1b: Abdominal ultrasound (longitudinal view) shows an hypoechoic mass (blue arrow) in the right kidney with hydrocalycosis (white arrow)

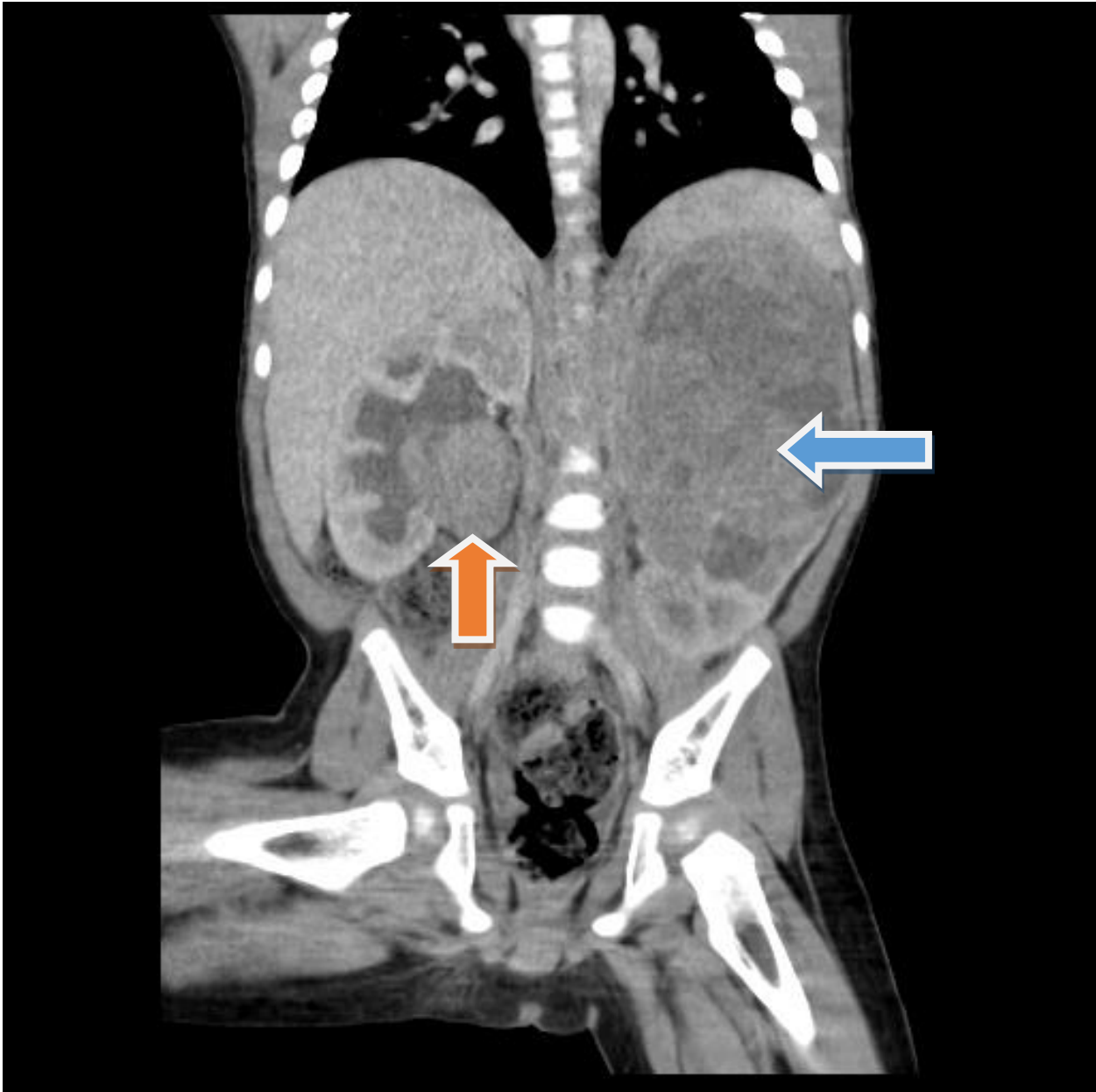


Figure 2a: Contrast enhanced computed tomography of the abdominopelvic coronal reformat shows hypodense mass involving both kidneys (left (blue arrow) and right (orange arrow)).



Figure 2b: Axial non contrast computed tomography of abdomen showing hypodense mass in both kidneys (white arrows)



Figure 3: Urethral mass at the tip of the penile meatus. This was later confirmed to be necrotic tissue debris from sloughing of the wilms tumor



Figure 4: Urethral meatal mass extracted for histopathological analysis which reveal necrotic tissue.

DISCUSSION

Wilms tumour can arise anywhere within the renal medulla or cortex and can protrude into the calyces and ureter and in 6% of patients the tumour extends into the renal vein or inferior vena cava(Qureshi et al., 2021).

The incidence of end stage renal disease is significantly higher in children with bilateral wilms tumour and the risk of renal failure increases with the loss of more than 50% of renal mass, however the prognosis is relatively

good as curative therapy is achievable in the majority of cases (90%)(Spreafico et al., 2021). The preservation of maximum amount of renal parenchymal is needed to prevent renal failure but complete resection is required to optimize the chances for cure of the malignancy(Martos Rodriguez et al., 2026)

The major challenge in bilateral renal tumour is to achieve cure rate and at the same time

to preserve sufficient renal tissue for normal growth and development(Alhashim et al., 2024; Wahyudi et al., 2020)

Staging according to the National Wilms Tumour Study(NWTS) comprises stage i: tumour limited to the kidney and completely resectable; stage ii: tumour extending beyond the kidney but still completely resectable; stage iii: residual tumour confined to the abdomen without distant metastasis; stage iv: haematogenous metastasis to lung, liver, bone, brain and stage v: bilateral renal involvement appearing initially or manifesting during treatment(Bhutani et al., 2021).

Bilateral Wilms tumour are all considered stage v disease and generally both kidneys are asymmetrically involved, one kidney being more severely affected than the other. The index patient had left kidney more severely affected than the right.

Synchronous bilateral wilms tumour represent 4%-7% of all wilms tumour and most patients present with synchronous disease(Asfour et al., 2025). The index patient had synchronous involvement.

Wilms tumour most commonly metastasises to lungs, followed by lymph nodes, and liver, rarely it metastasises to bone, bone marrow or brain. The chest radiograph of the index patient was essentially normal on admission. Imaging findings are solid, often heterogenous, intrarenal masses with internal hemorrhage, fat, necrosis or calcification.

On ultrasound wilms tumour appear heterogenous in echogenicity due to the presence of hemorrhage, fat, necrosis or calcification(Bălănescu et al., 2022)The index patient had heterogenous pattern, however the presence of calcifications could not be ascertained.

On computed tomography(CT) the mass may also appear heterogenous in density, while on contrast enhanced computed tomography it demonstrate tumour extension into the renal vein, inferior vena cava(IVC), hepatic vein and nodal metastasis(de Carvalho et al., 2021). In the index case the mass is hypodense on both views of the contrast enhanced images; no tumour extension into the renal vein seen.

Magnetic resonance imaging(MRI) will show wilms tumour as low signal intensity on T1weighted and high signal on T2weighted images, MRI is the most sensitive modality for determination of IVC patency, however the long sedation period has limited its use

in young children(de Carvalho et al., 2021). The index patient did not have an MRI scan done due to its non suitability.

Positron emission tomography CT allows accelerated metabolic activity to be accurately anatomically localised for proper staging, assessment of treatment response, surgical and radiotherapy planning.

The current recommendation for treatment of synchronous bilateral wilms tumour are biopsy, followed by neoadjuvant chemotherapy (Duncan et al., 2024) and then renal salvage procedures such as partial nephrectomy or tumourectomy(Neagu et al., 2025).

Preoperative chemotherapy is important because each kidney is staged separately and complete resolution of the disease in one kidney may allow surgery on the other kidney to achieve definitive cure(Chintagumpala et al., 2022)

Nephron sparing surgery when combined with adjuvant radiation and or chemotherapy, provides an opportunity to preserve renal function while maintaining excellent long term oncological outcomes for patients with bilateral wilms tumour. Bilateral nephron sparing surgery should be considered for all patients who have bilateral wilms tumour with favourable histology(Martos Rodriguez et al., 2026).

Survival of patients with wilms tumour has improved due to advances in imaging, histological methods of diagnosis, development of risk adapted therapy and improved staging(Bhutani et al., 2021). Although prognosis is dependent on individual staging and treatment, other factors that may contribute to poor outcome are under staging and or under treatment(Theilen et al., 2022).

SUMMARY

This is a case of a two year old boy with bilateral wilms tumour who presented with acute urinary retention from a necrotic urethral meatal mass which most probably resulted from dislodged necrotic tissue from the renal tumour into the urinary system. Unfortunately the child was not given the opportunity to complete the management of the tumour by the parents.

References

- Alhashim, M., Anan, N., Tamal, M., Altarrah, H., Alshaibani, S., & Hill, R. (2024). A review on optimization of Wilms tumour management using radiomics. *BJR/ Open*, 6(1), tzae034.
- Asfour, H. Y., Zekri, W., Hussein, M. H., Elkinaai, N., Sobhy, S., Helmy, M. M., Nasr, A., Refaat, A., Gamal, R., & Younes, A. (2025). Clinical outcome of 115 patients with synchronous bilateral Wilms' tumor: largest cohort of single-center experience. *Frontiers in Oncology*, 15, 1630923.
- Bălănescu, R. N., Băetu, A. E., Moga, A. A., & Bălănescu, L. (2022). Role of ultrasonography in the diagnosis of Wilms' tumour. *Children*, 9(8), 1252.
- Bernardo, G. D., Lucariello, A., Saggese, A., Giordano, M., Sordino, D., Buonomo, C., Gisone, S., Luca, A. D., Guerra, G., & Perna, A. (2019). Bilateral Wilms tumor with neonatal onset and the importance of prenatal diagnosis.
- Bhutani, N., Kajal, P., & Sharma, U. (2021). Many faces of Wilms Tumor: Recent advances and future directions. *Annals of Medicine and Surgery*, 64, 102202.
- Chintagumpala, M. M., Perlman, E. J., Tornwall, B., Chi, Y. Y., Kim, Y., Hoffer, F. A., Kalapurakal, J. A., Warwick, A. B., Shamberger, R. C., & Khanna, G. (2022). Outcomes based on histopathologic response to preoperative chemotherapy in children with bilateral Wilms tumor: A prospective study (COG AREN0534). *Cancer*, 128(13), 2493-2503.
- de Carvalho, L. G., Kobayashi, T., Cypriano, M. d. S., Caran, E. M. M., Lederman, H. M., Alves, M. T. d. S., & Abib, S. d. C. V. (2021). Diagnostic errors in Wilms' tumors: Learning from our mistakes. *Frontiers in Pediatrics*, 9, 757377.
- Duncan, C., Sarvode Mothi, S., Santiago, T. C., Coggins, J. A., Graetz, D. E., Bishop, M. W., Mullen, E. A., Murphy, A. J., Green, D. M., & Krasin, M. J. (2024). Response of bilateral Wilms tumor to chemotherapy suggests histologic subtype and guides treatment. *JNCI: Journal of the National Cancer Institute*, 116(8), 1230-1237.
- Ikhuorah, T., Oboh, D., Musheyev, Y., Abramowitz, C., & Ilyayev, B. (2023). Wilms tumor: A case report with typical clinical and radiologic features in a 3-year-old male. *Radiology Case Reports*, 18(5), 1898-1904.
- Liu, E. K., & Suson, K. D. (2020). Syndromic Wilms tumor: a review of predisposing conditions, surveillance and treatment. *Translational Andrology and Urology*, 9(5), 2370.
- Martos Rodriguez, M., Sudour-Bonnange, H., Ducou Le Pointe, H., Lemelle, L., Bonneau-Lagacherie, J., Pasqualini, C., Boulanger, C., Notz-Carrere, A., Mansuy, L., & Pluchart, C. (2026). Bilateral Wilms Tumor: Looking for the Best Surgical Strategy. *Annals of Surgical Oncology*, 1-9.
- Neagu, M. C., David, V. L., Iacob, E. R., Chiriac, S. D., Muntean, F. L., & Boia, E. S. (2025). Wilms' tumor: a review of clinical characteristics, treatment advances, and research opportunities. *Medicina*, 61(3), 491.
- Pater, L., Melchior, P., Rybe, C., Cooper, B. T., McAleer, M. F., Kalapurakal, J. A., & Paulino, A. C. (2021). Wilms tumor. *Pediatric Blood & Cancer*, 68, e28257.
- Qureshi, S. S., Bhagat, M., Smriti, V., Murli, D., Baheti, A., Yadav, S., Prasad, M., Khanna, N., Laskar, S., & Kembhavi, S. A. (2021). Intravascular extension of Wilms tumor: Characteristics of tumor thrombus and their impact on outcomes. *Journal of Pediatric Urology*, 17(1), 69. e61-69. e68.
- Spreafico, F., Fernandez, C. V., Brok, J., Nakata, K., Vujanic, G., Geller, J. I., Gessler, M., Maschietto, M., Behjati, S., & Polanco, A. (2021). Wilms tumour. *Nature reviews Disease primers*, 7(1), 75.
- Theilen, T.-M., Braun, Y., Bochennek, K., Rolle, U., Fiegel, H. C., & Friedmacher, F. (2022). Multidisciplinary treatment strategies for Wilms tumor: recent advances, technical innovations and future directions. *Frontiers in Pediatrics*, 10, 852185.
- Wahyudi, I., Aritonang, J., Hamid, A. R. A., Situmorang, G. R., Mirza, H., Widia, F., & Rodjani, A. (2020). Management of bilateral Wilms' tumour: A case report. *International Journal of Surgery Case Reports*, 77, 53-56.
- Welter, N., Brzezinski, J., Treece, A., Chintagumpala, M., Young, M. D., Perotti, D., Kieran, K., Jongmans, M. C., & Murphy, A. J. (2023). The pathophysiology of bilateral and multifocal Wilms tumors: what we can learn from the study of predisposition syndromes. *Pediatric Blood & Cancer*, 70, e29984.



PERSONAL CHARACTERISTICS AS DETERMINANTS OF STUDENTS' CLIMATE CHANGE AWARENESS IN RURAL COMMUNITIES IN ABIA STATE

BY

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Abstract

The investigated the demographic determinants of climate change awareness for living in rural communities in Ikwuan local government area of Abia state, Nigeria. The study employed a descriptive survey research design. Eight research purposes with eight corresponding research questions, and eight null hypotheses guided the study. The geographical scope of the study was Ikwuano LGA of Abia State. The population of the study consists of 2,735 secondary school students in Abia State aged between 12 – 19 years. The sample size of the study was 348 selected through purposive sampling techniques. The instrument used for data collection was a structured questionnaire developed by the researchers and titled climate change awareness and adaptation questionnaire. This instrument was validated by three experts two from the Department of Social Science Education and one from Measurement and Evaluation Unit of the Department of Science Education. The instrument had an overall reliability index 0.70. The researcher with the aid of research assistants administered the questionnaire. The questionnaire was completed and returned immediately. The data collected for the study were analyzed using mean, standard deviation, t-test and ANOVA. The findings of the study revealed that demographic variables such as age, parental income and education level have significant influence on students' awareness of climate change in Abia State. The students' gender did not significantly determinants their climate change and adoption of climate change awareness. Based on the findings, the study among others recommended that Governments should take the lead in developing and implementing climate change education policies, allocating resources, and establishing research centres for climate change awareness and adaptation. They should also support community-based initiatives and monitor program effectiveness.

Key Words: Climate, Climate Change, Awareness, Adaptation, Rural Settlement

Introduction

A Major threat to global environment in the past two decades is climate change. Climate change is a long-term change in the distribution of weather element over periods of time typically decades or longer with changes in mean and variability (World Bank, 2021). Climate change is the “long-term change in the average weather patterns that have come to define Earth’s local, regional and global climates National Aeronautics and Space Administration (NASA), (2018). Succinctly, climate change refers to any observed variations in climate systems

resulting from human activities, particularly those that interrupt the earth's atmospheric composition and equilibrium eventually contribute to what is known as global warming.

In Nigeria, the impact of climate change is clearly evident. Nigeria’s climate has been changing, and this is evident in the increase in temperature; variable rainfall, rise in sea level and flooding; drought and desertification; land degradation; and many more frequent extreme weather events. According to

Ifeanacho and Okudu (2020), the durations and intensities of rainfall have increased, producing large runoffs and flooding in many places. These changes are impacting agriculture and food security, depleting resources in every part of the country and posing a serious food security challenge in the face of a rapidly growing population. Low crop yield, food shortages, reduced livestock production, loss of income, and growing desperation over food supply are driving resource conflicts across Nigeria (Dauda, 2023).

Many environmental issues are subject to verifiable interpretations; climate change is one of them. Illness is often explained in terms of climate change, especially at the beginning of rainy season and dry season. It is interesting to know that the word 'climate' is the average weather pattern of a place. It includes the following: patterns of temperature, precipitation (snow or rain), humidity, wind and seasons.

Climate change awareness is rapidly evolving, with fresh perspectives emerging to encapsulate its multifaceted nature. The Intergovernmental Panel on Climate Change (IPCC) described it as "the understanding of the human influence on the climate system, its effects, and potential future impacts" (IPCC, 2018). The United Nations Framework Convention on Climate Change (UNFCCC) adopts a more action-oriented stance, framing climate change awareness as "the process of becoming aware of the effects of climate change and how to address them" (UNFCCC, 2024). Abbass, Qasim., Song, Murshed, Mahmood, & Younis (2022) described climate change awareness as "the capacity to notice, comprehend, respond to, and anticipate climate change impacts. Climate change awareness and understanding are essential for properly assessing its effects and dangers on a local and global level as well as encouraging actions across diverse strata of society to address climate change (Joro et al., 2022). Climate change awareness is important to understanding the causes and effects of climate change, as well as taking actions to adapt to the impacts of climate change.

According to the Institute for Security Studies Africa (2022), women often bear the brunt of climate change impacts due to their traditional roles in water and food security.

