

Influence of ICT Infrastructure on Teaching Performance of Academic Staff in Nigerian Public Universities

Ikoh Samson Joseph¹, Usman Madugu²

Department of Public Administration, Faculty of Management Science University of Abuja, Abuja, Nigeria.

DOI: <https://doi.org/10.51584/IJRIAS.2026.11080182>

Received: 20 August 2026; Accepted: 25 August 2026; Published: 22 September 2026

ABSTRACT

The growing deployment of digital technologies in higher education has brought renewed attention to the role of Information and Communication Technology (ICT) infrastructure in shaping teaching outcomes. This study examined the influence of ICT infrastructure on the teaching performance of academic staff in Nigerian public universities, focusing on the availability and adequacy of ICT infrastructure, its impact on teaching performance, and how access and use of ICT facilities affect instructional delivery. The study is anchored on Technology Acceptance Model (TAM), which describes how perceived usefulness and ease of use of technology affect adoption and performance. A systematic review design based on secondary data was adopted, drawing from recent empirical studies published between 2023 and 2026, with clearly defined inclusion and exclusion criteria to ensure relevance and reliability. One of the findings revealed that although ICT infrastructure is available in many Nigerian public universities, it is largely inadequate, unevenly distributed, and constrained by poor internet connectivity, unstable power supply, and limited maintenance. The findings further revealed that functional as well as accessible ICT infrastructure significantly enhances the teaching performance of academic staff by optimising instructional delivery, access to teaching resources, and student engagement, while limited access and low utilization reduce its effectiveness. It is concluded that ICT infrastructure remains a critical determinant of teaching quality, but its impact depends on adequacy, accessibility, and effective use. It recommends continuing investment in ICT facilities, equitable access across departments, and continuous capacity building for academic staff to improve utilization and teaching outcomes.

Keywords: ICT Infrastructure, Teaching Performance, Academic Staff, Nigerian Public Universities, Instructional Delivery.

INTRODUCTION

The integration of Information and Communication Technology (ICT) into higher education has become a defining feature of modern university systems across the world. Universities increasingly rely on digital infrastructure such as broadband connectivity, learning management systems, virtual classrooms, and digital instructional resources to support teaching, research, and administrative functions. The global shift toward technology-enhanced teaching has been accelerated by the demand for flexible learning systems and the expansion of digital knowledge economies. In this context, ICT infrastructure is no longer considered supplementary but central to the delivery of quality university education.

In developing countries, including Nigeria, the adoption of ICT in higher education has gained policy attention as part of efforts to improve educational standards and global competitiveness. ICT tools are widely acknowledged for their capacity to improve instructional delivery, facilitate access to teaching materials, enhance interaction between lecturers and students, and support innovative pedagogical practices (Agbo et al., 2024). The use of digital platforms such as virtual classrooms and online repositories enables academic staff to extend teaching beyond traditional lecture methods, thereby improving instructional effectiveness and student engagement.

Within Nigerian public universities, however, the level of ICT integration remains uneven. While some institutions have made progress in deploying digital technologies, others continue to struggle with inadequate infrastructure, including unreliable internet connectivity, insufficient digital equipment, and unstable power supply. Empirical studies indicate that the availability and quality of ICT infrastructure significantly influence teaching effectiveness and overall academic staff performance. For instance, Akinyemi (2024) found a significant positive relationship between ICT facilities and academic staff job performance, suggesting that improved access to digital resources enhances efficiency in teaching, research, and administrative tasks. Similarly, Odediji (2024) reported that ICT facilities are strongly associated with lecturers' productivity and engagement in academic activities.

Beyond availability, the functionality of ICT infrastructure also determines its impact on teaching performance. Studies have shown that poor broadband access and network instability limit the effective use of digital tools in Nigerian universities (Ademola, Popoola & Adesina, 2025). Inadequate infrastructure often leads to reduced utilization of e-learning platforms and digital teaching aids, thereby constraining lecturers' ability to adopt innovative teaching strategies. Conversely, where ICT infrastructure is adequate and reliable, academic staff are better positioned to deliver interactive, student-centered instruction and engage in continuous professional development.

Furthermore, ICT infrastructure supports not only classroom teaching but also broader academic responsibilities such as research dissemination, collaboration, and assessment. The increasing reliance on digital tools for academic publishing, online supervision, and data analysis underscores the importance of robust ICT systems in enhancing academic productivity. Despite these benefits, evidence suggests that institutional factors such as funding constraints, limited technical support, and inadequate training continue to hinder optimal ICT utilization in Nigerian public universities (Mohammed Salisu et al., 2024).

