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TEACHERS' ICT COMPETENCE AND STUDENTS' ACADEMIC PERFORMANCE IN PUBLIC SENIOR SECONDARY SCHOOLS IN LAGOS STATE, NIGERIA

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ABSTRACT

This study examined the relationship between teachers' ICT competence and students' academic performance in public senior secondary schools in Lagos State, Nigeria, and investigated the difference in ICT competence between male and female teachers. The study adopted a descriptive correlational survey design. A sample of 490 public senior secondary school teachers was selected using a multistage sampling technique. Data were collected using a validated Teachers' ICT Competence Questionnaire (TICTCQ), while students' academic performance was obtained from school academic records. The instrument yielded a Cronbach's alpha reliability coefficient of 0.86. Data were analysed using descriptive statistics, Pearson's Product-Moment Correlation Analysis, and an Independent Samples t-test at the 0.05 level of significance. The findings revealed no significant relationship between teachers' ICT competence and students' academic performance ($r = -0.034$, $p = .795$), indicating that teachers' ICT competence did not significantly influence students' academic performance. However, the study found a significant difference in ICT competence between male and female teachers ($t(406.47) = -2.36$, $p = .019$), with female teachers demonstrating significantly higher ICT competence than their male counterparts. The study concludes that while ICT competence remains an essential professional attribute for teachers, it alone does not significantly predict students' academic performance in public senior secondary schools in Lagos State. The study recommends continuous professional development in ICT for teachers, enhanced provision of digital teaching resources, and further research on other teacher- and school-related factors influencing students' academic performance.

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Keywords: Teachers' ICT competence, academic performance, gender differences, public senior secondary schools.

Introduction

The integration of Information and Communication Technology (ICT) into education has transformed teaching and learning globally, making digital competence an indispensable attribute of effective teachers in the twenty-first century. As educational systems continue to embrace technology-enhanced learning, teachers are expected not only to possess sound pedagogical and subject-matter knowledge but also the competence to effectively integrate digital technologies into instructional practices. This shift has positioned teachers' ICT competence as a critical factor in improving teaching quality, promoting students' engagement, and enhancing learning outcomes (UNESCO, 2018; Redecker, 2017).

Teachers' ICT competence encompasses the knowledge, skills, attitudes, and professional dispositions required to effectively utilise digital technologies for lesson preparation, instructional delivery, assessment, classroom management, communication, collaboration, and continuous professional development. According to UNESCO (2018), ICT competence extends beyond basic computer literacy to include the pedagogical integration of digital technologies that support learner-centred instruction and knowledge creation. Similarly, the European Digital Competence Framework for Educators (DigCompEdu) conceptualises teachers' digital competence across six dimensions, including professional engagement, digital resources, teaching and learning, assessment, empowering learners, and facilitating learners' digital competence (Redecker, 2017).

The relevance of teachers' ICT competence has become increasingly evident following the COVID-19 pandemic, which accelerated the adoption of digital and blended learning across educational systems worldwide. Consequently, teachers are expected to demonstrate competencies in using learning management systems, online assessment tools, virtual collaboration platforms, educational applications, and emerging technologies to facilitate meaningful learning experiences. However, evidence suggests that the educational benefits of ICT depend less on the availability of technological infrastructure than on teachers' competence in integrating these technologies into pedagogical practice (OECD, 2023; UNESCO, 2023).

Students' academic performance remains one of the most widely accepted indicators of educational effectiveness. It reflects learners' achievement of intended educational objectives as measured through examinations, continuous assessment, classroom participation, and other academic evaluations. Although students' academic

performance is influenced by numerous school-related and socio-economic factors, teacher quality remains one of the strongest determinants of learning outcomes. Within the context of digital education, teachers' ICT competence has attracted considerable scholarly attention because competent teachers are better positioned to design interactive lessons, personalise instruction, facilitate collaborative learning, and provide timely feedback that improves students' academic achievement (Tzafilkou et al., 2023).

In Nigeria, successive educational policies have emphasised ICT integration as a strategy for improving educational quality and preparing learners for participation in the digital economy. Lagos State, being one of the most technologically advanced states in the country, has invested substantially in digital learning initiatives, ICT infrastructure, and teacher capacity development. Despite these efforts, disparities remain in teachers' digital competence and the effective integration of ICT into classroom instruction. In many public secondary schools, challenges such as inadequate professional development opportunities, limited pedagogical application of digital technologies, inconsistent internet connectivity, and insufficient technical support continue to constrain effective ICT utilisation (UNESCO, 2023).