This can lead to increased workloads and vulnerability, particularly in developing countries where women have limited access to land, credit, and technology (Ayanlade, 2023). Understanding the gender dimensions of climate change awareness is crucial for designing inclusive and effective strategies. Parent's income level can also determine students' ability to be aware of climate changes in the society.

Research suggests a nuanced interplay between age and climate change awareness, with varying abilities to cope across different life stages. Age in this study refers to a combination of biological and chronological age. Climate change impacts young and old people differently and also limits their ability to adapt to these impacts. Children, who are chronologically young, often lack the knowledge, autonomy and experience to navigate climate risks effectively like older people (Ayalon & Roy, 2023). Like Age, income level informs climate change adaptation. Research paints a stark picture of how income level shapes climate change awareness. Wealthier individuals and communities can afford investments in climate-resilient infrastructure and technology, like flood-proof homes or drought-resistant crops (Thorn et al., 2021).

The level of education an individual has attained somewhat informs the individual's climate change awareness and resilience. Higher education levels equip individuals with the knowledge and skills to understand climate risks, access technology and information, and implement adaptation strategies, as studies across regions show (Reimers, 2020). Farmers with education in drought-resistant agriculture better adjust to changing rainfall patterns (Novenario, 2023). Conversely, limited education restricts information and adaptation options, particularly for marginalized communities, exacerbating their vulnerability. Conversely, limited education can hinder access to information and resources. The influence of personal characteristics (demographic variables) on individuals' awareness and response to climate change has remained a pressing question. Thus, this study delves into this crucial topic, examining how personal characteristics like age, gender, income level, and level of education shape climate change awareness among students in rural communities in Abia state, Nigeria.

Purpose of the Study

The study investigated the demographic variables that determine of climate change awareness of secondary school students' in rural communities of Abia State, Nigeria. Specifically, the study ascertained whether;

1. Gender determine climate change awareness of rural secondary school students.
2. Age determine climate change awareness of rural secondary school students.
3. Parental level of education determine climate change awareness of rural secondary school students.
4. Parental income level determine climate change awareness of rural secondary school students.

Research Questions

The following research questions were posed to guide the study:

1. How does gender determine climate change awareness of rural secondary school students.
2. How does age determine climate change awareness of rural secondary school student.
3. How does parental level of education determine climate change awareness of rural secondary school students.
4. How does parental income level determine climate change awareness of rural secondary school students.

Method

Ex post-facto research design was adopted for the study. According to Shaporovha (2012), ex post-facto research is a type of study which aims at collecting data, and describing in a systematic manner, the characteristics, features or facts about a given population.

The study was carried out in Abia State, Nigeria. The population of the study

was 2,735 secondary school students in the 9 secondary schools in Ikwuano LGA of Abia state . This population consist of 703 and 600 students respectively for junior and senior male students respectively while 730 and 702 represent junior and senior female student, making of a total of 2,735 students in all. The sample size for the study is 348 secondary school students, selected through the purposive sampling technique. The sample size was first computed using Taro Yamane formula for sample size determination.

The instrument for data collection was the climate change awareness questionnaire (CCAQ) developed by the researchers. The instrument was structured into two sections A and B. Section A sought to collect data on respondents' demographic variables. These variables are gender, age, income level and educational level. Section B contains the questionnaire items and is organized into two clusters I and II. Cluster I contains 40 items, designed with a 4-point response option of very highly aware (VHA), highly aware (HA), aware (A) and not aware (NA). Cluster II contains 13 items, design on a response option of very highly aware, highly aware, aware and not aware. The Cronbach Alpha technique was used to determine the reliability estimate of the instrument. This technique was considered ideal for determining the reliability of the CCAQ because the items that make up the instrument are polychotomously scored. The reliability coefficients CCAQ was 0.74. Mean of 2.50 was used as the criterion level to accept or reject the mean responses.

Results

The presentation of the results was done in tables based on the research questions that guided the study.

Research Question 1: How does gender determine rural secondary school students' awareness of climate change?

Table 1: Mean rating and standard deviation analysis on gender and rural secondary school students' awareness of climate change.

Gender	N	Mean	SD
Male	166	2.61	0.91
Female	182	2.63	0.77

Table 1 revealed that the mean and standard deviation of male and female respondents are 2.61 and 2.63. These mean scores are above the 2.50 acceptance benchmark which implies that both male and female students are aware of climate change. However, female respondents

expressed higher awareness of climate change. This prompted further analysis to ascertain if this difference is significant.

Research Question 2: How is age a determinant of rural secondary school students' awareness of climate change.

Table 3: Mean rating and standard deviation analysis on age and rural secondary school students' awareness of climate change.

Age	N	Mean	SD
12-14	188	2.56	0.84
15-17	124	2.62	0.76
17-19	36	2.68	0.88

Table above shows that students with age ranging from 12-14 had mean awareness score of 2.56 (0.82), 15-17 age range had mean awareness of 2.62 (0.76) while students with age range 17-19 had mean awareness score of 2.68 (0.88). These mean scores are above the 2.50 acceptance benchmark thus

implying that students of different age ranges are aware of climate change however higher aged students have higher awareness of climate change.

Research Question 3: How is parental income level a determinant of rural secondary school students' awareness of climate change?

Table 3: Mean rating and standard deviation analysis on parental income level and rural secondary school students' awareness of climate change.

Parental Income	N	Mean	SD
Low Income	226	2.54	0.77
Middle Income	95	2.63	0.67
High Income	27	2.69	0.61

Table 3 above shows that students with low level income parents recorded mean awareness score of 2.54 (0.77), students with middle income parents had mean awareness score of 2.63 (0.67) while students with high income parents expressed mean awareness score of 2.69 (0.61). These mean scores are

above the 2.50 acceptance benchmark thus implying that they are accepted. However higher levels of parental income level expressed higher levels of climate change awareness among rural students.

Research Question 4: How does parental educational level determine rural secondary school students' awareness of climate change.

Table 4: Mean rating and standard deviation on parental educational level and rural secondary school students' awareness of climate change.

Parental Education Level	N	Mean	SD
Uneducated	89	2.52	0.78
Primary Education	131	2.56	0.76
Secondary Education	103	2.68	0.88
Tertiary Education	25	2.72	0.89

Table 4 indicates that students with uneducated parents, primary education, secondary education and tertiary education expressed respective mean and standard

deviation scores of 2.52 (0.78), 2.56 (0.76), 2.68 (0.88) and 2.72 (0.89). These mean scores are above the 2.50 acceptance benchmark thus indicating high awareness of climate change among students with varying

level of parental education. Also, students with higher levels of parental education level expressed higher awareness scores.

Discussion

Gender as determinant of Rural Secondary School Students' Awareness of Climate Change

The study found that male and female rural secondary school students' expressed similar levels of climate change awareness with female students expressing higher awareness scores. Further analysis showed that the difference in their level of awareness on climate change phenomenon based on gender showed that the observed difference in awareness was not statistically significant. The finding that male and female rural secondary school students exhibit similar levels of climate change awareness, with females showing slightly higher awareness scores, is a noteworthy discovery. Several factors contribute to this outcome. Firstly, gender equality in education plays a significant role. Both males and females have equal access to education, leading to similar exposure to climate change information through the school curriculum. Female empowerment initiatives and active participation in environmental clubs may contribute to the slightly higher awareness scores among females. However, the overall similarity in awareness levels suggests that both genders have equal opportunities to engage with climate change information. This finding is in line with the finding of Shaporovha (2012) found out that the students' gender influence their climate change awareness. Also, in corroboration, Ishaya and Abaje (2018) who revealed that gender has no significant influence on students' climate change awareness. Bolaji and Adekoye (2012) also reported that gender has no significant influence on students' climate change awareness.

Age as a determinant of Rural Secondary School Students' Awareness of Climate Change

The study also found that rural secondary school students' in Ikwuano LGA of Abia State of different age ranges are aware of climate change. Further analysis showed that the difference in their level of awareness on climate change phenomenon based on their age showed that the observed

difference in awareness was statistically significant. The study's revelation that rural secondary school students exhibit varying levels of climate change awareness across different age ranges, with statistically significant differences, is a profound finding. This disparity can be attributed to several factors. As students mature, their cognitive abilities refine, enabling better comprehension of complex climate change concepts. Senior students have received more extensive education, including environmental science and climate change topics, thereby broadening their understanding. Life experiences, such as witnessing climate-related events, also contribute to heightened awareness among older students. Social influence plays a significant role, as peer discussions and social media exposure amplify climate change awareness. In consonance with this study finding, Daniel (2016) reported that age significantly influenced respondents' awareness to climate change. In contrast, Shaporovha (2012) reported that students' age has no significant influence on their climate change awareness.

Parental Income Level as a determinant of Rural Secondary School Students' Awareness of Climate Change

The study also found that rural students with higher levels of parental income level expressed higher levels of climate change awareness. Further analysis showed that the difference in their level of awareness on climate change phenomenon based on parental income level showed that the observed difference in awareness was statistically significant. The study found that rural students from higher-income families exhibit greater climate change awareness. This disparity can be attributed to several factors. Access to quality education, a privilege of higher-income families, exposes students to climate change information, fostering awareness. Greater financial resources also provide access to diverse information channels, such as newspapers, television, internet, and social media, further broadening climate change knowledge. Social networks and environmental experiences, more common among affluent families, contribute to heightened awareness. Samara (2018) also reported that students from parents in occupations with higher income have more

climate change awareness than those from parents with lower income occupation.

Parental Education Level as a determinant of Rural Secondary School Students' Awareness of Climate Change

An important outcome here is that rural students with parents having higher educational level expressed high awareness of climate change. The revelation that rural students with higher levels of parental education exhibit greater climate change awareness is a compelling discovery. This can be attributed to several factors. Educated parents are more likely to engage their children in climate change discussions, fostering awareness and understanding. They are also likely to instill environmental values, shaping their children's perspectives and influencing their attitudes toward climate change. Furthermore, educated parents provide access to diverse information channels, encouraging critical thinking and media literacy. In consonance, Klistoch (2015) and Samara (2018) indicated that parental level of education has significant influence on students' climate change awareness. In consonance, Samara (2018) reported that education level has significant determinant of students' climate change awareness. In contrast, Nkola (2018) and Davidson (2017) reported that parents' level of education has no significant influence on students' climate change awareness and adaptation.

Gender as determinant of rural secondary school students' awareness of climate change

The study found that male and female rural secondary school students' expressed similar levels of awareness on climate change adaptation strategies however female students expressed lower mean score. Further analysis showed that the difference in their level of awareness on climate change adaptation strategies based on gender showed that the observed difference was not statistically significant. The study's finding that male and female rural secondary school students exhibit similar levels of awareness on climate change adaptation strategies, with females scoring slightly lower, is a noteworthy discovery which is consistent with Ahmed (2013) who conducted a study on the influence of gender on students' climate change adaptation in selected secondary schools in Wakiso District,

Sokoto State and revealed that gender has influence on students' climate change adaptation. Galadima (2017) also revealed that gender has influence on students' climate change adaptation and mitigation strategies. This similarity can be attributed to equal access to education and shared environmental experience. This finding is also in line with the findings of Musa (2013) who revealed that gender has no significant influence on students' climate change adaptation.

Conclusion

Based on the research findings, the study hereby concludes that personal characteristics such as age, parental income and education level have significant influence on students' awareness and adoption of climate change adaptation strategies in rural communities in Abia State. The study also concludes that students' gender did not significantly influence students' awareness of climate change in the rural communities in Abia State.

References

- Abbass, K., Qasim, M. Z., Song, H., Murshed, M., Mahmood, H., & Younis, I. (2022). A Review of the Global Climate Change impacts, adaptation, and Sustainable Mitigation Measures. *Environmental Science and Pollution Research*, 29(1), 42539–42559. Springer. <https://doi.org/10.1007/s11356-022-19718-6>
- Ayalon, L., & Roy, S. (2023). *The role of chronological age in climate change attitudes, feelings, and behavioral intentions: The case of null results*. *PLoS ONE*, 18(6), e0286901–e0286901. <https://doi.org/10.1371/journal.pone.0286901>
- Ayanlade, A., Oluwatimilehin, I. A., Ayanlade, O. S., Adeyeye, O., & Abatemi-Usman, S. (2013). Gendered vulnerabilities to climate change and farmers' adaptation responses in Kwara and Nassarawa States, Nigeria. *Humanities and Social Sciences Communications*, 10(1), 1–15. <https://doi.org/10.1057/s41599-023-02380-9>
- Bolaji & Adekoye T. M. (2012). *Funtua: A History of Maska and Funtua Districts*.



- Kano, Alfikra Publication Ventures Nigeria Limited.
- Davidson (2017). Why gender? <<http://www.fao.org/gender/gender-home/gender-why/whygender/en/> site> accessed 21.3.2019)
- Intergovernmental Panel for Climate Change. (2018). *IPCC Sixth Assessment Report*. [Www.ipcc.ch](http://www.ipcc.ch).
<https://www.ipcc.ch/report/ar6/wg2/chapter/annex-ii/>
- Institute for Security Studies Africa. (2022). *African women bear the brunt of climate change*. ISS Africa.
<https://issafrica.org/pscreport/psc-insights/african-women-bear-the-brunt-of-climate-change>.
- Ishaya & Abaje J. (2018). *Climate Change Denial: Head in the Sand*. London: Earth-Scan, pp 43 - 46.
- Joro, M., Leitro, A., Silva, R. M., Monteiro, V., & Melo, P. (2022). Climate Change Prevention through Community Actions and Empowerment: A Scoping Review. *International Journal of Environmental Research and Public Health*, 19(22), 14645–14645.
<https://doi.org/10.3390/ijerph192214645>
- Kenyatta (2013), Farmers' awareness and understanding of climate change and variability in central semi-arid Tanzania, University of Dar es Salaam Library *Journal*, 12 (2), 124138
- Magnan, A. K., Oppenheimer, M., Garschagen, M., Buchanan, M. K., Duvat, V. K. E., Forbes, D. L., Ford, J. D., Lambert, E., Petzold, J., Renaud, F. G., Sebesvari, Z., van de Wal, R. S. W., Hinkel, J., & Purner, H.-O. (2022). Sea level rise risks and societal adaptation benefits in low-lying coastal areas. *Scientific Reports*, 12(1). <https://doi.org/10.1038/s41598-022-14303-w>
- Musa S. (2013). Determinants of Public Awareness and Attitude on Climate Change in Urban Bangladesh: Dhaka as a Case. *European Journal of Scientific Research*: 4(7), 124 - 138.
- National Aeronautics and Space Administrations, NASA. (2014). *What Is Climate Change?* [Science.nasa.gov](http://science.nasa.gov); NASA.
<https://science.nasa.gov/climate-change/what-is-climate-change/>
- Nkola C. (2018). *Perception of an adaptation to climate change by farmers in the Nile Basin of Ethiopia* 1,23–31.
<http://dx.doi.org/10.1017/S002185961000687> accessed 3.8.2018>.
- Rasul, G., & Molden, D. (2019). The Global Social and Economic Consequences of Mountain Cryospheric Change. *Frontiers in Environmental Science*, 7(91).
<https://doi.org/10.3389/fenvs.2019.00091>
- Samara, L. (2018). *Effects of climate variability on tomato crop production in the Offinso North District of Ashanti Region, a dissertation for award of degree of Master of Philosophy, Kwame Nkrumah University*.
- Shaporovha (2012). Determining Sample Size for Research Activities. *Educational and Psychological Measurements*. 30, 607 – 610.
- Thorn, J. P. R., Biancardi Aleu, R., Wijesinghe, A., Mdongwe, M., Marchant, R. A., Shackleton, S. (2021). Mainstreaming nature-based solutions for climate resilient infrastructure in peri-urban sub-Saharan Africa. *Landscape and Urban Planning*, 216, 104235.
<https://doi.org/10.1016/j.landurbplan.2021.104235>
- Ugwuda S.O & Ogbonnaya E. K (2017) Strategies for public awareness of climate change for sustainable livelihood. *Journal of Home Economics Research*, 24(2), 12-22.
- United Nations (UN) (2022) United Nations Climate Change Annual Report (<https://unfccc.int/resource/> accessed 24 April 2022)
- UNFCCC. (2024). *What is the United Nations Framework Convention on Climate Change?* [Unfccc.int](https://unfccc.int); United Nations Climate Change.
<https://unfccc.int/process-and-meetings/what-is-the-united-nations-framework-convention-on-climate-change>
- World Bank. (2021). *World Bank Climate Change Knowledge Portal*. [Climateknowledgeportal.worldbank.org](https://climateknowledgeportal.worldbank.org); The World Bank
- World Health Organization. (2023). *Climate change*. World Health Organization.



ITEM DIFFICULTY AND DISCRIMINATION INDICES IN OSUN STATE, NIGERIA

BY

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Abstract

This study evaluated the psychometric quality of 40 secondary school chemistry multiple-choice items using item difficulty and discrimination indices. The population comprised 5,831 senior secondary students in selected schools in Ilesa East and Egbedore Local Government Areas of Osun State, Nigeria. A sample of 374 students was obtained through stratified random sampling, with sample size determined by a finite-population formula at 5% precision. Data were collected with the Chemistry Multiple-Choice Achievement Test covering organic chemistry, chemical combination, electrolysis, redox reactions, thermodynamics and the periodic table. Classical Test Theory guided the analysis. The instrument produced a Kuder-Richardson Formula 20 coefficient of .70, indicating minimum acceptable but borderline internal consistency. Approximately 72% of the items fell within the acceptable difficulty range of .30-.70, while approximately 68% attained an acceptable discrimination index of at least .30. The documented item examples yielded difficulty values from .24 to .83 and discrimination values from .04 to .60. The findings show that most items functioned adequately, although a substantial minority require revision. Routine item analysis, expert review and a continuously updated chemistry item bank were recommended.