Given these dynamics, understanding the influence of ICT infrastructure on academic staff teaching performance is critical for informing policy and institutional interventions aimed at improving the quality of higher education in Nigeria. This paper was therefore situated within the broader discourse on educational technology and staff performance, with a focus on how infrastructural factors shape teaching outcomes in public universities.

Statement of the Problem

Despite increasing recognition of the role of ICT in higher education, Nigerian public universities continue to face persistent challenges related to the adequacy and functionality of ICT infrastructure. While investments in digital technologies have been initiated in some institutions, there remains a significant gap between policy expectations and actual implementation. This gap raises concerns about the extent to which ICT infrastructure effectively supports academic staff in delivering quality teaching. Empirical evidence indicates that ICT infrastructure has a direct and significant relationship with academic staff performance. However, many Nigerian universities operate with limited access to essential ICT resources, including modern computer systems, stable internet connectivity, and digital teaching platforms (Akinyemi, 2024; Odediji, 2024). In several cases, existing facilities are either obsolete or poorly maintained, thereby reducing their usefulness for instructional purposes. These deficiencies restrict lecturers' ability to integrate technology into their teaching and limit the adoption of innovative pedagogical approaches.

In addition, problems related to network reliability and bandwidth availability continue to undermine the effective use of ICT in teaching. Research has shown that issues such as low bandwidth, intermittent connectivity, and inadequate technical infrastructure significantly constrain digital teaching practices in Nigerian universities (Ademola, Popoola & Adesina, 2025). As a result, academic staff may resort to traditional teaching methods, even when digital alternatives could enhance learning outcomes.

Another dimension of the problem lies in the uneven distribution of ICT resources across institutions and departments. While some faculties may have relatively better access to digital tools, others operate with minimal infrastructure, creating disparities in teaching quality within the same university system. Furthermore, the lack

of institutional support, including training and technical assistance, limits lecturers' capacity to effectively utilize available ICT resources (Mohammed Salisu et al., 2024).

These problems collectively raise critical questions about the actual influence of ICT infrastructure on academic staff teaching performance in Nigerian public universities. Although existing studies have established a general link between ICT and academic performance, there remains a need for more focused inquiry into how infrastructural factors specifically affect teaching practices. Without such understanding, efforts to improve educational quality through ICT investment may yield limited results.

It is against this backdrop that this paper sought to examine the influence of ICT infrastructure on teaching performance of academic staff in Nigerian public universities, with the following specific objectives:

- i. To assess the availability and adequacy of ICT infrastructure in Nigerian public universities.
- ii. To assess the extent to which ICT access and use influence instructional delivery among academic staff in Nigerian public universities.

METHODOLOGY

This study deployed qualitative approach premised on secondary data to synthesize existing empirical evidence on the influence of ICT infrastructure on teaching performance of academic staff in Nigerian public universities. This approach was considered appropriate because it allows for a rigorous, transparent, and replicable process of identifying, evaluating, and integrating findings from relevant studies, thereby providing a consolidated understanding of the subject.

In other words, a comprehensive review was conducted by surfing relevant academic databases and electronic repositories, with emphasis on studies conducted within higher education context.

LITERATURE REVIEW

The existing literature was reviewed based on the study's objectives, categorised into conceptual review, empirical review, and theoretical framework as detailed below:

Conceptual Review

Information and Communication Technology (ICT)

Information and Communication Technology (ICT) has been widely conceptualized in educational research as the collection of digital tools and systems that enable the creation, storage, processing, and exchange of information within teaching and learning environments. Recent studies describe ICT as encompassing hardware, software, networks, and communication platforms that support instructional delivery and knowledge dissemination (Ntorukiri et al., 2022; Dada et al., 2025). Scholars further argue that ICT extends beyond physical tools to include their pedagogical application in enhancing interaction, access to resources, and instructional innovation (Abedi, 2023). While some authors emphasize its technical components, others stress its functional role in improving teaching effectiveness and learning outcomes. In this paper, ICT is adopted as an integrated system of digital technologies and communication tools that support, enhance, and transform teaching processes and academic activities in universities.

Infrastructure

Infrastructure in the context of higher education refers to the physical and technological facilities that support academic functions and institutional operations. Ogunode and Akpakwu (2023) conceptualize infrastructure as including lecture halls, laboratories, libraries, ICT facilities, electricity supply, and internet services that enable effective teaching and learning. Ajayi (2024) extends this view by emphasizing that infrastructure represents the enabling environment that determines the efficiency of academic work and institutional productivity. While some

perspectives focus on general physical facilities, more recent scholarship highlights the growing importance of digital infrastructure as a core component of educational systems. This paper therefore adopts a definition of infrastructure as the combination of physical and digital facilities, including ICT systems that provide the necessary support for instructional delivery and academic performance.