Although previous empirical studies have investigated ICT availability, ICT utilisation, and technology integration in schools, relatively fewer studies have specifically examined teachers' ICT competence as a determinant of students' academic performance within the context of public senior secondary schools in Lagos State. Moreover, existing findings remain inconsistent, indicating the need for further empirical evidence. Consequently, this study investigates the relationship between teachers' ICT competence and students' academic performance in public senior secondary schools in Lagos State, Nigeria.

Statement of the Problem

Teachers' ICT competence has become increasingly important for improving instructional effectiveness and students' learning outcomes in contemporary education. Despite substantial investments in ICT infrastructure and teacher capacity development, students' academic performance in many public senior secondary schools in Lagos State remains below expectations. This raises concerns about whether teachers possess the requisite ICT competencies needed to effectively integrate digital technologies into classroom instruction and facilitate improved academic achievement (UNESCO, 2023).

Existing studies in Nigeria have largely focused on ICT availability, accessibility, and utilisation, with comparatively limited attention given to the influence of teachers'

ICT competence on students' academic performance. Furthermore, findings from previous studies have produced mixed results, making it difficult to establish the extent to which teachers' ICT competence contributes to students' academic success within the Lagos State context. It is against this background that this study examines the relationship between teachers' ICT competence and students' academic performance in public senior secondary schools in Lagos State, Nigeria.

Specific Objectives

The study seeks to:

1. Examine the relationship between teachers' ICT competence and students' academic performance in public senior secondary schools in Lagos State, Nigeria.
2. Determine the difference in the ICT competence of male and female teachers in public senior secondary schools in Lagos State, Nigeria, in terms of their familiarity and proficiency with ICT tools and software for teaching and administrative purposes.

Research Questions

The following research questions guided the study:

1. What relationship exists between teachers' ICT competence and students' academic performance in public senior secondary schools in Lagos State, Nigeria?
2. What difference exists between the ICT competence of male and female teachers in public senior secondary schools in Lagos State, Nigeria, in terms of their familiarity and proficiency with ICT tools and software for teaching and administrative purposes?

Research Hypotheses

The following research answered in the study:

H_{O1}: There is no significant relationship between teachers' ICT competence and students' academic performance in public senior secondary schools in Lagos State**,** Nigeria**.**

H_{O2}: There is no significant difference in the competence of male and female public senior secondary school teachers in Lagos State in terms of familiarity and proficiency with ICT tools and software for teaching and administrative purposes**.**

Review of Related Literature

Teachers' ICT Competence

Teachers' Information and Communication Technology (ICT) competence has emerged as a critical factor in the delivery of quality education in the digital age. The rapid advancement of technology and its integration into educational systems have transformed teaching and learning processes, making ICT competence an essential requirement for teachers at all levels of education. ICT competence refers to the knowledge, skills, attitudes, values, and

abilities that enable teachers to effectively utilise digital technologies for instructional, administrative, communication, assessment, and professional-development purposes. In contemporary education, teachers are expected not only to possess subject-matter knowledge but also to demonstrate competence in using technology to enhance students' learning experiences and improve educational outcomes (UNESCO, 2023; Tondeur, Howard, & Scherer, 2020).

In modern educational practice, ICT competence is considered a multidimensional construct that consists of several interconnected components. One important component is technological knowledge, which refers to teachers' understanding of digital devices, software applications, internet resources, multimedia tools, and emerging technologies. Teachers require adequate technological knowledge to effectively utilise educational technologies in teaching and learning activities, including the ability to operate computers, use productivity software, navigate the internet, manage digital files, and troubleshoot basic technological challenges. According to Mishra and Koehler (2021), technological knowledge forms the foundation upon which effective technology integration in education is built.

Another significant component is pedagogical competence, which involves the ability to integrate technology into instructional processes in ways that support students' learning and improve educational outcomes. This component emphasises the relationship between technology and teaching methodologies, and teachers who possess strong pedagogical competence can select appropriate digital tools, instructional strategies, and learning resources that align with curriculum objectives and students' learning needs. According to Koehler et al. (2022), successful ICT integration occurs when technological knowledge is combined with pedagogical expertise and content knowledge.

Information literacy is another essential component of teachers' ICT competence, involving the ability to locate, evaluate, organise, interpret, and utilise information obtained from digital sources. In the contemporary knowledge society, vast amounts of information are available through online platforms, making it necessary for teachers to possess skills for identifying credible and relevant information and for guiding students in accessing trustworthy sources, avoiding misinformation, and using information ethically. According to the International Society for Technology in Education (ISTE, 2023), information literacy is fundamental for effective teaching and learning in digital environments because it supports critical thinking and informed decision-making.