Keywords: Chemistry assessment, Classical test theory, Difficulty index, Discrimination index, Item analysis

Introduction

Assessment is central to chemistry teaching and learning because it provides evidence of students' conceptual understanding, supports instructional decisions and informs promotion, placement and certification. Multiple-choice questions are widely used because they can sample broad curriculum content, support objective scoring and permit efficient comparison of performance. Their efficiency, however, does not guarantee measurement quality. Ambiguous stems, implausible distractors, cueing, content underrepresentation and inappropriate cognitive demand can introduce error and weaken the meaning of test scores. Recent psychometric research therefore emphasises the need to evaluate how individual items function, rather than relying only on total scores (Rashwan et al., 2024; Rezigalla et al., 2024).

Under Classical Test Theory (CTT), the difficulty index is the proportion of examinees who answer an item correctly, while the discrimination index indicates the extent to which the item differentiates stronger from weaker examinees. These indices are

complementary: an item may be easy but still discriminate well, or possess moderate difficulty but discriminate poorly because of ambiguity, a defective key or non-functioning distractors. International studies show that systematic post-examination analysis can identify defective items, strengthen question banks and improve assessment governance (Eleragi et al., 2025; Gebremichael et al., 2025; Hillsley, 2025).

Four gaps justify the present study. Empirically, much recent work on multiple-choice item quality has been conducted in higher education and medical education, with comparatively limited evidence from secondary school chemistry in Nigeria. Methodologically, studies do not always combine difficulty and discrimination evidence into explicit retain-revise-remove decisions based on stated criteria. Theoretically, CTT is often applied procedurally without explaining observed, true and error scores or contrasting CTT with Item Response Theory (IRT). Contextually, evidence on locally developed chemistry tests in Osun State, particularly across schools in different senatorial districts, remains limited.

These gaps constrain evidence-based improvement of classroom chemistry assessment (Ayanwale et al., 2022; Butakor, 2022; Logayah et al., 2024).

This study addresses the gaps by evaluating 40 senior secondary chemistry multiple-choice items with explicit difficulty and discrimination criteria, interpreting the evidence within CTT and identifying items that should be retained, revised or removed. The study is intended to strengthen the validity, reliability and fairness of locally developed chemistry assessments and support teachers in building higher-quality item banks.

Statement of the Problem

Teachers and school administrators commonly interpret chemistry test scores as evidence of achievement, yet the quality of the individual questions producing those scores may remain unknown. Where items are excessively easy, excessively difficult, ambiguously worded or unable to distinguish high- from low-achieving students, total scores may provide misleading feedback and unfairly influence academic decisions. In Osun State, there is limited documented evidence showing whether locally administered secondary school chemistry multiple-choice items meet explicit psychometric standards. A systematic evaluation is therefore required to combine item difficulty and discrimination indices, ground interpretation in a clear measurement framework and identify questions that should be retained, revised or removed.

Purpose of the Study

The study evaluated the psychometric quality of secondary school chemistry multiple-choice tests in selected schools in Osun State, Nigeria. Specifically, it sought to:

1. determine the difficulty levels of the chemistry multiple-choice items;
2. determine the extent to which the items discriminate between high- and low-performing students; and
3. classify the items according to whether they should be retained, revised or removed.

Research Questions

1. What are the difficulty levels of the secondary school chemistry multiple-choice items?
2. To what extent do the items discriminate between high- and low-performing students?

3. Which items meet the stated psychometric criteria, and which require revision or removal?

Literature Review

The psychometric quality of a test item concerns the extent to which it contributes useful and interpretable information about intended learning outcomes. Difficulty is conventionally represented by p , the proportion answering correctly. For achievement testing, a range of difficulties is desirable, although moderately difficult items commonly provide greater differentiation because they generate more response variation. Discrimination represents the relationship between item performance and overall achievement; positive values show that higher-achieving examinees are more likely to answer correctly. Negative or near-zero values are warning signs requiring investigation of the key, wording, curriculum alignment, distractors and scoring (Hillsley, 2025; Rezigalla et al., 2024).

Recent evidence demonstrates the value of systematic item analysis. Rashwan et al. (2024) showed that quantitative indices combined with qualitative review can identify defective items and support a validated question bank. Rezigalla et al. (2024) found that distractor efficiency is related to both difficulty and discrimination, showing that item quality cannot be inferred from one statistic. Eleragi et al. (2025), in a three-year evaluation of 210 items, reported that continuous analysis supports quality improvement, while Gebremichael et al. (2025) similarly emphasised removal or revision of excessively easy, difficult or non-discriminating items. In general education, Logayah et al. (2024) also demonstrated the usefulness of difficulty and discrimination statistics for judging the quality of olympiad multiple-choice items.

Validity concerns the strength of evidence supporting the intended interpretation and use of test scores. Content evidence requires systematic alignment between items, curriculum domains and intended cognitive processes. Expert review may be quantified through item-level and scale-level content validity indices when validators provide structured relevance ratings (Zapata-Ospina & Garcha-Valencia, 2022). Reliability concerns score consistency. For dichotomously scored

items, KR-20 estimates internal consistency; a coefficient of .70 is generally a minimum exploratory threshold, but it is borderline rather than strong and should not be treated as sufficient for consequential individual decisions without further evidence (Reynolds et al., 2021).

Classical Test Theory provides the framework for the study. It assumes that an examinee's observed score (X) consists of a true-score component (T) and an error component (E):

$$r_{xx} = \text{Var}(T) / \text{Var}(X) = \text{Var}(T) / [\text{Var}(T) + \text{Var}(E)]$$

Within CTT, the difficulty index for a dichotomously scored item is:

$$P = R / N$$

where R is the number of correct responses and N is the number of examinees. The upper-lower discrimination index is:

$$D = (RU - RL) / n_g$$

where RU and RL are the numbers answering correctly in the upper and lower groups, respectively, and n_g is the number of students in either group. Positive values approaching 1.00 indicate stronger discrimination; values near zero indicate little differentiation, while negative values suggest a potentially defective item.

IRT models the probability of a correct response as a function of latent ability and item parameters such as difficulty and discrimination. Compared with CTT, IRT can produce item and ability estimates that are less sample-dependent when assumptions, calibration size and model fit are adequate. It nevertheless requires specialised estimation and more demanding diagnostics. CTT was selected because the study sought direct classroom-level screening of a 40-item dichotomous test using an available sample of 374 students and decision rules that teachers can readily interpret. The choice is therefore proportionate to the study purpose, while future studies may compare CTT findings with IRT estimates (Ayanwale et al., 2022; Butakor, 2022).

Methodology

The study adopted a descriptive psychometric evaluation design. The design was appropriate because students' responses to an existing chemistry achievement test were analysed without manipulation of variables. The focus was item functioning under CTT rather than estimation of a causal treatment effect.

The population comprised 5,831 senior secondary school students in selected schools

$$X = T + E$$

The true score is the expected score across an indefinitely large number of equivalent administrations, whereas error represents unsystematic influences such as guessing, temporary inattention, unclear wording, scoring inconsistencies and occasion-specific conditions. Reliability is the proportion of observed-score variance attributable to true-score variance:

in Ilesa East Local Government Area, Osun East Senatorial District, and Egbedore Local Government Area, Osun West Senatorial District, Osun State, Nigeria. The target sample was determined at 5% precision using the finite-population formula $n = N/[1 + N(e^2)]$. Thus, $n = 5,831/[1 + 5,831(0.05^2)] = 374.32$, which was rounded to 374 students. Stratified random sampling was used to obtain proportional representation by local government area, school and class level, after which students were selected randomly within the relevant strata.

Data were collected with the Chemistry Multiple-Choice Achievement Test (CMCA), a 40-item dichotomously scored instrument covering organic chemistry, chemical combination, electrolysis, redox reactions, thermodynamics and the periodic table. Each item had one keyed answer and distractors. A correct response attracted one mark, while an incorrect or omitted response attracted zero; there was no penalty for guessing. The maximum obtainable score was 40.

Face validity was addressed through expert review of clarity, language, format, keying and distractor plausibility. Content validity was addressed through a table of specifications mapping the 40 items to the approved senior secondary chemistry curriculum and intended cognitive demands. Experienced chemistry teachers and a specialist in test construction reviewed the items for relevance, accuracy and representativeness. For quantified content validity, the item-level content validity index is $I-CVI = A/Ne$, where A is the number of

experts rating an item as relevant and N_e is the total number of experts. The scale-level average is $S-CVI/Ave = \sum(I-CVI)/k$, where k is the number of items (Zapata-Ospina & Garcha-Valencia, 2022).

The instrument was pilot-tested with 40 students from schools outside the main study areas to reduce contamination. The pilot responses were analysed using Kuder-Richardson Formula 20: The coefficient was .70. This meets the minimum threshold for exploratory classroom use but is borderline and should be interpreted cautiously. The reported pilot review led to minor revisions of items with unclear distractors or extreme difficulty.

The final CMCA was administered during a 60-minute session under standardised classroom conditions. Uniform instructions and supervision were provided. Response sheets were scored dichotomously, and each student's total score was obtained by summing correct responses.

For each item, difficulty was calculated as $P = R/N$. Values below .30 were classified

as difficult, values from .30 to .70 as acceptable or moderate, and values above .70 as easy. Students were ranked by total score for upper-lower discrimination analysis, and D was computed as $(RU - RL)/ng$. Values of .30 or greater were treated as acceptable; values below .30 required qualitative review, revision or removal. Decisions were based jointly on difficulty, discrimination, curriculum relevance and item-writing quality rather than on a single statistic.

Results and Discussion

Research Question 1: What are the difficulty levels of the secondary school chemistry multiple-choice items?

The reviewer-supplied summary indicates that approximately 72% of the 40 items were within the acceptable difficulty interval of .30-.70. Expressed as whole items, this corresponds to 29 items (72.5%), while 11 items (27.5%) were outside the interval and required review for being too easy or too difficult.

Table 1: Summary of psychometric classifications for the 40-item CMCA

Indicator	Criterion	Acceptable items	Acceptable (%)	Items requiring review
Difficulty index	$.30 \leq P \leq .70$	29	72.5	11 (27.5%)
Discrimination index	$D \geq .30$	27	67.5	13 (32.5%)

Research Question 2: To what extent do the items discriminate between high- and low-performing students?

Approximately 68% of the items attained an acceptable discrimination index of at least .30. This corresponds to 27 items (67.5%). The remaining 13 items (32.5%) had discrimination below .30 and therefore required inspection of their keys, stems, distractors, content alignment and cognitive demand.

Research Question 3: Which items meet the stated psychometric criteria, and which require revision or removal?

Table 2 combines the difficulty and discrimination evidence available for the five item-level examples contained in the submitted manuscript. Item 5 has been reclassified as moderate rather than difficult because $P = .40$ falls within the stated .30-.70 interval. Items 1 and 5 were retained; Item 2 may be retained after review of its distractors because it is easy but discriminates well. Items 3 and 4 require revision or removal because they combine extreme difficulty with poor discrimination

Table 2: Combined item statistics and decisions for the five documented items

Item	Correct	P	Level	Upper	Lower	D	Decision
1	220	.59	Moderate	48	18	.60	Retain
2	280	.75	Easy	50	30	.40	Retain; review distractors
3	90	.24	Difficult	30	28	.04	Revise/remove
4	310	.83	Very easy	40	32	.10	Revise/remove
5	150	.40	Moderate	38	20	.36	Retain

Discussion of Findings

The first major finding was that 29 of the 40 items (72.5%) fell within the acceptable difficulty range. This indicates that most questions provided a reasonable level of challenge. The pattern is broadly consistent with contemporary item-analysis studies in which a substantial proportion of items fell within usable difficulty ranges, although exact proportions differ across disciplines and populations (Eleragi et al., 2025; Logayah et al., 2024; Rezigalla et al., 2024). The 11 items outside the interval may reflect low-level recall, insufficient curriculum coverage, ambiguous wording or weak distractors. Educationally, acceptable items may be retained, but extreme items should undergo targeted qualitative review before reuse. Future studies should report cognitive level and distractor efficiency for every item so that genuine content difficulty can be separated from item-writing defects.

The second major finding was that 27 items (67.5%) attained discrimination of at least .30, whereas 13 items did not. The acceptable proportion shows that most questions differentiated stronger from weaker students, but the number of weak items remains educationally significant. Recent studies report that discrimination is affected by key accuracy, distractor plausibility, item format, curriculum alignment and the match between item demand and examinee preparation (Gebremichael et al., 2025; Hillsley, 2025; Rashwan et al., 2024). The very low values for Items 3 and 4 suggest that their difficulty did not produce useful information about achievement. They may have confused both groups or encouraged guessing. Such items should be checked for miskeying, rewritten and re-piloted. Future research should supplement upper-lower discrimination with point-biserial correlations and differential item functioning.

The third finding concerned joint retain-revise-remove decisions. Items 1 and 5 combined moderate difficulty with acceptable discrimination, while Item 2, although easy, still discriminated well and may be retained after checking its curricular purpose and distractors. Items 3 and 4 should not be reused unchanged. This decision-oriented approach agrees with the view that quantitative indices should trigger, rather than replace, expert review (Eleragi et al., 2025; Rashwan et al., 2024). The practical implication is that school item banks should preserve each item's content domain, cognitive level, difficulty, discrimination, distractor performance and revision history. Subsequent administrations can then show whether revised items function more effectively.

The KR-20 coefficient of .70 provides minimum acceptable but borderline evidence of internal consistency. It is lower than preferred for consequential decisions about individual students. Under CTT, weakly discriminating items and heterogeneous content can increase error variance and depress reliability (Reynolds et al., 2021). Revising or removing defective items may improve score consistency, but reliability must be recalculated after revision rather than assumed to improve. Future research should report confidence intervals for reliability, examine dimensionality and, where feasible, compare CTT results with an IRT model.

Limitations of the Study

The study was limited to selected schools in two local government areas, so the findings should not be generalised to all schools in Osun State without caution. The analysis relied on CTT indices, which are partly sample-dependent, and did not report distractor efficiency, point-biserial correlations, differential item functioning or IRT information functions. In addition, the

submitted files contained complete item-level statistics for only five of the 40 items, so the appendix requires completion from the original analysis output before resubmission.

Conclusion

The 40-item chemistry multiple-choice test demonstrated generally useful but uneven psychometric quality. Approximately 72% of the items had acceptable difficulty and approximately 68% had acceptable discrimination. The evidence supports retention of many items, but a substantial minority require revision, re-keying checks, distractor improvement or removal. The KR-20 coefficient of .70 is adequate only at a minimum exploratory level. Systematic item analysis, expert review and re-piloting are therefore necessary before the test is reused for consequential assessment.

Recommendations

1. Chemistry teachers should conduct item analysis after every major test and preserve the results in a school-based item bank.
2. Items with P outside .30-.70 or D below .30 should undergo expert review of the stem, key, distractors, curriculum alignment and cognitive demand before reuse.
3. Teacher professional development should include blueprint construction, distractor writing, content-validity procedures and interpretation of CTT indices.
4. Revised items should be re-piloted, and KR-20 should be recalculated after weak items are corrected or removed.
5. Future studies should use larger and more diverse samples and extend the analysis to point-biserial correlation, distractor efficiency, differential item functioning and IRT.

References

- Ayanwale, M. A., Chere-Masopha, J., & Morena, M. C. (2022). The classical test or item response measurement theory: The status of the framework at the Examination Council of Lesotho. *International Journal of Learning, Teaching and Educational Research*, 21(8), 384-406.
<https://doi.org/10.26803/ijlter.21.8.22>
- Butakor, P. K. (2022). Using classical test and item response theories to evaluate psychometric quality of teacher-made test in Ghana. *European Scientific Journal, ESJ*, 18(1), 139-165.
- <https://doi.org/10.19044/esj.2022.v18n1p139>
- Eleragi, A. M. S., Miskeen, E., Hussein, K., Rezigalla, A. A., Adam, M. I. E., Al-Faifi, J. A., Alhalafi, A., Al Ameer, A. Y., & Mohammed, O. A. (2025). Evaluating the multiple-choice questions quality at the College of Medicine, University of Bisha, Saudi Arabia: A three-year experience. *BMC Medical Education*, 25, Article 233.
<https://doi.org/10.1186/s12909-025-06700-2>
- Gebremichael, M. W., Baraki, B., Mehari, M.-A., & Assalfew, B. (2025). Item analysis of multiple choice questions from assessment of health sciences students, Tigray, Ethiopia. *BMC Medical Education*, 25, Article 441.
<https://doi.org/10.1186/s12909-025-06904-6>
- Hillsley, K. (2025). Question format is the best predictor of item discrimination: A multivariable analysis. *Journal of Microbiology & Biology Education*, 26(3), Article e00205-25. <https://doi.org/10.1128/jmbe.00205-25>
- Logayah, D. S., Ruhimat, M., Arrasyid, R., & Islamy, M. R. F. (2024). Item analysis of National Geography Olympiad multiple-choice questions (MCQs) in Indonesia. *Cogent Social Sciences*, 10(1), Article 2354971.
<https://doi.org/10.1080/23311886.2024.2354971>
- Rashwan, N. I., Aref, S. R., Nayel, O. A., & Rizk, M. H. (2024). Postexamination item analysis of undergraduate pediatric multiple-choice questions exam: Implications for developing a validated question bank. *BMC Medical Education*, 24, Article 168.
<https://doi.org/10.1186/s12909-024-05153-3>
- Reynolds, C. R., Altmann, R. A., & Allen, D. N. (2021). *Mastering modern psychological testing: Theory and methods* (2nd ed.). Springer. <https://doi.org/10.1007/978-3-030-59455-8>
- Rezigalla, A. A., Eleragi, A. M. E. S. A., Elhussein, A. B., Alfaifi, J., AlGhamdi, M. A., Al Ameer, A. Y., Yahia, A. I. O., Mohammed, O. A., & Adam, M. I. E. (2024). Item analysis: The impact of distractor efficiency on the difficulty index and discrimination power of multiple-choice items. *BMC Medical Education*, 24, Article 445.
<https://doi.org/10.1186/s12909-024-05433-y>
- Zapata-Ospina, J. P., & Garcha-Valencia, J. (2022). Validity based on content: A challenge in health measurement scales. *Journal of Health Psychology*, 27(2), 481-493.
<https://doi.org/10.1177/1359105320953477>



EMOTIONAL INTELLIGENCE AND JOB SATISFACTION AMONG PUBLIC SECONDARY SCHOOL SCIENCE TEACHERS IN ONDO STATE, NIGERIA: IMPLICATIONS FOR ENVIRONMENTAL AND SUSTAINABILITY PRACTICES

BY

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Abstract

Teachers' emotional and occupational well-being may shape their willingness to embed environmental and sustainability practices in science instruction. This study examined the relationships among emotional intelligence, job satisfaction, and environmental and sustainability practices among public secondary school science teachers in Ondo State, Nigeria. A descriptive correlational survey design was adopted. The population comprised all public secondary school science teachers in the state, from whom 202 teachers were selected. Data were collected with the Emotional Intelligence, Job Satisfaction and Sustainability Practices Questionnaire (EIJSSPQ), which was validated by experts, while internal consistency was assessed using Cronbach's alpha. Pearson Product-Moment Correlation and multiple regression were applied at the 0.05 significance level. Emotional intelligence correlated positively with job satisfaction ($r = .62$) and environmental and sustainability practices ($r = .58$), while job satisfaction correlated positively with the practices ($r = .55$). Emotional intelligence and job satisfaction jointly predicted the practices ($R = .71$, $R^2 = .50$, adjusted $R^2 = .49$, $F = 98.45$, $p < .001$). The study concludes that teachers' emotional competence and job satisfaction are significant factors in their engagement in environmental and sustainability practices.

Keywords: Emotional intelligence; job satisfaction; science teachers; environmental practices; sustainability practices.

Introduction

Contemporary science education is expected to develop subject knowledge while also preparing learners to respond responsibly to environmental and sustainability challenges. Public secondary school science teachers therefore perform both instructional and developmental roles: they explain scientific concepts, manage diverse classrooms, model responsible behaviour, and connect learning with environmental issues that affect students' communities. The quality and consistency of these practices may depend not only on teachers' professional knowledge but also on their emotional and occupational well-being.

Emotional intelligence concerns the capacity to perceive, understand, regulate, and use emotions effectively in oneself and in

relationships with others. In teaching, these capacities can support classroom management, constructive responses to stress, collegial relationships, and sustained instructional effort. Recent evidence shows that teachers' emotional intelligence is associated with work engagement, job performance, job satisfaction, and lower intentions to leave the profession (Lu & Chen, 2024; Mírida-López et al., 2022, 2023).

Job satisfaction reflects teachers' overall evaluation of their work and of important job conditions such as leadership, recognition, workload, remuneration, collegial support, and opportunities for professional growth. It is a central indicator of occupational well-being

because satisfied teachers tend to display stronger professional commitment and more positive instructional behaviours. A recent meta-analysis found that teachers' job satisfaction was positively associated with teacher-student interaction, classroom management, instructional support, and student motivation, while it was negatively associated with turnover intentions and absenteeism (Wartenberg et al., 2023).

Environmental and sustainability practices in this study refer to teachers' integration of environmental issues, conservation activities, real-life environmental examples, responsible resource use, and environmental awareness activities into science teaching. UNESCO (2020) identifies teachers as central actors in education for sustainable development because curriculum transformation depends on their knowledge, motivation, pedagogical competence, and institutional support. Yet, the integration of sustainability into classroom practice remains uneven, and teacher preparation literature continues to identify gaps in competence, confidence, and implementation opportunities (Raman et al., 2022).

Emotionally intelligent teachers are better positioned to recognise emotional cues, regulate frustration, respond constructively to classroom difficulties, and sustain productive relationships with students and colleagues. Collie (2021) demonstrated that workplace conditions and personal adaptive resources are important to teachers' stress and emotional exhaustion. More directly, Lu and Chen (2024) found that teachers' emotional intelligence positively influenced team-member exchange and job performance, indicating that emotional competence can support both interpersonal collaboration and task accomplishment. Mñrida-Lopez et al. (2023) also reported that emotional intelligence was positively related to teachers' work engagement, with perceived stress playing an important explanatory role. These findings suggest that emotional intelligence may help teachers invest effort in instructional activities that extend beyond routine delivery.

Teachers' job satisfaction is shaped by both intrinsic and extrinsic conditions. Intrinsic sources include meaningful work, professional accomplishment, and relationships with learners, whereas extrinsic sources include salary, promotion, leadership, workload, resources, and recognition. In the Nigerian context, Akomolafe and Ogunmakin (2014) found that emotional intelligence and self-efficacy contributed to the prediction of secondary school teachers' job satisfaction. More recent synthesis by Wartenberg et al. (2023) showed that job satisfaction is linked with the quality of teacher-student interactions and instructional support. Thus, teachers who evaluate their work positively may be more willing to invest time, creativity, and discretionary effort in enriched instructional practices.

Science subjects provide direct opportunities to connect classroom content with climate, pollution, biodiversity, resource conservation, health, energy, and responsible consumption. However, the existence of environmental content in a curriculum does not automatically produce sustained classroom implementation. Teachers require suitable pedagogical knowledge, confidence, teaching materials, supportive school leadership, and opportunities for professional learning. UNESCO's (2020) roadmap emphasises action-oriented, interdisciplinary, and transformative learning, while Raman et al. (2022) concluded that teacher preparation remains essential for effective integration of sustainability concepts. Consequently, psychological readiness and satisfaction with the work environment may influence whether teachers consistently translate sustainability expectations into practice.

Existing studies have established links between emotional intelligence and job satisfaction, work engagement, retention intentions, and general job performance. Other studies have examined teachers' preparedness for sustainability education. Nevertheless, limited empirical evidence jointly connects emotional intelligence and job satisfaction with the environmental and

sustainability practices of public secondary school science teachers in Nigeria. The present study addresses this gap by examining the relationships among the three variables and the combined predictive contribution of emotional intelligence and job satisfaction to teachers' environmental and sustainability practices in Ondo State.

Problem of the Study

Environmental and sustainability issues increasingly require science teachers to move beyond routine content delivery and provide learning experiences that develop responsible attitudes and practical action. However, teachers working in public secondary schools may face heavy workloads, inadequate resources, limited professional support, and dissatisfaction with important conditions of service. These pressures can reduce the emotional energy and professional commitment required for sustained innovation. Although emotional intelligence may help teachers manage emotions and relationships, and job satisfaction may strengthen commitment to instructional responsibilities, there is insufficient empirical evidence showing how these factors relate jointly to the environmental and sustainability practices of science teachers in Ondo State. The study therefore investigated whether emotional intelligence and job satisfaction are significantly related to, and jointly predict, teachers' engagement in such practices.

Purpose of the Study

The purpose of the study was to examine the relationship among emotional intelligence, job satisfaction, and public secondary school science teachers' engagement in environmental and sustainability practices in Ondo State, Nigeria. It also determined the combined predictive influence of emotional intelligence and job satisfaction on the teachers' engagement in these practices.

Research Questions

1. What relationship exists among emotional intelligence, job satisfaction, and teachers' engagement in environmental and sustainability practices?

2. What is the combined predictive influence of emotional intelligence and job satisfaction on teachers' engagement in environmental and sustainability practices in Ondo State, Nigeria?

Research Hypotheses

1. H_{01} : There is no significant relationship among emotional intelligence, job satisfaction, and public secondary school science teachers' engagement in environmental and sustainability practices in Ondo State, Nigeria.
2. H_{02} : Emotional intelligence and job satisfaction do not significantly jointly predict public secondary school science teachers' engagement in environmental and sustainability practices in Ondo State, Nigeria.

Methodology

A descriptive correlational survey design was adopted because the study sought to determine the relationships among emotional intelligence, job satisfaction, and teachers' engagement in environmental and sustainability practices without manipulating the variables. The population comprised all science teachers in public secondary schools in Ondo State, Nigeria, while 202 science teachers constituted the sample.

Data were collected using a structured questionnaire titled Emotional Intelligence, Job Satisfaction and Sustainability Practices Questionnaire (EIJSSPQ). Section A obtained demographic information; Section B measured emotional intelligence; Section C assessed job satisfaction; and Section D measured teachers' engagement in environmental and sustainability practices. The items were rated on a four-point Likert scale ranging from Strongly Agree to Strongly Disagree. Experts in educational psychology, science education, and measurement and evaluation established the face and content validity of the instrument. A pilot test was conducted, and internal consistency was assessed using Cronbach's alpha, with .70 adopted as the minimum acceptable criterion.

Pearson Product-Moment Correlation was used to answer the first research question

and test the first hypothesis. Multiple regression analysis was used to answer the second research question and test the second hypothesis. All hypotheses were tested at the .05 level of significance.

Results and Discussion

Research Question One and Hypothesis One

What relationship exists among emotional intelligence, job satisfaction, and teachers' engagement in environmental and sustainability practices?

Table 1: Correlation Matrix of Emotional Intelligence, Job Satisfaction, and Environmental and Sustainability Practices (N = 202)

Variables	EI	JS	ESP
Emotional Intelligence (EI)	1.00	.62*	.58*
Job Satisfaction (JS)	.62*	1.00	.55*
Environmental and Sustainability Practices (ESP)	.58*	.55*	1.00

* Correlation is significant at the .05 level (two-tailed).

Table 1 shows positive and significant relationships between emotional intelligence and job satisfaction ($r = .62$), emotional intelligence and environmental and sustainability practices ($r = .58$), and job satisfaction and environmental and sustainability practices ($r = .55$). Therefore, the first null hypothesis was rejected. The result indicates that teachers with stronger emotional competence tend to report greater job satisfaction and more frequent engagement in environmental and sustainability practices.

The positive relationship between emotional intelligence and job satisfaction supports Akomolafe and Ogunmakin (2014), who found that emotional intelligence contributed to the prediction of job satisfaction among Nigerian secondary school teachers. It also supports Mñrida-Lopez et al. (2022), whose findings linked higher emotional intelligence with greater job satisfaction and lower intentions to leave teaching. The relationship between emotional intelligence and environmental and sustainability practices is also consistent with Lu and Chen (2024), who reported that teachers' emotional intelligence positively affected job performance, and with Mñrida-Lopez et al. (2023), who found a positive

link between emotional intelligence and teachers' work engagement. Although these studies examined general performance or engagement rather than sustainability-oriented practice specifically, their findings support the present result that emotional competence is associated with greater professional involvement.

The positive relationship between job satisfaction and environmental and sustainability practices supports Wartenberg et al. (2023), whose meta-analysis found that teachers' job satisfaction was positively associated with classroom management, instructional support, teacher-student interaction, and student motivation. The current finding extends that evidence to sustainability-oriented science teaching in Ondo State, suggesting that teachers who are more satisfied with their work may be more willing to invest discretionary effort in integrating environmental examples, conservation activities, and responsible resource-use themes into instruction.

Research Question Two and Hypothesis Two

What is the combined predictive influence of emotional intelligence and job satisfaction on teachers' engagement in environmental and sustainability practices in Ondo State, Nigeria?

Table 2: Regression Summary for the Combined Prediction of Environmental and Sustainability Practices (N = 202)

Model	R	R ²	Adj. R ²	SEE	F	p
1	.71	.50	.49	.52	98.45	< .001

Predictors: (Constant), Emotional Intelligence, Job Satisfaction.

Dependent variable: Environmental and Sustainability Practices.

Table 2 shows a multiple correlation coefficient of $R = .71$. The coefficient of determination ($R^2 = .50$) indicates that emotional intelligence and job satisfaction jointly accounted for 50% of the variance in teachers' environmental and sustainability practices. The model was statistically significant ($F = 98.45$, $p < .001$); consequently, the second null hypothesis was rejected. The result means that the two predictors, considered together, significantly predicted teachers' engagement in the practices.

This finding supports the broader evidence that teachers' personal emotional resources and occupational well-being contribute to professional functioning. Collie (2021) showed that personal and workplace resources are relevant to teachers' stress and emotional exhaustion, while Wartenberg et al. (2023) established that job satisfaction is associated with important instructional outcomes. Similarly, Lu and Chen (2024) demonstrated that emotional intelligence contributes to teachers' job performance. The present result extends these studies by showing that emotional intelligence and job satisfaction jointly explain a substantial proportion of variation in sustainability-oriented practices among public secondary school science teachers. However, because the study used a cross-sectional self-report design, the regression result should be interpreted as prediction rather than proof of causation.

Conclusion

The study concluded that emotional intelligence and job satisfaction are significantly related to public secondary school science teachers' engagement in

environmental and sustainability practices in Ondo State, Nigeria. Teachers who reported higher emotional intelligence and greater job satisfaction also reported stronger engagement in sustainability-oriented practices. Emotional intelligence and job satisfaction jointly accounted for 50% of the variance in the practices, indicating that both personal emotional competence and occupational well-being are important to the implementation of environmental and sustainability themes in science teaching.

Recommendations

1. Education authorities and school administrators should provide regular professional development on emotional awareness, self-regulation, empathy, stress management, and constructive interpersonal communication.
2. Government and school managers should strengthen the conditions that support job satisfaction, particularly reasonable workload, recognition, adequate instructional resources, supportive leadership, and improved welfare.
3. Continuous professional development for science teachers should combine sustainability content with practical pedagogies for integrating local environmental issues, conservation activities, and responsible resource use into classroom instruction.
4. Further studies should use longitudinal, observational, or mixed-method designs to examine how emotional intelligence and job satisfaction influence actual classroom sustainability practices over time.

References

- Akomolafe, M. J., & Ogunmakin, A. O. (2014). Job satisfaction among secondary school teachers: Emotional intelligence, occupational stress and self-efficacy as predictors. *Journal of Educational and Social Research*, 4(3), 487–498. <https://doi.org/10.5901/jesr.2014.v4n3p487>
- Collie, R. J. (2021). COVID-19 and teachers' somatic burden, stress, and emotional exhaustion: Examining the role of principal leadership and workplace buoyancy. *AERA Open*, 7, 1–15. <https://doi.org/10.1177/2332858420986187>
- Lu, T.-P., & Chen, J. (2024). The effects of teacher's emotional intelligence on team-member exchange and job performance: The moderating role of teacher seniority. *Current Psychology*, 43, 4323–4336. <https://doi.org/10.1007/s12144-023-04593-2>
- Mirida-Lopez, S., Carvalho, V. S., Chambel, M. J., & Extremera, N. (2023). Emotional intelligence and teachers' work engagement: The mediating and moderating role of perceived stress. *The Journal of Psychology*, 157(3), 212–226. <https://doi.org/10.1080/00223980.2023.2169231>
- Mirida-Lopez, S., Quintana-Orts, C., Hints, T., & Extremera, N. (2022). Emotional intelligence and social support of teachers: Exploring how personal and social resources are associated with job satisfaction and intentions to quit job. *Revista de Psicodidáctica (English Edition)*, 27(2), 168–175. <https://doi.org/10.1016/j.psicoe.2022.02.001>
- Raman, F. I., Hutagalung, F. D., & Abdul Rahman, M. N. (2022). Preparing pre-service teachers for integration of education for sustainable development in school: A systematic review (2013–2022). *Geografia-Malaysian Journal of Society and Space*, 18(3), 153–169. <https://doi.org/10.17576/geo-2022-1803-10>
- UNESCO. (2020). Education for sustainable development: A roadmap. UNESCO. <https://unesdoc.unesco.org/ark:/48223/pf0000374802>
- Wartenberg, G., Aldrup, K., Grund, S., & Klusmann, U. (2023). Satisfied and high performing? A meta-analysis and systematic review of the correlates of teachers' job satisfaction. *Educational Psychology Review*, 35, Article 114. <https://doi.org/10.1007/s10648-023-09831-4>



COLLABORATIVE INSTRUCTIONAL STRATEGY AND STUDENTS' PERFORMANCE IN BIOLOGY IN EKITI STATE SECONDARY SCHOOLS

BY

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Abstract

This study investigated the effect of collaborative instructional strategy on performance of secondary school students in Biology in Ekiti State. The study adopted a two group quasi-experimental research design of pre-test, post-test and control group design. The population for this study comprised all Senior Secondary Two (SS II) students of Ekiti State, using multistage sampling procedure. The sample used was made up of 190 SS II students sampling procedure the sample used for the study was selected and it consisted of 190 SS II students found in the intact classes of the selected schools. The instrument used in this study was an adapted Biology Performance Test (BPT). The reliability of the instrument (BPT) was determined using test re-test method and a reliability coefficient of 0.87 was obtained. The data collected were analyzed using descriptive and inferential statistics. Findings revealed that students taught using collaborative instructional learning strategy demonstrated significantly better performance in Biology compared to those taught using conventional teaching method. Furthermore, the study found no interactive effect of treatment on students' performance based on gender, suggesting that the strategy was beneficial across different student demographics and learning environments. It is recommended that; the teachers should incorporate collaborative instructional learning strategy into their instructional methods to enhance student engagement, comprehension, and problem solving skills. Policymakers should provide adequate resources, infrastructure, and support to facilitate the successful adoption of collaborative learning in secondary schools, particularly in rural areas.

Keywords: collaboration, collaborative instructional strategies, performance, gender, Biology students

Introduction

Biology as a science subject is fundamental to industrialisation and economy in many aspects of life especially in biochemistry, pharmacy, medicine, nursing, and environmental sciences; where the subject forms the foundational knowledge and skills that can assist man and society immensely as it has a wide range of effects on living things, including maintaining the necessary standard of living for both plants and animals (Uqwadu & Joda, 2015).

The scientific curriculum places a strong emphasis on Biology as a subject (FRN, 2018). This is due to the fact that Biology is life sciences that focus on the structure, function, growth, evolution, distribution, identification, and taxonomy of living things. Man will be able to comprehend the variety of living forms, conservation, and sustainable

use of natural resources through the study of Biology. Every year, despite Biology's enormous contribution to a country's economic growth and development and the efforts made by stakeholders to significantly improve student performance, students continue to perform appallingly in Biology (Joda & Mohammed, 2017; Joda, 2018). This raises questions about the causes of this, including teacher strategies, instructional materials, student-teacher ratios, learning environments, and motivation.