In the Nigerian educational system, the increasing emphasis on technology-enhanced learning has made ICT competence a

requirement for teachers. Government initiatives promoting digital education, e-learning, and ICT integration have increased expectations regarding teachers' technological capabilities. However, challenges such as inadequate infrastructure, insufficient training opportunities, limited internet access, and inadequate funding continue to affect the development of ICT competence among teachers. Despite these challenges, teachers who possess adequate ICT competence are more likely to deliver effective instruction, support students' learning needs, and contribute to improved academic performance (Ogunode & Musa, 2023). Moreover, ICT competence contributes to the achievement of national educational goals by promoting innovation, improving educational quality, and preparing students for participation in a technology-driven society. Teachers serve as facilitators of learning and play a critical role in equipping students with digital literacy skills necessary for success in the twenty-first century, and enhancing teachers' ICT competence therefore remains a strategic priority for educational policymakers and school administrators, including those responsible for public senior secondary education in Lagos State.

Dimensions of Teachers' ICT Competence

Familiarity and Proficiency with ICT Tools

Familiarity with ICT tools refers to the extent to which an individual is aware of, has knowledge of, and is accustomed to using various information and communication technologies in performing educational and professional tasks. It involves recognising the functions, features, and applications of digital technologies such as computers, projectors, interactive whiteboards, learning management systems, productivity software, internet resources, and educational applications. In the educational context, teachers' familiarity with ICT tools provides the foundation for developing digital competence and encourages the integration of technology into instructional practices. However, being familiar with ICT tools does not necessarily imply the ability to use them effectively for pedagogical purposes.

According to UNESCO (2024), teachers' familiarity with ICT encompasses awareness of and a basic understanding of digital technologies and their potential applications in teaching, learning, communication, and professional development. Familiarity enables teachers to appreciate the value of technology in education and serves as the first step toward achieving higher levels of digital competence.

Proficiency with ICT Tools

Proficiency with ICT tools refers to the ability to competently, confidently, and efficiently use digital technologies to accomplish specific educational and professional tasks. It encompasses not only technical skills in operating ICT devices and software but also the pedagogical ability to integrate technology effectively into

teaching, assessment, classroom management, communication, collaboration, and problem-solving. ICT proficiency enables teachers to select appropriate digital tools, create engaging learning experiences, assess students using technological applications, and adapt to emerging educational technologies.

According to the European Commission (2022), ICT proficiency is demonstrated through educators' capacity to use digital technologies effectively, responsibly, and creatively for teaching, assessment, learner engagement, professional collaboration, and continuous professional development. Teachers with high ICT proficiency are better positioned to improve instructional quality and facilitate meaningful student learning experiences.

Similarly, UNESCO (2024) emphasises that ICT proficiency extends beyond operational knowledge to include the effective integration of digital technologies into curriculum delivery and innovative pedagogical practices. Teachers' ICT competence is a multidimensional concept that encompasses various knowledge areas, technical abilities, attitudes, and pedagogical skills required for the effective integration of technology into educational processes. As educational systems increasingly embrace digital transformation, teachers are expected to possess competencies that enable them to utilise technology effectively for teaching, learning, assessment, communication, collaboration, research, and professional development. The effectiveness of technology integration in schools largely depends on the extent to which teachers possess the necessary ICT competencies, and several dimensions have been identified in contemporary educational literature as critical for effective teaching and learning in the digital era (UNESCO, 2023; Tondeur et al., 2020).

Another important dimension is internet and information literacy skills, involving the ability to access, retrieve, evaluate, organise, analyse, and utilise information obtained through digital platforms. Teachers must be capable of searching for educational resources online, evaluating the credibility of information sources, distinguishing between reliable and unreliable information, and using information ethically. According to Tondeur et al. (2020), information literacy is essential for promoting informed decision-making, lifelong learning, and academic excellence, and teachers who possess strong information literacy skills are more effective in supporting students' research activities and knowledge acquisition.

Collectively, these dimensions basic computer operation skills, information literacy, digital communication, ICT integration, content creation, digital assessment, professional development, data management, cybersecurity awareness, innovation, and problem-solving competencies — define teachers' ICT

competence and influence their ability to utilise technology effectively in educational settings. Teachers who possess these competencies are more likely to promote meaningful learning experiences, improve instructional quality, foster students' digital literacy, and contribute positively to students' academic achievement. In contemporary education, ICT competence is no longer optional but an essential professional requirement, and the development of teachers' ICT competence remains crucial for improving educational quality, enhancing teaching effectiveness, and preparing students for success in a knowledge-based society, particularly within the technologically dynamic environment of Lagos State's public senior secondary schools.