As a result of the abysmal students' results in the senior secondary certificate examination over the years, which could be as a result of the current approaches used by Biology instructors. Additionally, certain Biology topics are considered difficult by secondary school students. Collaborative

learning strategy and other forms of creative, inventive, and interactive instruction can captivate students and help them better understand difficult ideas in foundational courses like Biology, which is essential for achieving success in the classroom. It is also unproductive to only present ideas to students without actively engaging them. Collaborative learning involves interactions between students and teachers; as the students interact with each other within each group. Teachers as a knowledge facilitator and instructor assigns tasks to the students and explains difficult concepts. The teacher's job as a facilitator is to arrange the classroom so that students can collaborate. Considering students' individual variations, teacher arranges the students in a diverse manner. Each group rotates its leadership position as instructed by the facilitator. Every student is welcome to contribute to the discussion and ask questions if necessary. The group can get together to collaborate if there is a personal problem (Monoranjana, 2016). For instance, if a student is struggling with a work, he can use the group leader to get in touch with other members of the group to ask for help in their free time. Without thier teacher's intervention, students might collaborate to solve the particular problem or difficulties. Collaborative learning strategy improve students' performance and cause a positive change in their attitudes towards the subject. Each student is assessed, and the average score for the group is calculated.

According to Umar (2019), collaborative strategy is the most popular and usual teaching strategy compared to traditional teaching methods since it fosters the teaching and learning process more. Collaborative learning teams are reported to achieve higher-level thinking and retain information for longer periods of time than the students working alone (Maxwell, 2015). The material shared is preserved in long-term memory, and the group typically learns through conversation, concept clarification, and appraisal of one another's views. According to research by Chianson, Kurumeh, and Obinda (2016), students who collaborated on computational issues scored much higher than those who worked alone, while students who performed worse improved when they worked in diverse

groups. Students who collaborate in groups also typically exhibit higher levels of intrinsic motivation, intellectual curiosity, empathy, and psychological well-being.

Gender is a sociocultural construct that assigns duties and characteristics to sex, such as male and female. Over the years, scholars have focused on gender inequalities. It has been one of the obvious elements affecting pupils' performance and attitudes. In terms of attitudes and academic achievement, Biology is frequently seen as a subject where male students excel. According to Scafidi and Bui (2018), there is no discernible difference between male and female students' grades or performance.

Male and female students typically perform differently academically, and Popoola (2017) suggests that this difference may be due to the students' attitudes. This suggests that male and female students' attitudes, drive, and methods of learning may have distinct effects on their academic performance. Additionally, it has been noted that when exposed to collaborative learning during Biology classes, female students outperformed male students (Gambari, 2014). Gambari (2014) claims that a particular teaching strategy has an effect on both male and female Biology students' performance. In Biology classes, female students did better than their male peers when they were in collaborative learning contexts. In the context of Biology education, collaborative learning may be especially helpful for female students since it places a strong emphasis on cooperation, group discussions, and peer-to-peer relationships. However, Sidhu (2015) discovered gender disparities that favoured male pupils. The information supplied does not specify the precise rationale behind this preference. It does, however, suggest that male students may perform better than their female counterparts under specific circumstances or instructional strategies. Male and female students exposed to contextual learning strategies did not significantly differ in their performance, according to Gambari and Yussuf (2017).

Statement of the Problem

Since Biology is a practical subject, it must be taught in a way that encourages active

student participation in the teaching and learning process. Despite the importance of Biology, students' performance in the subject has consistently fallen short of expectations on both external (WASSCE and NECO) and terminal school exam (Adeleye & Omotayo, 2020). Researcher observed that Biology teacher are accustomed to traditional chalk-and-talk teaching methods such teacher-centered, competitive, individualistic, and low-profit methods. It has been noted that some Biology instructors forbid their students from interacting and exchanging views. Parents, stakeholders, and science education experts are increasingly concerned about children's performance fluctuations. Students' varying Biology performance may be a result of the instructional methods used by Biology instructors. Although the lecture method of teaching Biology concepts may have the benefit of providing a lot of information that can be used to cover the extensive syllabus in a short amount of time, it may also hinder students' learning processes because learning is an active process that involves more than just listening to the teacher. It has also been noted that pupils' gender may play a role in their inability to grasp certain Biology concepts. It is anticipated that the application of collaborative teaching techniques will likely have a favourable impact on the Biology students' performance.

Purpose of the Study

This study examined how collaborative teaching methods affect secondary school Biology students' academic performance in Ekiti State.

Research Question

A research question was raised to guide the study

1. What is the performance of students in Biology before and after the treatment?

Research Hypotheses

At the 0.05 threshold of significance, the following null hypotheses was formulated in this study

1. There is no significant difference in the students' performance in the

experimental and the control group before treatment.

2. There is no significant difference in the students' performance in the experimental and the control group after treatment.
3. There is no significant difference in the performance of male and female students exposed to collaborative instructional strategy.

Methodology

The research employed in this study was a quasi-experimental of pretest, posttest and control group design. This allows for the evaluation of causality, provides a basis for comparison, addresses internal validity concerns, considers practical and ethical considerations, and enhances the generalisability of the research findings in the context of educational research. A pre-test was administered in order to determine the homogeneity of the groups. 190 SS I1 students from the intact classes of the chosen schools made up the study's sample. The sample was chosen using a multistage sampling procedure. The researcher constructed an instrument called the Biology Performance Test (BPT); it has two sections; A and B. The instrument was validated by experts in Biology Education, Tests and Measurement from the Department of Science Education, and two seasoned Biology instructors who are WAEC/NECO examiners. The test re-test method was used to ascertain the BPT dependability. In order to do this, a pilot research was conducted in public secondary schools that were not part of the sampling area. 20 SSII Biology students were given the test twice over the course of two weeks. The reliability coefficient of 0.87 was obtained when Pearson's Product Moment Correlation Analysis was used.

Results

Research Questions

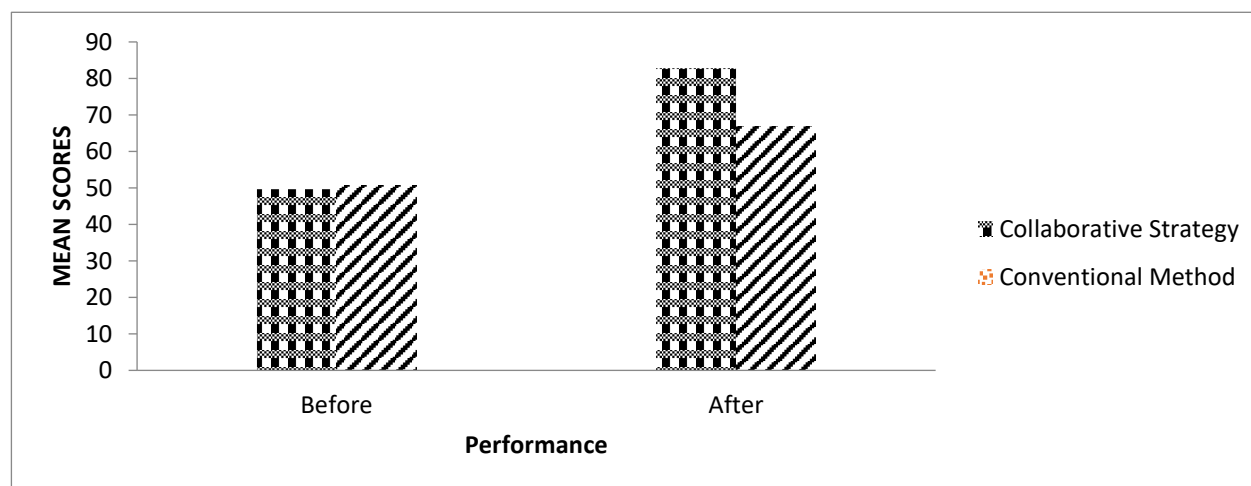
1. What is the performance of students in Biology before and after the treatment?

Table 1: Average and standard deviation of the students' Biology performance before and after the intervention

Variable	N	Before		After		Mean Difference
		Mean	S.D	Mean	S.D	
Collaborative Strategy	101	49.63	6.61	82.84	8.64	33.21
Conventional Method	89	50.55	8.74	66.82	8.41	16.27

Table 1 shows that, when compared to the conventional approach, the experimental group using the collaborative teaching model significantly improved. Students who were taught utilising the collaborative instructional technique had a mean score of 49.63 (S.D = 6.61) prior to the treatment, which rose to 82.84 (S.D = 8.64) following the treatment, yielding a mean difference of 33.21. Students who were taught using the

traditional approach, on the other hand, had a mean score of 50.55 (S.D = 8.74) prior to the therapy, which increased to 66.82 (S.D = 8.41) following it, with a mean difference of 16.27. These findings imply that, as compared to the traditional teaching approach, the collaborative instructional strategy improved students' performance in Biology. Figure 1 below provides more illustration of this:



Hypothesis 1: There is no significant difference in the students' performance in the experimental and the control group before treatment

Table 2: t-test on the experimental and control groups of students prior to treatment

Variable	N	Mean	S.D	df	t	p
Experimental Control	101	49.63	6.61	188		0.821
Conventional Group	89	50.55	8.74			

$P < 0.05$

Table 2 showed that $t = 0.821$; $p = 0.413 > 0.05$. The null hypothesis was not rejected since the p-value was higher than 0.05. This suggests that prior to the invention students' performance in the experimental and control groups did not differ significantly. This implies that both groups are homogeneous, which

means that prior to the intervention their baseline performance was similar.

Hypothesis 2: There is no significant difference in the students' performance in the experimental and the control group after treatment.

Table 3: *t*-test analysis of the performance of students in the experimental group and control group after treatment

Variable	N	Mean	S.D	df	t	p
Experimental Control	101	82.84		8.64		
				188	12.92	0.00
Control Group	89	66.82		8.41		

P<0.05

Table 3, $t = 12.92$; $p = 0.00 < 0.05$. The null hypothesis was disproved since the p-value was less than 0.05. This suggests that following the treatment, there was a notable difference in the performance of the experimental and control groups, suggesting that the collaborative instructional strategy

outperformed the traditional approach in raising biology students' scores.

Hypothesis 3: The performance of male and female students exposed to collaborative instructional strategies does not significantly differ.

Table 4: *t*-test analysis of male and female students exposed to collaborative instructional strategy.

Variable	N	Mean	S.D	df	t	p
Male	64	83.14	8.44			
				99		0.52
Female	37	82.19	9.17			

P<0.05

Table 4 showed that $t = 0.52$; $p = 0.603 > 0.05$. The null hypothesis was not rejected since the p-value was greater than 0.05. This suggests that the collaborative educational technique was equally beneficial for both genders because there was no significant difference in the performance of male and female students exposed to it.

Discussion

The finding of the study revealed that students taught using the collaborative instructional strategy showed a greater improvement in Biology performance compared to those taught with the conventional method. This finding is in consonance with the finding of Adeyemi (2018) which reveals that students exposed to collaborative instructional strategies demonstrated higher academic achievement

than their counterparts taught using traditional methods. The finding is also corroborated by Olagunju and Ogunleye (2020), who found that collaborative learning significantly enhances students' engagement, comprehension, and retention in science subjects. Similarly, the study aligns with the finding of Yusuf and Akinpelu (2019) which established that students taught Biology using collaborative learning strategies exhibited better conceptual understanding and problem-solving skills than those taught through conventional teaching approaches. However, the finding contradicts the finding of the study of Nwosu and Alade (2017) that no significant difference exists in students' academic performance when exposed to collaborative instructional strategy compared to the conventional method. Their study suggested that factors such as teacher effectiveness and students' learning styles play

a more crucial role in academic achievement than the instructional strategy employed.

The finding of the study revealed that there was no significant difference in the performance of male and female students exposed to the collaborative strategy, indicating that the strategy was equally effective for both genders. This finding aligns that study of Adeyemo and Olagunju (2019) that collaborative learning approaches provided equal learning opportunities for both male and female students, leading to comparable academic performance. Similarly, the finding is corroborated by that of Yusuf and Bello (2021) that gender had no significant effect on students' achievement when exposed to student-centered learning methods. In consonance with this, Oyetunde and Ajibola (2022) concluded that collaborative instructional strategies promote inclusive learning, ensuring that both male and female students benefit equally in science education. The finding contradicts the finding from the study of Eze and Okafor (2020), that male students performed significantly better than their female counterparts when exposed to collaborative instructional strategies. Their study suggested that differences in participation levels and confidence in problem-solving activities could account for the disparity. Similarly, the study of Balogun and Adekunle (2018) found that female students exhibited lower engagement in group discussions, which negatively impacted their performance compared to male students which also aligns with that of the study. These conflicting findings highlight the need for further research into how gender dynamics influence the effectiveness of collaborative learning strategies in different educational settings.

Conclusion

It was concluded that collaborative instructional strategy significantly improved students' performance in Biology. There was no significant effect of gender on the performance of students, suggesting the strategy benefits all students equally.

Recommendations

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

1. Teachers should adopt collaborative instructional strategies to enhance students' engagement, comprehension, and problem-solving skills, particularly in science subjects like Biology.
2. Schools should provide training for teachers on effectively implementing collaborative instructional methods, ensuring they can facilitate group activities and maximize student participation.
3. Policymakers and educators should consider factors such as classroom size, resource availability, and student motivation when implementing collaborative instructional strategy to ensure its effectiveness across diverse educational settings.

REFERENCES

- Adeleye, A.M., and Omotayo, K.A. (2020). Effects of Spaced Learning and Blended Learning on Senior Secondary School Students' Interest in Biology in Ekiti State. *Euro Afro Studies International Journal*. 1(2), 11-22.
- Adeyemi, T. (2018). The effectiveness of collaborative learning strategies in enhancing student achievement. *International Journal of Pedagogical Studies*, 10(1), 34-49.
- Adeyemo, K., & Olagunju, M. (2019). Gender differences in academic achievement: The role of collaborative learning strategies. *Nigerian Journal of Educational Development*, 18(1), 78-92.
- Balogun, T., & Adekunle, J. (2018). Examining gender participation in collaborative learning: Effects on student achievement. *Journal of Gender and Education*, 14(2), 55-67.
- Chianson, M. M... Kurumeh, M.S. & Obinda, J. A. (2016). Effect of cooperative learning strategy on students retention in circle geometry in secondary school in Benue State. *America Journal of Scientific and Industrial Research*, 3(1), 90-98.
- Eze, M., & Okafor, N. (2020). Gender disparities in collaborative learning



- effectiveness. *West African Journal of Gender Studies*, 13(1), 45-59.
- FRN, (2018). National Curriculum for science secondary school Biology. Lagos: Government press.
- Gambari, I. A. & Yusuf M. O. (2017). Effects of three cooperative learning strategies on the performance of secondary school student in physics. *Bulgarian Journal of Science Education*, 23 (3)
- Gambari. I. A. (2014). Effect of computer-supported cooperative learning strategies on the performance of senior secondary students in physics, in Minna, Nigeria (Unpublished Ph, D Thesis). University of Florin, florin, Nigeria.
- Joda, F. M. & Mohamed, A. A. (2017). Effect of Guided Inquiry teaching method on senior secondary school Biology students Academic Performance and Retention in Yola Education Zone, Adamawa State, Nigeria. *Multidisciplinary Journal of Science, Technology and Vocational Education*, 5(1), 89-96.
- Joda, F. M. (2018). Effect of concept mapping teaching approach on senior secondary school Biology students Performance in Biology in Adamawa State, Nigeria. *Jigawa Journal of Multi-disciplinary Studies (JJMS)*, 1(1), 140-147.
- Maxwell E. U. (2015). Comparative effects of scaffolding and collaborative instructional approaches on secondary school students' psychomotor performance in basic electronics in North- Central Nigeria. *IOSR Journal of Engineering*, 5 (6), 23-31.
- Nwosu, P., & Alade, T. (2017). Evaluating the impact of collaborative learning: An empirical study. *Journal of Educational Research and Development*, 9(2), 123-138.
- Olagunju, A., & Ogunleye, K. (2020). Enhancing student engagement through collaborative learning: A case study in science education. *International Journal of Science Teaching*, 17(4), 200-215.
- Oyetunde, O., & Ajibola, F. (2022). Promoting inclusivity through collaborative instructional strategies. *West African Journal of Educational Practice*, 16(4), 58-72.
- Popoola, A. A. (2017). Diversity, equity and mathematics learning: consideration of literacy approach. Literacy and reading in Nigeria. *Journal of Reading Association of Nigeria (RAN)* 14 (1), 178-184.
- Scafidi. T. & Bui, K. (2010). Gender similarities in mathematics performance from middle school through high school. *Journal of Instructional Psychology*, 37 (3), 252-255.
- Sidhu, K. S. (2015). *The teaching of Mathematics*. Sterling Publishers Private Limited: New Delhi.
- Ugwuadu, O. R & Joda, F. M. (2015). Reality of teaching Biology in Secondary Schools in Adamawa State, Nigeria. *Educational Forum A Journal of Institute of Education, Ahmadu Bello University Zaria*, 24(1), 59 75.
- Yusuf, R., & Akinpelu, D. (2019). Conceptual understanding and problem-solving skills in Biology: The impact of collaborative learning. *Nigerian Journal of Science Education*, 12(4), 44-59.
- Yusuf, S., & Bello, K. (2021). The role of gender in student-centered learning methodologies. *International Journal of Gender and Education*, 19(2), 93-106.

KNOWLEDGE, ATTITUDE AND PERCEPTION ON GENDER-BASED VIOLENCE AMONG NIGERIAN SECURITY AND CIVIL DEFENCE CORPS (NSCDC) OPERATIVES, PLATEAU STATE COMMAND

BY

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Abstract

This study examined the knowledge, attitudes, and perceptions (KAP) of Gender-Based Violence (GBV) among 217 NSCDC operatives in Plateau State Command using a mixed-methods explanatory sequential design, comprising a quantitative survey and 20 in-depth interviews. Findings revealed moderate knowledge (mean=2.76/4), but critical gaps: only 22.6% were familiar with the VAPP Act (Violence Against Persons Prohibition Act, 2015) and 41.9% knew reporting procedures. Attitudes were ambivalent, accountability support (mean=3.41) coexisted with justification of GBV (mean=2.85) and victim-blaming (mean=2.92). Perceptions were overwhelmingly negative: 93.5% feared retaliation for reporting senior officers, only 25.3% believed procedures were clear, and 38.2% would report a colleague. Qualitative themes inadequate training, culture of silence, and distrust in mechanisms revealed that KAP gaps are embedded in organizational culture rather than individual deficiencies. The study recommends establishing an independent confidential reporting mechanism, enforcing whistleblower protection, mandating annual GBV training, and increasing female recruitment to 35%.