Academic Performance

Academic performance is one of the most widely used indicators for evaluating educational effectiveness, students' achievement, and the overall success of educational institutions. It refers to the extent to which students successfully attain educational goals, learning objectives, and expected competencies within a specified period of study. Academic performance serves as a measure of students' learning outcomes and reflects their mastery of knowledge, skills, attitudes, values, and competencies acquired through educational experiences. In educational research, academic performance is often regarded as a key outcome variable because it provides evidence of the effectiveness of teaching, learning, school administration, and educational policies (Adeyemi & Aremu, 2021; Olatoye & Agbatogun, 2022).

The concept of academic performance encompasses various indicators that reveal students' educational progress and achievement levels. According to Adeyemi and Aremu (2021), academic performance refers to the measurable outcomes of learning activities expressed through grades, examination scores, class rankings, and other indicators of educational achievement. Similarly, Olatoye and Agbatogun (2022) define academic performance as the level of success attained by students in academic tasks and assessments conducted within formal educational settings. These definitions emphasise that academic performance is a reflection of students' ability to understand, retain, apply, and demonstrate acquired knowledge in different learning situations.

Several indicators are commonly used to assess academic performance, including examination scores, continuous assessment results, classroom participation, assignment completion, project performance, attendance records, practical activities, graduation rates, and standardised test outcomes. Academic performance may also be reflected in students' ability to apply knowledge, solve problems, think critically, communicate effectively, and demonstrate competence in various subject areas. In secondary schools, performance in core subjects such as

Mathematics, English Language, Biology, Chemistry, Physics, and Economics is often used as a significant indicator of academic achievement, and the level of students' success in these subjects frequently determines their educational progression and future career opportunities (Okeke & Nwafor, 2020).

Methodology

This study adopted a descriptive survey research design of the correlational type to examine the relationship between teachers' ICT competence and students' academic performance in public senior secondary schools in Lagos State, Nigeria, and to determine whether teachers' ICT competence differs by gender. The study population comprised teachers in public senior secondary schools across Lagos State. A total of 490 teachers were selected through a multistage sampling procedure involving the selection of schools and teachers from the six educational districts of the state. Data on students' academic performance were obtained from the academic records of the sampled schools.

Data were collected using a structured questionnaire designed to measure teachers' ICT competence in terms of their familiarity and proficiency with ICT tools and software for instructional and administrative purposes. The instrument was subjected to face and content validation by experts in Educational Management and Measurement and Evaluation. Its internal consistency reliability was established using Cronbach's alpha, yielding a reliability coefficient of 0.86, which indicated that the instrument was reliable for the study.

Data were analysed using the Statistical Package for the Social Sciences (SPSS), Version 27. Descriptive statistics, including mean and standard deviation, were used to summarise the study variables. Pearson's Product-Moment Correlation Analysis (PPMCA) was employed to test the relationship between teachers' ICT competence and students' academic performance, while an Independent Samples t-test was used to examine the difference in ICT competence between male and female teachers. All hypotheses were tested at the 0.05 level of significance.

Result and Interpretation

H_{O1}: There is no significant relationship between teachers' ICT competence and students' academic performance in public senior secondary schools in Lagos State, Nigeria.

To test the null hypothesis, Pearson's Product-Moment Correlation Analysis (PPMCA) was carried out between teachers' ICT competence and students' academic performance in public senior secondary schools in Lagos State.

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Table 1: Relationship between teachers' ICT competence and students' academic performance in public senior secondary schools in Lagos State, Nigeria

Variable	M	SD	N	r	p	Remark
Teachers' ICT Competence	2.27	0.83	490	-.034	0.795	Not Sig.
Students' Academic Performance	54.85	14.57	60			

The results in Table 1 present the descriptive statistics of the teachers' ICT competence and students' academic performance in public senior secondary schools in Lagos State, Nigeria. The mean score for teachers' ICT competence is 2.27 (SD = 0.83, N = 490), indicating a relatively low level of ICT competence among the teachers in the study. Whereas students' academic performance has a mean score of 54.85 (SD = 14.57, N = 60), suggesting a moderate level of academic performance among students, with a relatively wide variation in performance as reflected by the higher standard deviation.

However, the correlation analysis reveals a very weak negative relationship between teachers' ICT competence and students' academic performance in public senior secondary schools in Lagos State, Nigeria (r = -0.034) (Table 1). This implies that an increase in teachers' ICT competence is associated with a negligible decrease in students' academic performance in public senior secondary schools in Lagos State, Nigeria; however, the magnitude of this relationship is extremely small and non-significant. The p -value (p = .795) is far greater than the significance level of 0.05, indicating that the relationship is not significant. These findings suggest that teachers' ICT competence does not significantly influence students' academic performance. Therefore, the null hypothesis, which states that there is no significant relationship between teachers' ICT competence and students' academic performance in public senior secondary schools in Lagos State, Nigeria, is hereby not rejected.

Hypothesis Two: There is no significant difference in the competence of male and female public senior secondary school teachers in Lagos State in terms of familiarity and proficiency with ICT tools and software for teaching and administrative purposes**.**

To test the null hypothesis, An Independent t-test was performed. The data gathered on the competence of public senior secondary school teachers in Lagos State in terms of

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familiarity and proficiency with ICT tools and software for teaching and administrative purposes, categorised by the respondents' gender, were analysed using an independent t-test, with the results displayed in Table 2 (a – b).

Table 2a: Descriptive Statistics of difference in the competence of male and fame public senior secondary school teachers in Lagos State in terms of familiarity and proficiency with ICT tools and software for teaching and administrative purposes

Variable	Gender	N	Mean	SD	SE
Teachers' ICT Competence	Male	281	46.75	10.22	0.61
	Female	209	49.18	11.96	0.83

Note: *M* = Mean; *SD* = Standard Deviation; *SE* = Standard Error of the Mean.

Table 2b: Independent t-statistics of significant difference in the competence of male and female public senior secondary school teachers in Lagos State in terms of familiarity and proficiency with ICT tools and software for teaching and administrative purposes

Variable	F	P	T	df	p (2-tailed)	Mean Difference	SE Difference	95% CI [LL, UL]	Remark
Teachers' ICT competence	18.32	.000	-2.36	406.47	.019	-2.43	1.03	[-4.45, -0.41]	Sig.

Note: *F* = Levene's test statistic; *t* = t-value; *df* = degrees of freedom; *p* = significance level; *SE* = standard error; CI = confidence interval; LL = lower limit; UL = upper limit.

The independent samples *t*-test conducted to examine the difference between male and female public senior secondary school teachers' ICT competence in Lagos State, Nigeria, showed that Levene's test for equality of variances was significant (F = 18.32, $p < .05$), indicating that the assumption of homogeneity of variance was violated. Therefore, the results for equal variances not assumed were used. Table 2b reveals a significant difference in teachers' ICT competence between male and female public senior secondary school teachers, with $t(406.47) = -2.36$, $p = .019$. The mean difference of -2.43 indicates that the male group scored, on average, 2.43 points lower in ICT competence than the other group. Furthermore, the 95% confidence interval [-4.45, -0.41] confirms that the difference is significant, suggesting that teachers' ICT competence differs significantly between male and female public senior secondary school teachers, with the female teachers being significantly more competent than the male teachers. Hence, null hypothesis two, which states that there is no significant difference between the competence of male and female public senior secondary school teachers in Lagos State in terms of familiarity

and proficiency with ICT tools and software for teaching and administrative purposes, is rejected. The implication is that gender has a significant impact on the ICT competence of public senior secondary school teachers in Lagos State, Nigeria.

Conclusion

This study examined the relationship between teachers' ICT competence and students' academic performance in public senior secondary schools in Lagos State, Nigeria, and investigated whether teachers' ICT competence differs by gender. The findings revealed no significant relationship between teachers' ICT competence and students' academic performance. This suggests that teachers' ICT competence alone may not be sufficient to influence students' academic outcomes, as academic performance is shaped by multiple interacting factors, including instructional practices, learning resources, students' motivation, and the school learning environment. However, the study found a significant gender difference in teachers' ICT competence, with female teachers demonstrating higher levels of familiarity and proficiency with ICT tools and software than their male counterparts. The study concludes that while ICT competence is an important professional skill for teachers, efforts to improve students' academic performance should adopt a more holistic approach that addresses other instructional and contextual factors alongside teachers' digital competence.

Recommendations

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

1. Educational authorities should provide continuous professional development programmes to enhance teachers' ICT competence, with particular attention to strengthening the digital skills of teachers who require additional support.
2. School administrators should promote the effective integration of ICT into classroom instruction by providing adequate technological facilities, technical support, and opportunities for teachers to apply digital tools in teaching and learning.
3. Policymakers should complement ICT capacity-building initiatives with broader interventions aimed at improving instructional quality, teaching resources, and the overall learning environment, given that teachers' ICT competence alone did not significantly predict students' academic performance.
4. Future studies should investigate other school- and teacher-related factors, such as instructional strategies, teachers' pedagogical competence, school leadership, and students' learning motivation, which may jointly influence academic performance in public secondary schools.

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