Keywords: Knowledge, Attitude, Perception, Gender-Based Violence, Nigerian Security and Civil Defence Corps

Background to the Study

Gender-Based Violence (GBV) remains one of the most widespread human rights violations globally, affecting nearly one in three women worldwide, with rates significantly higher in conflict-affected settings (WHO, 2022). In Nigeria, 31% of women aged 15–49 have experienced physical violence (NPC & ICF, 2019). The Violence Against Persons Prohibition (VAPP) Act (2015) provides a legal framework for GBV response, but implementation remains weak (Amnesty International, 2021). Security operatives, including the Nigeria Security and Civil Defence Corps (NSCDC), are first responders to GBV. Their ability to recognize GBV, respond appropriately, and support survivors depends on their knowledge, attitudes, and perceptions (KAP). Despite NSCDC initiatives such as gender desks and the N-Alert platform (Channels Television, 2023; Guardian Nigeria, 2024), no systematic KAP assessment has been conducted among its personnel in Plateau State a conflict-affected region with decades of ethno-religious crises and farmer-herder conflicts (Mercy Corps, 2021). This study fills that gap.

Statement of the Problem

Despite legislative progress, GBV remains pervasive in Nigeria, and the response of security agencies has been criticized as inadequate (Amnesty International, 2021). The NSCDC has a dual responsibility: to protect civilians from GBV and maintain internal discipline. However, operatives are sometimes perpetrators, and survivors avoid reporting due to fear of retaliation and distrust in the system (Human Rights Watch, 2019; Frontiers, 2024).

Three key gaps exist. First, there is limited empirical data on what NSCDC operatives know about GBV, including the VAPP Act and reporting procedures. Existing studies focus mainly on the police or military (Duru & Ogbonnaya, 2018). Second, even when knowledge exists, attitudes may be unsupportive victim-blaming and cultural justifications for violence are common (Morrell & Jewkes, 2011). Third, perceptions of institutional response matter greatly; operatives who fear retaliation will not report (Stellenbosch University, 2021). In Plateau State, these challenges are exacerbated by high operational demands and communal

conflict. Most previous studies used only quantitative surveys, missing the lived experiences that shape attitudes. A mixed-methods approach is needed to quantify KAP levels and explore the reasons behind the findings. This study addresses these gaps.

Objectives of the Study

1. Assess the level of knowledge of NSCDC operatives in Plateau State Command regarding the forms, causes, and consequences of Gender-Based Violence.
2. Examine the attitudes of NSCDC operatives in Plateau State Command towards Gender-Based Violence, victims, and perpetrators.
3. Investigate the perceptions of NSCDC operatives in Plateau State Command concerning the effectiveness, accessibility, and fairness of existing policies, reporting mechanisms, and institutional responses to Gender-Based Violence within the NSCDC.

Research Questions

1. What is the level of knowledge of NSCDC operatives in Plateau State Command regarding the forms, causes, and consequences of Gender-Based Violence?
2. What are the attitudes of NSCDC operatives in Plateau State Command towards Gender-Based Violence, victims, and perpetrators?
3. What are the perceptions of NSCDC operatives in Plateau State Command concerning the effectiveness, accessibility, and fairness of existing policies, reporting mechanisms, and institutional responses to Gender-Based Violence within the NSCDC?

Significance of the Study

Academically, it contributes to the growing body of literature on GBV in security institutions, an area that remains under-researched in Nigeria, particularly regarding the NSCDC. By applying the KAP framework, the study provides a holistic assessment that goes beyond simple awareness surveys.

Practically, the study directly benefits NSCDC leadership and training units by identifying specific knowledge deficits (e.g., lack of familiarity with the VAPP Act, misunderstanding of psychological and economic abuse), problematic attitudes (e.g.,

victim-blaming, cultural relativism), and negative perceptions (e.g., fear of retaliation, distrust in reporting channels). Based on these findings, targeted training modules can be developed, reporting mechanisms can be redesigned to be survivor-centered, and whistleblower protection policies can be strengthened.

For policy, the study provides evidence that can inform amendments to the NSCDC Act and the development of national standards for GBV response within paramilitary institutions. The recommendations are grounded in empirical data, making them more persuasive for policymakers and funding bodies. Ultimately, improved KAP among NSCDC operatives enhances the protection of both internal personnel and the civilian population, contributing to safer communities in Plateau State and beyond

Scope of the Study

This study focused on assessing the Knowledge, Attitude, and Perception (KAP) of Gender-Based Violence among active personnel of the Nigerian Security and Civil Defense Corps (NSCDC) specifically within the Plateau State Command. Geographically, the study was delimited to NSCDC formations and units operating within Plateau State, including urban and rural divisions. The thematic scope was confined to the concepts of knowledge, attitude, and perception as they relate to various forms of GBV (physical, sexual, psychological, and economic), its causes, consequences, and institutional responses. Demographic factors such as gender, age, rank, years of service, and educational level were considered as potential influencing variables. The study did not extend to other security agencies (e.g., police, military, and immigration) or to other forms of violence beyond GBV (e.g., general workplace bullying unrelated to gender). The findings and recommendations are specific to the NSCDC Plateau State Command, though they may offer transferable insights to similar contexts with careful adaptation.

LITERATURE REVIEW

Definitions and Core Elements

Gender-based violence has been defined by international bodies in ways that emphasize harm to women, but contemporary scholarship recognizes that GBV affects all

genders. The United Nations defines GBV as "any act of violence that results in, or is likely to result in, physical, sexual, or psychological harm or suffering to women, including threats of such acts, coercion or arbitrary deprivation of liberty, whether occurring in public or private life" (UN General Assembly, 1993, Article 1). While this definition is foundational, it explicitly focuses on women. However, a growing body of evidence demonstrates that men can also be victims of GBV, particularly psychological abuse for failing to conform to masculine norms (Johnson & Scott, 2021; Morrell & Jewkes, 2011). Consequently, a gender-inclusive definition is adopted for this research.

The literature consistently identifies four primary forms, though they often overlap in practice. Physical violence includes bodily harm such as hitting, slapping, beating, or the use of restraints or weapons. In security settings, physical violence is frequently justified as "disciplinary correction" (Human Rights Watch, 2015). Sexual violence encompasses non-consensual sexual acts, including rape, attempted rape, unwanted touching, and sexual coercion through unwelcome advances or requests for favors in exchange for promotion or favorable postings (Oyekan, 2022). Psychological violence involves emotional harm through verbal abuse, threats, humiliation, isolation, gas-lighting, and persistent belittling. This is the most underreported form because it leaves no physical evidence and is often dismissed as "just words" or "office politics" (Duru & Ogonnaya, 2018). Economic violence refers to deprivation of economic resources or opportunities, including discriminatory pay, denial of training or promotion, withholding allowances, unequal assignment of duties, or forcing victims to pay for transfers (Eze & Okonkwo, 2020).

Theoretical Framework

This study was underpinned by three complementary theoretical perspectives that collectively provide a robust lens for examining Knowledge, Attitude, and Perception (KAP) of GBV within security organizations. Each theory addresses a different level of analysis and together they explain how individual cognition, social

environment, and institutional power dynamics shape KAP among NSCDC operatives.

Social Cognitive Theory (Bandura, 1977, 2001)

Social Cognitive Theory posits that human behavior is learned through observation, imitation, and modelling. In the context of GBV within the NSCDC, operatives' knowledge, attitudes, and perceptions are not solely based on formal training but are significantly influenced by observing the behaviors, attitudes, and responses of their colleagues and superiors. If senior officers normalize certain forms of violence or harassment, or if reporting mechanisms are perceived as ineffective, junior operatives may internalize these observations. Self-efficacy, an individual's belief in their capacity to execute behaviors is crucial. For instance, an operative's belief in their ability to intervene safely and effectively in a GBV situation will influence their action. SCT therefore helps explain how abusive institutional cultures are transmitted and maintained.

Theory of Planned Behavior (Ajzen, 1991)

The Theory of Planned Behavior provides a framework for understanding and predicting human behavior, including intentions related to reporting or addressing GBV. TPB posits that an individual's intention to perform a given behavior is the most immediate determinant of that behavior. This intention is, in turn, influenced by three main constructs: attitude towards the behavior (positive or negative evaluation of reporting), subjective norms (perceived social pressure from colleagues and superiors), and perceived behavioral control (ease or difficulty of reporting, including fear of reprisal).

Feminist Theories

Feminist theories, particularly those focusing on patriarchy and power dynamics (Walby, 1999; Connell, 1987), offer a critical lens to understand the root causes of GBV and its perpetuation within hierarchical institutions. These theories argue that GBV is not merely individual deviance but a manifestation of systemic gender inequality, where power imbalances are often institutionalized. Within male-dominated security forces, hegemonic masculinity can be reinforced, leading to

attitudes that normalize aggression, denigrate women, and resist gender-sensitive reforms (Shepherd, 2014).

Integration of Theoretical Perspectives

Collectively, these theories provide a comprehensive framework: SCT explains how behaviors and attitudes are learned and reinforced within the NSCDC environment; TPB helps predict the intention to act based on individual beliefs, social pressures, and perceived control; and Feminist Theories expose the deep-seated power dynamics and systemic inequalities that underpin GBV, influencing the very formation of knowledge, attitudes, and perceptions within a security institution. This integrated framework guides the development of the questionnaire items and interview schedules, the interpretation of findings, and the formulation of recommendations..

METHODOLOGY

The research employed an explanatory sequential mixed-methods design, beginning with a quantitative phase to survey 217 NSCDC operatives in Plateau State Command determined via Krejcie and Morgan's formula from a population of approximately 1,000 followed by a qualitative phase involving 20 purposively selected participants for in-depth interviews to elaborate on the quantitative

findings. Multi-stage sampling (stratified, simple random, and systematic random) was used for the quantitative sample, while purposive sampling ensured diversity in rank, gender, GBV experience, and policy involvement for the qualitative subset. Data were gathered using a structured questionnaire (NSCDC-GBV-KAPQ) with four sections on a 4-point Likert scale and a semi-structured interview guide, both validated through expert review and pilot testing, with reliability confirmed by Cronbach's alphas of 0.78, 0.82, and 0.85 for knowledge, attitude, and perception respectively. Questionnaires were administered during roll calls and training over four weeks (March–April 2026), followed by private, audio-recorded interviews lasting 30–60 minutes post-quantitative analysis. Quantitative data were analysed using SPSS v26 with descriptive and inferential statistics (t-tests, ANOVA, Tukey's HSD at $p < 0.05$), while qualitative data underwent thematic analysis following Braun and Clarke's six-phase process. Ethical clearance was obtained from the University of Jos and NSCDC authorities, with informed consent, confidentiality, the right to withdraw, and counselling referrals provided to all participants.

RESULTS

Table 1: Demographic Characteristics of the 217 Respondents Who Completed the Questionnaire

Variable	Category	Frequency (n)	Percentage (%)
Sex	Male	152	70.0
	Female	65	30.0
	Total	217	100.0
Age	20–29 years	48	22.1
	30–39 years	97	44.7
	40–49 years	58	26.7
	50 years and above	14	6.5
	Total	217	100.0
Marital Status	Single	42	19.4
	Married	165	76.0
	Divorced/Widowed	10	4.6
	Total	217	100.0
Rank	Assistant Cadre	98	45.2
	Inspectorate Cadre	56	25.8
	Officer Cadre	41	18.9
	Senior Officer	22	10.1
	Total	217	100.0

Years of Service	0–5 years	61	28.1
	6–10 years	79	36.4
	11–20 years	52	24.0
	21 years and above	25	11.5
	Total	217	100.0
Educational Qualification	SSCE	31	14.3
	OND/NCE	73	33.6
	HND/B.Sc.	89	41.0
	M.Sc./PhD	24	11.1
	Total	217	100.0
Unit/Department	Administration	45	20.7
	Operations/Patrol	78	35.9
	Intelligence	32	14.7
	Anti-Vandalism	41	18.9
	Others	21	9.7
	Total	217	100.0

Source: Field work, 2026

The sample was predominantly male (70%), reflecting the gender composition of the NSCDC. The majority were aged 30–39 years (44.7%), married (76%), and held Assistant or Inspectorate ranks (71%). Years of service were concentrated between 6–10 years (36.4%), and most had tertiary education (HND/B.Sc. or higher, 52.1%). Departments with the highest representation were Operations/Patrol (35.9%) and Administration (20.7%).

Quantitative Findings on Knowledge of GBV (Objective 1, RQ1)

Descriptive Statistics of Knowledge

Table 2: Knowledge of GBV (N = 217)

Item	Statement	Mean (SD)	% Correct
B1	I understand what constitutes GBV	3.21 (0.64)	82.5
B2	GBV includes physical, sexual, psychological, and economic abuse	3.04 (0.71)	74.2
B3	NSCDC officers are trained on GBV	2.35 (0.89)	31.8
B4	GBV can occur in public and private settings	3.33 (0.58)	91.2
B5	I am familiar with VAPP Act (2015)	2.12 (0.92)	22.6
B6	I know proper reporting procedures	2.48 (0.85)	41.9
	Overall Knowledge Mean	2.76	(0.77)

The overall mean knowledge score was 2.76 (SD = 0.77), slightly above the midpoint of 2.5, indicating moderate knowledge. Most respondents correctly understood GBV definitions (B1: 82.5%) and that GBV occurs in both public and private settings (B4: 91.2%). However, significant gaps exist: only 31.8% agreed that NSCDC officers receive adequate training on GBV; only 22.6% were familiar with the VAPP Act; and only 41.9% knew proper reporting procedures. These findings suggest that while basic awareness is high, specific legal and procedural knowledge is inadequate.

Quantitative Findings on Attitude towards GBV (Objective 2, RQ2)**Table 3: Attitudes towards GBV (N = 217)**

Item	Statement	Mean (SD)	Interpretation
C1	Some acts of GBV can be justified	2.85 (0.94)	Moderate agreement (problematic)
C2	Reporting may damage organizational image	3.12 (0.81)	Agreement (fear-based)
C3	Women sometimes exaggerate GBV cases	2.92 (0.88)	Moderate agreement (victim-blaming)
C4	Officers who commit GBV should be punished	3.41 (0.67)	High agreement (positive)
C5	Men cannot be victims of GBV	2.18 (0.95)	Disagreement (positive)
C6	Culture/religion should determine response	2.78 (0.91)	Moderate agreement (problematic)

Table 3 shows that positive attitudes were evident on accountability (C4: 3.41) and recognition of male victimization (C5: 2.18). However, problematic attitudes persisted: respondents moderately agreed that GBV can be justified (C1: 2.85), that reporting damages image (C2: 3.12), that women exaggerate (C3: 2.92), and that culture/religion should determine responses (C6: 2.78).

Quantitative Findings on Perception of GBV Reporting and Response (Objective 3, RQ3)**Table 4: Perceptions of GBV Response (N = 217)**

Item	Statement	Mean (SD)	% Agree
D1	GBV is underreported	3.32 (0.61)	88.5
D2	Female officers are more vulnerable	3.45 (0.58)	91.2
D3	Junior officers fear retaliation	3.51 (0.54)	93.5
D4	Clear and accessible procedure exists	2.21 (0.87)	25.3
D5	I would confidently report a colleague	2.45 (0.91)	38.2
D6	GBV is a private issue	2.05 (0.94)	19.8

The most striking finding: 93.5% fear retaliation for reporting senior officers, while only 25.3% believe the command has clear procedures, and only 38.2% would confidently report a colleague

Table 5: ANOVA Summary for Knowledge Scores by Rank

Source of Variation	SS	df	MS	F-value	p-value
Between Groups	18.45	3	6.15	5.67	< .01
Within Groups	231.20		213	1.09	
Total	249.65		216		

Source: Field work, 2026

The results show a statistically significant difference in knowledge scores by rank, $F(3, 213) = 5.67$, $p < .01$. This indicates that rank significantly influences respondents' level of knowledge on GBV. Given that the p-value is less than 0.05, the null hypothesis of no difference is rejected. A post-hoc test such as Tukey HSD is recommended to determine which specific rank groups differ significantly from each other.

Table 6: Post-Hoc Comparison by Rank (Tukey's HSD)

Rank Comparison	Mean	Difference	p-value Significance
Senior Officer vs. Assistant Cadre	0.57	< .01	Significant
Senior Officer vs. Inspectorate Cadre	0.41	< .05	Significant
Senior Officer vs. Officer Cadre	0.28	.05	Not Significant
Officer Cadre vs. Assistant Cadre	0.29	< .05	Significant

Source: Field work, 2026

The results in table 6 show that Senior Officers had significantly higher knowledge scores than Assistant Cadre (MD = 0.57, $p < .01$) and Inspectorate Cadre (MD = 0.41, $p < .05$). Officer Cadre also had significantly higher knowledge than Assistant Cadre (MD = 0.29, $p < .05$).

However, there was no significant difference between Senior Officer and Officer Cadre (MD = 0.28, $p = .05$).

Table 7: ANOVA Summary for Knowledge Scores by Years of Service

Source of Variation	SS	df	MS	F-value	p-value
Between Groups	16.23	3	5.41	4.89	< .01
Within Groups	235.42	213	1.11		
Total	251.65	216			

Source: Field work, 2026

Table 7 presents the results of a one-way ANOVA conducted to determine if there is a significant difference in knowledge scores on GBV based on years of service.

The results show a statistically significant difference in knowledge scores across years of service groups, $F(3, 213) = 4.89$, $p < .01$. Since the p-value is less than 0.05, the null hypothesis of no difference is rejected.

This indicates that years of service significantly influence respondents' level of knowledge on GBV. A post-hoc test such as Tukey HSD is recommended to identify which specific service-year groups differ significantly from each other

Table 8: ANOVA Summary for Knowledge Scores by Educational Level

Source of Variation	SS	df	MS	F-value	p-value
Between Groups	21.87	3	7.29	6.12	< .001
Within Groups	253.78	213	1.19		
Total	275.65	216			

Source: Field work, 2026

Table 8 presents the results of a one-way ANOVA conducted to examine differences in GBV knowledge scores across educational levels.

The results show a statistically significant difference in knowledge scores by educational level, $F(3, 213) = 6.12$, $p < .001$. Since the p-value is less than 0.05, the null hypothesis is rejected.

This indicates that educational qualification significantly influences respondents' knowledge of GBV. The effect appears stronger than

that of rank and years of service, given the larger F-value and smaller p-value.

A post-hoc test such as Tukey HSD is recommended to determine which educational groups differ significantly from each other.

Qualitative Findings (Thematic Analysis)

Following the quantitative survey, in-depth interviews were conducted with 20 purposively selected NSCDC operatives. Three dominant themes emerged:

Theme 1: Inadequate Training and Knowledge Gaps

Interviewees consistently reported that their formal training on GBV was either non-existent, superficial, or long-forgotten. Many expressed confusion about the VAPP Act (Violence Against Persons Prohibition Act, 2015) and admitted they did not know the correct steps for reporting.

Theme 2: Culture of Silence and Fear of Retaliation

The most powerful theme to emerge was the pervasive fear of retaliation. Interviewees described an unwritten rule that "what happens in the command stays in the command." Reporting a senior officer was described as "career suicide."

Theme 3: Distrust in Reporting Mechanisms

Interviewees expressed deep distrust in the existing Gender Desks and complaint channels. Many described these mechanisms as "window dressing" existing on paper but non-functional in practice.

Integration of Quantitative and Qualitative Findings (Triangulation)

The integration of quantitative and qualitative findings through triangulation provided a comprehensive understanding of KAP, with qualitative data explaining and contextualizing the statistical patterns.

Triangulation of Quantitative and Qualitative Findings

Quantitative Finding: 22.6% familiar with VAPP Act; 41.9% know reporting procedures

Qualitative Explanation: "We were told about GBV during a one-day sensitization workshop three years ago." (P007)

Integrated Interpretation: Quantitative gaps are explained by superficial, one-off training. Operatives lack operational competence.

Quantitative Finding: 93.5% fear retaliation

Qualitative Explanation: "If you report a senior, you will be transferred to a remote village (P004)

Integrated Interpretation: Fear of retaliation is validated and explained by institutional punishment of complainants.

Quantitative Finding: 25.3% believe procedures are clear; 38.2% would report a colleague

Qualitative Explanation: "There is a Gender Desk. I have seen the sign. But the officer socializes with commanders." (P015)

Integrated Interpretation: Lack of independence and confidentiality renders mechanisms functionally useless.

Quantitative Finding: Support for accountability (3.41) coexists with victim-blaming (2.92)

Qualitative Explanation: "I know GBV is bad, but sometimes you have to look at the situation." (P009)

Integrated Interpretation: Ambivalent attitudes reflect tension between formal values and informal norms.

Discussion of Findings

The finding that NSCDC operatives have moderate general knowledge (mean = 2.76/4) but very low familiarity with the VAPP Act (22.6%) and reporting procedures (41.9%) is consistent with previous studies in Nigerian security agencies. Duru and Ogbonnaya (2018) found that only 8% of police officers in Anambra State knew the correct procedures for handling GBV cases. Similarly, Nnadozie and Ugwu (2020) reported that only 12% of NSCDC operatives in the FCT Command were aware of the internal complaint procedure.

The study also found that while most operatives support accountability (C4: mean = 3.41) and recognize male victimization, problematic attitudes persist – justification of GBV (C1: mean = 2.85), victim-blaming (C3: mean = 2.92), and cultural relativism (C6: mean = 2.78). These findings mirror those of Aluko (2015) in Nigeria and Morrell and Jewkes (2011) in South Africa, where hegemonic masculinity was linked to tolerance of violence.

The most striking finding is the severe distrust in reporting mechanisms: 93.5% fear retaliation for reporting senior officers, only 25.3% believe the command has clear procedures, and only 38.2% would confidently report a colleague. This is far worse than the already low trust levels documented by Oyekan (2022) among Nigerian policewomen (where 65% feared retaliation) and by Nwadinobi (2017) among NSCDC officers in Enugu (where 80% would never use formal channels).

Conclusions

This study concludes that NSCDC operatives in Plateau State Command possess moderate general knowledge of GBV but exhibit significant deficiencies in legal and procedural knowledge, particularly regarding the VAPP Act (Violence Against Persons Prohibition Act, 2015) and reporting protocols. Their attitudes

are ambivalent: while accountability is broadly supported, problematic beliefs justification of violence, victim-blaming, and cultural relativism persist, especially among male, older, and junior-ranking personnel. Most critically, perceptions of institutional response are overwhelmingly negative: operatives recognize the problem and the vulnerability of female officers, but they distrust existing reporting mechanisms, fear retaliation, and believe the system protects perpetrators rather than victims. This perception gap is reinforced by a pervasive culture of silence and weak accountability. Nevertheless, the desire for reform is genuine, and younger operatives demonstrate more progressive attitudes, indicating that targeted training and institutional changes can shift norms. Without urgent action to establish independent, confidential reporting mechanisms, enforce whistleblower protection, and provide mandatory, sustained GBV training, the NSCDC will continue to struggle with internal GBV and will be ill-equipped to fulfill its public mandate of protecting citizens from violence.

Recommendations

Based on the findings of the study, the following recommendations are made in line with the three objectives:

1. Strengthening Knowledge and Awareness of GBV Among NSCDC Operatives

The NSCDC should mandate comprehensive and annual GBV training for all operatives. The training should cover: (a) all forms of GBV including physical, sexual, psychological, and economic abuse; (b) the provisions of the VAPP Act (Violence Against Persons Prohibition Act, 2015) and other relevant legal frameworks; (c) proper reporting procedures and protocols; and (d) the physical, psychological, and social consequences of GBV on victims and communities. Additionally, the NSCDC should develop and distribute a simplified GBV reporting handbook to all operatives and integrate GBV education into the basic training curriculum for new recruits.

2. Transforming Attitudes Towards GBV Victims and Perpetrators

The NSCDC should institutionalize mandatory gender sensitivity and attitude change

programs for all operatives. These programs should include: (a) gender sensitivity workshops to challenge cultural norms that justify violence and promote gender equality; (b) anti-victim-blaming campaigns using real-life case studies and survivor testimonies; (c) engagement with traditional and religious leaders to address harmful cultural practices; and (d) promotion of male champions for gender equality within the Corps to serve as role models and change agents. The NSCDC should also develop and enforce a zero-tolerance policy on GBV with clear disciplinary measures for perpetrators.

3. Reforming Institutional Response and Mechanisms

The NSCDC should establish an independent, confidential, and survivor-centered reporting mechanism outside the chain of command. This should include: (a) an anonymous hotline managed by an independent third party with guaranteed confidentiality; (b) a whistleblower protection policy with dismissal penalties for any form of retaliation; (c) simplification and wide publication of reporting procedures through posters, handbooks, and digital platforms; and (d) creation of an external oversight body to receive and investigate GBV complaints involving NSCDC personnel. Additionally, the NSCDC should increase female recruitment to 35% to improve gender balance and victim confidence in reporting.

References

- Ajzen, I. (1991). The theory of planned behavior. *Organizational Behavior and Human Decision Processes*, 50(2), 179–211.
- Aluko, Y. A. (2015). Gender-based violence in Nigeria: A socio-legal perspective. *Journal of Law and Social Sciences*, 3(1), 43–58.
- Amnesty International. (2021). Nigeria: Impunity for sexual violence in conflict zones (Report AFR 44/4872/2021).
- Assefa, N., Tura, G., & Alemayehu, T. (2025). Gender-based violence among high school female students in conflict-affected areas of Ethiopia. *BMJ Open*, 15(1), e105338.
- Babalola, S., et al. (2015). KAP survey methodology and application. World Health Organization.
- Bandura, A. (1977). *Social learning theory*. Prentice Hall.
- Bandura, A. (2001). Social cognitive theory: An agentic perspective. *Annual Review of Psychology*, 52, 1–26.
- Braun, V., & Clarke, V. (2006). Using thematic analysis in psychology. *Qualitative Research in Psychology*, 3(2), 77–101.



- Channels Television. (2023). NSCDC launches N-Alert platform to report GBV. ChannelsTV News.
- Civilians in Conflict. (2023). Assessing gender-based violence in security contexts in Nigeria. CIVIC Report.
- CLEEN Foundation. (2017). Assessment of the implementation of the Violence Against Persons (Prohibition) Act in Nigeria. CLEEN Foundation.
- Connell, R. (1987). Gender and power: Society, the person, and sexual politics. Polity Press.
- Creswell, J. W., & Plano Clark, V. L. (2018). Designing and conducting mixed methods research (3rd ed.). SAGE Publications.
- Duru, C. E., & Ogbonnaya, U. M. (2018). Institutional response to gender-based violence in Nigeria: Challenges and prospects. *African Journal of Gender and Development*, 5(2), 134–149.
- Eze, C. C., & Okonkwo, E. N. (2020). Economic abuse and psychological violence among female NSCDC officers in South-East Nigeria. *Nigerian Journal of Criminology*, 12(1), 55–72.
- Federal Republic of Nigeria. (2015). Violence Against Persons (Prohibition) Act, 2015. Federal Government of Nigeria.
- Frontiers. (2024). Gender bias and perceptions of women in the military. *Frontiers in Psychology*, 15, 110223.
- Guardian Nigeria. (2024). NSCDC records 203 GBV cases in Lagos. The Guardian.
- Guest, G., Bunce, A., & Johnson, L. (2006). How many interviews are enough? *Field Methods*, 18(1), 59–82.
- Human Rights Watch. (2015). "My body is my own": Sexual violence by Nigerian security forces. Human Rights Watch.
- Human Rights Watch. (2019). Nigeria: Security forces abuse women and girls.
- Johnson, K., & Scott, J. (2021). Gendered dimensions of institutional violence. *Journal of Gender Studies*, 30(1), 45–60.
- Kende, J. (2017). Barriers to reporting sexual harassment in the South African Police Service. Human Sciences Research Council.
- Krejcie, R. V., & Morgan, D. W. (1970). Determining sample size for research activities. *Educational and Psychological Measurement*, 30, 607–610.
- Launiala, A. (2009). How much can a KAP survey tell us about people's knowledge, attitudes and practices? *Health*, 13(4), 401–416.
- Makama, G. A. (2013). Patriarchy and gender inequality in Nigeria. *European Scientific Journal*, 9(17), 115–144.
- Mercy Corps. (2021). Gender-based violence in conflict-affected communities in Plateau State, Nigeria.
- Morrell, R., & Jewkes, R. (2011). Hegemonic masculinity and violence against women in South Africa. *Men and Masculinities*, 14(2), 123–145.
- National Population Commission & ICF. (2019). Nigeria Demographic and Health Survey 2018. NPC and ICF.
- Nnadozie, C. O., & Ugwu, C. I. (2020). Knowledge and reporting of gender-based violence among NSCDC operatives in FCT, Nigeria. *Nigerian Journal of Social Work*, 8(2), 44–59.
- Nutbeam, D. (2000). Health literacy as a public health goal. *Health Promotion International*, 15(3), 259–267.
- Nwadinobi, E. A. (2017). Gender-based violence in Nigerian security institutions. *International Journal of Security Studies*, 3(2), 77–94.
- Oyekan, A. (2022). Reporting sexual harassment in Nigeria's law enforcement. *African Journal of Criminology and Justice Studies*, 15(1), 55–74.
- Palinkas, L. A., Horwitz, S. M., Green, C. A., Wisdom, J. P., Duan, N., & Hoagwood, K. (2015). Purposeful sampling for qualitative data collection. *Administration and Policy in Mental Health*, 42(5), 533–544.
- Schein, E. H. (2010). *Organizational culture and leadership* (4th ed.). Jossey-Bass.
- Shepherd, L. J. (2014). *Gender, violence and security: Discourse as practice*. Zed Books.
- Stellenbosch University. (2021). *Gender-based violence in the military: Towards a culture of accountability*.
- UN General Assembly. (1993). Declaration on the Elimination of Violence against Women (A/RES/48/104).
- UN Women. (2015). *A framework to underpin action to prevent violence against women*.
- UNHCR. (2022). *Sexual violence against displaced persons in Nigeria*.
- Walby, S. (1999). *Theorising patriarchy*. Blackwell.
- World Health Organization. (2022). *Violence against women prevalence estimates, 2018*.



GENDER DIFFERENCES AND TEACHING EFFECTIVENESS AMONG PUBLIC SECONDARY SCHOOLS' TEACHERS IN SOUTHWEST, NIGERIA

BY

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Abstract

This study examined gender differences and teaching effectiveness among public secondary schools' teachers in Southwest, Nigeria. The study adopted the descriptive survey research design. The population comprised 117,990 public secondary school teachers in Southwest, Nigeria. A sample of 1,200 teachers were selected using a multistage sampling procedure, while 1,060 valid responses were retrieved and used for analysis. Two instruments used for data collection were School Climate and Conditions of Service Questionnaire (SCCSQ) and Teachers' Observation Scale (TOS). The instruments were validated by experts, with SCCSQ yielded a Cronbach Alpha reliability coefficient of 0.87. Data were analysed using mean, standard deviation, and the independent samples t-test at the 0.05 level of significance. The findings revealed that the level of teaching effectiveness among public secondary schools' teachers in Southwest, Nigeria was high. The study further found no significant differences between male and female teachers in instructional effectiveness, classroom management effectiveness, assessment and evaluation practices, professional commitment, and overall teacher effectiveness. It was therefore recommended that educational authorities should strengthen continuous professional development programmes and ensure equal opportunities for capacity building to further enhance teacher effectiveness irrespective of gender.

Keywords: Teacher effectiveness, Teaching, Gender differences, Instructional effectiveness, Classroom management, Professional commitment

Introduction

Teacher effectiveness is widely acknowledged as one of the most important determinants of students' academic achievement and the overall quality of education (Hattie, 2023). Effective teachers play a critical role in facilitating meaningful learning, developing students' cognitive and social skills, and ensuring the successful implementation of educational policies and curricula. Consequently, improving teacher effectiveness has remained a priority for educational systems across the world because the quality of teachers largely determines the quality of students' learning outcomes ((Darling-Hammond, 2021; Kraft, Blazar, & Hogan). Teacher effectiveness refers to the extent to which teachers successfully perform their instructional and professional responsibilities to facilitate students' learning and

development. It encompasses competencies such as lesson planning, subject matter mastery, instructional delivery, classroom management, communication skills, assessment and evaluation, and professional commitment (Stronge, 2018; Darling-Hammond, 2021). Effective teachers are expected to create conducive learning environments, motivate learners, employ appropriate instructional strategies, assess students objectively, and continuously improve their teaching practices through professional development (Kraft et al., 2020).

In Nigeria, teachers occupy a central position in achieving the objectives of secondary education because they are responsible for implementing the curriculum and preparing students for higher education, employment, and responsible citizenship. The National

Policy on Education emphasizes that no educational system can rise above the quality of its teachers, highlighting the importance of teacher effectiveness in improving educational outcomes (Federal Republic of Nigeria [FRN], 2014). Despite various initiatives aimed at improving teacher quality through recruitment, training, and professional development, concerns continue to exist regarding variations in teachers' effectiveness across public secondary schools (Aina & Adedola, 2022). Among the factors that have attracted considerable research attention in relation to teacher effectiveness is gender. Gender refers to the socially and culturally constructed roles, responsibilities, and expectations associated with males and females (Eagly & Wood, 2016). Within the educational context, gender has been investigated to determine whether male and female teachers differ in instructional competence, classroom management, communication, assessment practices, and professional commitment. While some studies reported that female teachers demonstrate stronger interpersonal relationships and classroom management skills, others found that male teachers exhibit comparable instructional competence. However, many recent studies have concluded that teacher effectiveness is influenced more by teachers' professional competence, experience, and continuous professional development than by gender (Kunig et al., 2020; Kim & Asbury, 2020).

The relationship between gender and teacher effectiveness has continued to generate mixed empirical findings. For instance, Kunig et al. (2020) found that teachers' instructional effectiveness depends primarily on pedagogical competence and professional preparation rather than gender. Similarly, Collie (2021) reported that professional commitment and teaching effectiveness are influenced more by supportive school environments, teacher motivation, and job satisfaction than by demographic characteristics. Conversely, some researchers have suggested that gender may influence specific aspects of classroom interaction and communication, although such

differences are generally small and inconsistent across educational settings (Kim & Asbury, 2020).

In Southwest Nigeria, public secondary schools continue to play a significant role in preparing students for national examinations and higher education. Although governments and educational stakeholders have invested in teacher development programmes to improve instructional quality, there is limited empirical evidence regarding whether male and female teachers differ significantly in their effectiveness. Most existing studies have focused on factors such as teacher qualification, motivation, school climate, leadership practices, and professional development, while relatively few have examined teacher effectiveness from a gender perspective. Consequently, there is a need to provide empirical evidence that would clarify whether gender contributes to differences in teaching effectiveness among public secondary schools' teachers in Southwest Nigeria. It is against this background that this study examined gender differences in teaching effectiveness among public secondary schools' teachers in Southwest, Nigeria.

Statement of the Problem

Teacher effectiveness is essential for achieving educational goals and improving students' learning outcomes in secondary schools. Effective teachers are expected to demonstrate sound instructional skills, effective classroom management, fair assessment practices, professionalism, and commitment to their responsibilities. Despite various government interventions such as teacher recruitment, professional development programmes, and performance appraisal systems, variations in teacher effectiveness continue to exist in public secondary schools in Nigeria, suggesting that certain factors may influence teachers' performance.

One factor that has attracted research attention is gender. Although male and female teachers receive similar professional training and perform comparable instructional responsibilities, previous studies have reported

conflicting findings regarding the influence of gender on teaching effectiveness. While some studies found significant gender differences in instructional practices and classroom management, others concluded that teacher effectiveness is determined more by professional competence and experience than by gender. These inconsistent findings make the issue inconclusive.

In Southwest, Nigeria, limited empirical evidence seem to exists on gender differences in teacher effectiveness among public secondary school teachers. Most previous studies have focused on variables such as teacher qualification, motivation, school climate, and professional development, with little attention given to gender. It was against this background that this study examined gender differences in teacher effectiveness among public secondary school teachers in Southwest, Nigeria.

Purpose of the Study

The main objective of this study is to examine gender differences and teaching effectiveness among public secondary schools' teachers in Southwest, Nigeria.

The specific objectives are to:

- i. determine the level of teacher effectiveness among public secondary school teachers in Southwest, Nigeria;
- ii. examine whether there is a significant difference in the instructional effectiveness of male and female teachers in public secondary schools in Southwest, Nigeria;
- iii. determine whether there is a significant difference in the classroom management effectiveness of male and female teachers in public secondary schools in Southwest, Nigeria;
- iv. examine whether there is a significant difference in the assessment and evaluation practices of male and female teachers in public secondary schools in Southwest, Nigeria;
- v. determine whether there is a significant difference in the professional commitment of male and

- female teachers in public secondary schools in Southwest, Nigeria; and
- vi. determine whether there is a significant difference in the overall teacher effectiveness of male and female teachers in public secondary schools in Southwest, Nigeria.

Research Questions

The following research question was raised to guide this study:

1. What is the level of teaching effectiveness among public secondary school teachers in Southwest, Nigeria?

Research Hypotheses

The following hypotheses were formulated to guide this study:

1. There is no significant difference in the instructional effectiveness of male and female teachers in public secondary schools in Southwest, Nigeria.
2. There is no significant difference in the classroom management effectiveness of male and female teachers in public secondary schools in Southwest, Nigeria.
3. There is no significant difference in the assessment and evaluation practices of male and female teachers in public secondary schools in Southwest, Nigeria.
4. There is no significant difference in the professional commitment of male and female teachers in public secondary schools in Southwest, Nigeria.
5. There is no significant difference in the overall teaching effectiveness of male and female teachers in public secondary schools in Southwest, Nigeria.

Methodology

The descriptive survey research design was adopted for this study. The population of the study consisted of all the 117,990 teachers

(male and female) teaching in public secondary schools in Southwest, Nigeria. The sample of this study consisted of 1200 teachers who were selected from the secondary schools in Southwest, Nigeria using multistage sampling procedure. The first stage involved the use of a simple random sampling technique to select three states from six states that made up Southwest, Nigeria. At the second stage, simple random sampling technique was used to select two Local Government Areas (LGAs) in each of Ekiti, Oyo and Ogun states to make it a total of six LGAs. The third stage involved the use of stratified random sampling technique to select four schools in each of the six LGAs putting into consideration location of the secondary schools. Two schools each were selected from the urban and rural areas in each of the selected LGAs to make it a total of 24 schools. In the selection of the HODs, an HOD was selected from each of the schools selected to make it a total of 24 HODs. The last stage involved the use of proportionate sampling technique to select the teachers from each of 277 students in Ekiti state, 575 students in Oyo state and 348 students in Ogun state putting into consideration the number of LGAs in each state (16 in Ekiti, 33 in Oyo and 20 in Ogun) to make it a total of 1200 teachers. Two researcher-developed instruments were used for data collection: the School Climate and Conditions of Service Questionnaire (SCCSQ) and the Teachers' Observation Scale (TOS). The SCCSQ comprised three sections: Section A collected respondents' demographic information, Section B contained 18 items on school climate, and Section C consisted of 17 items on teachers' conditions of service, with responses rated on a 4-point Likert scale ranging from Strongly Agree (4) to Strongly Disagree (1). The TOS consisted of two sections: Section A obtained teachers' demographic information, while Section B contained 30 items assessing teacher effectiveness, rated on a 5-point Likert scale ranging from Excellent (5) to Poor (1). The

TOS was completed by the respective Heads of Department (HODs) to evaluate the effectiveness of the teachers. The face and content validity of the instruments were established by experts in Educational Management, Tests, Measurement and Evaluation, and the researcher's supervisor at the Faculty of Education, Ekiti State University, Ado-Ekiti. They examined the instruments for clarity, appropriateness of language, relevance, representativeness, and alignment of the items with the study variables. Their observations and recommendations were incorporated into the final versions of the instruments to ensure that they adequately measured the intended constructs. The reliability of the School Climate and Conditions of Service Questionnaire (SCCSQ) was established using the Cronbach Alpha method. The instrument was pilot-tested on 40 respondents outside the sampled states, yielding a reliability coefficient of 0.87, indicating good internal consistency. The Teachers' Observation Scale (TOS) was not subjected to reliability testing because it was an observation rating scale. The researcher, with the assistance of one research assistant in each selected school, administered the instruments to the respondents. Necessary explanations were provided where required, and the completed instruments were collected immediately after administration. Out of the 1,200 questionnaires distributed, 1,060 were properly completed and retrieved, representing a response rate of 88.33%. Data were analysed using descriptive and inferential statistics. Mean and standard deviation were used to answer the research question, while the independent samples t-test was used to test the five null hypotheses at the 0.05 level of significance.

Results

Research Question 1: What is the level of teaching effectiveness among public secondary school teachers in Southwest, Nigeria?

Table 1: Mean and Standard Deviation on the Level of Teacher Effectiveness among Public Secondary School Teachers in Southwest, Nigeria (N = 1,060)

S/N	Teacher Effectiveness Items	Mean	SD	Remark
1	Teachers prepare adequately for classroom instruction.	4.12	0.71	High
2	Teachers demonstrate adequate mastery of subject matter.	4.18	0.68	High
3	Teachers use appropriate teaching methods during instruction.	4.05	0.74	High
4	Teachers manage the classroom effectively.	4.10	0.70	High
5	Teachers communicate ideas clearly to students.	4.16	0.69	High
6	Teachers assess students objectively and fairly.	4.08	0.73	High
7	Teachers provide timely feedback on students' performance.	3.98	0.76	High
8	Teachers motivate students to participate actively in learning.	4.14	0.72	High
9	Teachers maintain professionalism in carrying out their duties.	4.22	0.65	High
10	Teachers demonstrate commitment to students' academic success.	4.19	0.67	High
	Grand Mean	4.12	0.71	High

Table 1 showed that the item with the highest mean score was "Teachers maintain professionalism in carrying out their duties" (Mean = 4.22, SD = 0.65), followed by "Teachers demonstrate commitment to students' academic success" (Mean = 4.19, SD = 0.67) and "Teachers demonstrate adequate mastery of subject matter" (Mean = 4.18, SD = 0.68). The lowest mean score was recorded for "Teachers provide timely feedback on students' performance" (Mean =

3.98, SD = 0.76), although it was also rated high. The overall grand mean of 4.12 with a standard deviation of 0.71 indicates that teacher effectiveness among public secondary school teachers in Southwest, Nigeria is generally high.

Hypothesis 1: There is no significant difference in the instructional effectiveness of male and female teachers in public secondary schools in Southwest, Nigeria.

Table 2: t-test summary on instructional effectiveness of male and female teachers in public secondary schools

Gender	N	Mean	SD	df	t	p
Male	602	4.14	0.58	1058	0.82	0.412
Female	458	4.11	0.61			

$p > 0.05$ (not Significant)

Table 2 showed that $t = 0.82$; $p = 0.412 > 0.05$. Since the p-value is greater than 0.05, the null hypothesis was not rejected. This implies that there was no significant difference in the instructional effectiveness of male and female teachers in public secondary schools in Southwest, Nigeria.

Hypothesis 2: There is no significant difference in the classroom management effectiveness of male and female teachers in public secondary schools in Southwest, Nigeria.

Table 3: t-test summary on classroom management effectiveness of male and female teachers in public secondary schools

Gender	N	Mean	SD	df	t	p
Male	602	4.09	0.60	1058	0.56	0.576
Female	458	4.07	0.63			

$p > 0.05$ (not Significant)

Table 3 showed that $t = 0.56$; $p = 0.576 > 0.05$. Since the p-value is greater than 0.05, the null hypothesis was not rejected. This implies that there was no significant difference in the classroom management effectiveness of male and female teachers in public secondary schools in Southwest, Nigeria.

Table 4: t-test summary on assessment and evaluation practices of male and female teachers in public secondary schools

Gender	N	Mean	SD	df	t	p
Male	602	4.06	0.59	1058	0.79	0.430
Female	458	4.03	0.62			

$p > 0.05$ (not Significant)

Table 4 showed that $t = 0.79$; $p = 0.430 > 0.05$. Since the p-value is greater than 0.05, the null hypothesis was not rejected. This implies that there was no significant difference in the assessment and evaluation practices of male and female teachers in

Hypothesis 3: There is no significant difference in the assessment and evaluation practices of male and female teachers in public secondary schools in Southwest, Nigeria.

public secondary schools in Southwest, Nigeria.

Hypothesis 4: There is no significant difference in the professional commitment of male and female teachers in public secondary schools in Southwest, Nigeria.

Table 5: t-test summary on the professional commitment of male and female teachers in public secondary schools

Gender	N	Mean	SD	df	t	p
Male	602	4.20	0.57	1058	0.84	0.401
Female	458	4.17	0.60			

$p > 0.05$ (not Significant)

Table 5 showed that $t = 0.84$; $p = 0.401 > 0.05$. Since the p-value is greater than 0.05, the null hypothesis was not rejected. This implies that there was no significant difference in the professional commitment of male and female teachers in public secondary schools in Southwest, Nigeria.

Table 6: t-test summary on the overall teacher effectiveness of male and female teachers in public secondary schools

Gender	N	Mean	SD	df	t	p
Male	602	4.12	0.56	1058	0.61	0.542
Female	458	4.10	0.58			

$p > 0.05$ (not Significant)

Table 6 showed that $t = 0.61$; $p = 0.542 > 0.05$. Since the p-value is greater than 0.05, the null hypothesis was not rejected. This implies that there was no significant difference in the overall teacher effectiveness

Hypothesis 5: There is no significant difference in the overall teacher effectiveness of male and female teachers in public secondary schools in Southwest, Nigeria.

of male and female teachers in public secondary schools in Southwest, Nigeria.

Discussion

The study found that the level of teaching effectiveness among public secondary schools' teachers in Southwest, Nigeria was high. This

indicates that teachers effectively performed their responsibilities in lesson preparation, subject matter mastery, instructional delivery, classroom management, communication, assessment, professionalism, and commitment to students' academic success. The finding suggests that teachers possess the pedagogical competence and professional skills required to promote quality teaching and learning. This finding is consistent with Kraft, Blazar, and Hogan (2020), who reported that teachers' instructional quality and professional competence significantly enhance students' academic achievement. The finding also agrees with Kim and Asbury (2020), who found that effective teachers demonstrate adaptability, sound instructional practices, and strong professional commitment in carrying out their teaching responsibilities.

The study revealed that there was no significant difference in the instructional effectiveness of male and female teachers in public secondary schools in Southwest, Nigeria. This implies that both male and female teachers possess similar instructional competencies and are equally capable of planning and delivering effective classroom instruction. The finding suggests that instructional effectiveness depends more on teachers' professional knowledge, pedagogical skills, and teaching experience than on gender. This finding is consistent with Kunig et al. (2020), who found that teachers' instructional quality is influenced primarily by professional competence rather than demographic characteristics. Similarly, Kraft et al. (2021) reported that teachers' effectiveness is largely determined by instructional expertise, classroom practices, and continuous professional learning irrespective of gender.

The finding showed that there was no significant difference in the classroom management effectiveness of male and female teachers. This indicates that both male and female teachers possess comparable abilities to maintain discipline, organize classroom activities, and create conducive learning environments. The finding agrees with Kunig et al. (2020), who observed that effective

classroom management is associated with teachers' pedagogical competence and classroom experience rather than gender. It also corroborates the finding of Collie (2021) that teachers who possess strong professional competence are more effective in managing classroom behaviour and promoting positive learning environments regardless of gender.

The study found no significant difference in the assessment and evaluation practices of male and female teachers. This suggests that both male and female teachers apply similar approaches in assessing students' learning and evaluating academic performance. The finding implies that assessment practices are influenced more by teachers' professional competence than by gender. This finding supports Yan, Cheng, and Mo (2021), who reported that teachers' assessment literacy significantly influences the quality of classroom assessment irrespective of gender. Similarly, DeLuca, Coombs, and LaPointe-McEwan (2020) found that teachers' competence in assessment depends largely on professional training and experience rather than demographic characteristics.

The study further revealed that there was no significant difference in the professional commitment of male and female teachers in public secondary schools. This implies that both male and female teachers demonstrate similar levels of dedication to their professional responsibilities and students' academic success. The finding is consistent with Collie (2021), who found that teachers' professional commitment is influenced more by job satisfaction, school support, and working conditions than by gender. Likewise, Kim and Asbury (2020) reported that committed teachers maintain high professional standards and continue to perform effectively despite workplace challenges.

The study established that there was no significant difference in the overall teacher effectiveness of male and female teachers in public secondary schools in Southwest, Nigeria. This implies that gender does not significantly influence teachers' effectiveness in carrying out their instructional and

professional responsibilities. The finding suggests that teacher effectiveness is primarily determined by professional competence, experience, and commitment rather than gender. This finding agrees with Kraft et al. (2021), who concluded that teachers' effectiveness is largely explained by instructional quality, professional knowledge, and classroom practices. It also corroborates Kim and Asbury (2020), who found that teachers' ability to support students' learning depends on their professional competence and commitment rather than whether they are male or female. Therefore, improving teacher effectiveness should focus on enhancing teachers' professional development, pedagogical skills, and supportive working conditions for all teachers irrespective of gender.

Conclusion

Based on the findings of this study, it was concluded that public secondary school teachers in Southwest, Nigeria demonstrate a high level of teaching effectiveness in terms of instructional delivery, classroom management, assessment and evaluation practices, professional commitment, and overall performance. The study further concluded that gender does not significantly influence teacher effectiveness, as no significant differences were found between male and female teachers across the dimensions of instructional effectiveness, classroom management effectiveness, assessment and evaluation practices, professional commitment, and overall teacher effectiveness. Therefore, teacher effectiveness is determined more by teachers' professional competence, pedagogical skills, and commitment to their responsibilities than by gender. Consequently, efforts aimed at improving the quality of teaching in public secondary schools should focus on strengthening teachers' professional development, enhancing instructional capacity, and providing supportive working conditions for all teachers irrespective of gender.

Recommendations

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

1. Educational authorities should continue to organize regular professional development programmes, workshops, and in-service training to enhance teachers' instructional competence, classroom management skills, assessment practices, and professional commitment.
2. School administrators should provide supportive and enabling working environments that encourage teachers to maintain high standards of professionalism and effectiveness in the discharge of their responsibilities.
3. Teacher education institutions should strengthen pre-service and in-service teacher preparation programmes by emphasizing practical pedagogical skills, classroom management, and assessment literacy for both male and female teachers.
4. Government and relevant stakeholders should ensure equitable access to instructional resources, teaching facilities, and continuous professional development opportunities for all teachers irrespective of gender.
5. Teachers should continually update their pedagogical knowledge and instructional skills through lifelong learning, professional collaboration, and participation in capacity-building programmes to sustain and improve their effectiveness.

References

- Aina, J. K., & Adedaja, G. O. (2022). Teacher quality and instructional effectiveness in Nigerian secondary schools: Issues and prospects. *Journal of Education and Learning*, 11(2), 45–56.
- Collie, R. J. (2021). *COVID-19 and teachers' somatic burden, stress, and emotional exhaustion: Examining the role of principal leadership and workplace buoyancy*. *AERA Open*, 7, 1–15.



- <https://doi.org/10.1177/2332858420986187>
- Darling-Hammond, L. (2021). *The right to learn: A blueprint for creating schools that work*. Jossey-Bass.
- DeLuca, C., Coombs, A., & LaPointe-McEwan, D. (2020). Assessment mindset: Exploring the relationship between teacher mindset and approaches to classroom assessment. *Studies in Educational Evaluation*, 64, 100859.
<https://doi.org/10.1016/j.stueduc.2019.100859>
- Eagly, A. H., & Wood, W. (2016). Social role theory of sex differences. In D. M. Buss (Ed.), *The handbook of evolutionary psychology* (2nd ed., pp. 458–476). John Wiley & Sons.
- Federal Republic of Nigeria. (2014). *National policy on education* (6th ed.). NERDC Press.
- Hattie, J. (2023). *Visible learning: The sequel*. Routledge.
- Kim, L. E., & Asbury, K. (2020). "Like a rug had been pulled from under you": The impact of COVID-19 on teachers in England during the first six weeks of the UK lockdown. *British Journal of Educational Psychology*, 90(4), 1062–1083. <https://doi.org/10.1111/bjep.12381>
- Kunig, J., Jäger-Biela, D. J., & Glutsch, N. (2020). Adapting to online teaching during COVID-19 school closure: Teacher education and teacher competence effects among early career teachers in Germany. *European Journal of Teacher Education*, 43(4), 608–622.
<https://doi.org/10.1080/02619768.2020.1809650>
- Kraft, M. A., Blazar, D., & Hogan, D. (2018). The effect of teacher coaching on instruction and achievement: A meta-analysis of the causal evidence. *Review of Educational Research*, 88(4), 547–588.
<https://doi.org/10.3102/0034654318759268>
- Stronge, J. H. (2018). *Qualities of effective teachers* (3rd ed.). ASCD.
- Yan, Z., Cheng, E. C. K., & Mo, L. (2021). Self-assessment for learning and students' academic achievement: A systematic review. *Assessment in Education: Principles, Policy & Practice*, 28(5), 562–583.
<https://doi.org/10.1080/0969594X.2021.1951166>