Academic Staff

Academic staff are generally defined as professional personnel engaged in teaching, research, and community service within higher education institutions. According to recent empirical work, academic staff consist of lecturers and faculty members responsible for delivering instruction, conducting research, and contributing to institutional development (Odediji, 2024). This definition is consistent with broader academic discourse which positions academic staff as central agents in knowledge production and dissemination. Some scholars further highlight their role in mentoring students and participating in administrative duties, thereby expanding the scope of their responsibilities. Drawing from these views, this paper defines academic staff as university-based professionals whose primary responsibilities include teaching, research, and academic service delivery.

Teaching Performance

Teaching performance refers to the effectiveness with which academic staff carry out instructional duties, including lesson delivery, student engagement, assessment practices, and mastery of subject content. Recent studies conceptualize teaching performance in terms of measurable indicators such as punctuality, instructional clarity, student interaction, and the ability to utilize teaching resources effectively (Odediji, 2024; Akinyemi, 2024). Other scholars argue that teaching performance also reflects the capacity to adopt innovative pedagogical strategies, particularly through the use of ICT, to enhance learning outcomes. While definitions vary in scope, there is consensus that teaching performance is closely linked to both individual competence and the availability of institutional resources. In this paper, teaching performance is defined as the extent to which academic staff effectively delivers instruction, engage students, and utilize available resources, including ICT, to achieve educational objectives.

Public Universities

Public universities are institutions of higher learning established, funded, and regulated by government authorities to provide tertiary education and promote research and community development. In the Nigerian context, public universities are primarily owned by federal or state governments and are mandated to expand access to higher education while maintaining academic standards. Recent literature emphasizes their role in national development, particularly through human capital formation and knowledge production, despite facing challenges such as inadequate funding and infrastructural deficits (Ogunode&Akpakwu, 2023). While some scholars focus on governance structures, others stress their social responsibility in ensuring equitable access to education. This study adopts the definition of public universities as government-owned higher education institutions tasked with teaching, research, and service functions within the framework of national educational policies.

Availability and Adequacy of ICT Infrastructure in Nigerian Public Universities

Recent empirical literature shows that the availability and adequacy of ICT infrastructure in Nigerian public universities remain uneven and, in many cases, insufficient to support effective teaching functions. ICT infrastructure in this context includes hardware such as computers and projectors, network systems including internet bandwidth, and supporting facilities such as power supply and digital learning platforms. Studies conducted across federal and state universities consistently indicate that while ICT facilities are present in many institutions, their adequacy relative to staff and student population is limited. For instance, Mohammed Salisu et al. (2024) reported that although over 70% of surveyed universities possessed basic ICT facilities, less than 40% of academic staff rated these facilities as adequate for teaching purposes due to overcrowding, outdated systems, and limited access time.

Further analysis shows that internet connectivity remains one of the most critical constraints. Ademola, Popoola and Adesina (2025), in a multi-institutional assessment, found that bandwidth availability in several Nigerian universities falls below the minimum requirement for effective e-learning delivery, with frequent downtime and slow speeds reported by over 60% of respondents. This limitation directly affects the ability of lecturers to access online teaching resources, upload course materials, and conduct virtual classes. Similarly, Dada et al. (2025) observed that ICT infrastructure in teacher education institutions is often characterized by insufficient digital tools and weak maintenance culture, leading to rapid deterioration of available facilities.

Electricity supply further complicates the adequacy of ICT infrastructure. Empirical findings indicate that inconsistent power supply significantly undermines the functionality of ICT systems, particularly in public universities where alternative power sources are either inadequate or expensive to maintain. In a study covering universities in northern Nigeria, Abubakar and Sani (2023) found that more than half of the institutions relied on intermittent electricity, which limited the operational hours of ICT facilities and reduced their usability for teaching activities.

Case-based evidence also highlights disparities across institutions. Federal universities located in urban areas tend to have relatively better ICT infrastructure compared to state universities and those in rural settings. However, even within better-funded institutions, access is often centralized, with ICT facilities concentrated in specific units such as computer laboratories rather than integrated into classrooms. This structural limitation restricts routine use of ICT in teaching. Akinyemi (2024) demonstrated that while some universities reported moderate availability of ICT tools, only a small proportion of lecturers had consistent personal access to these facilities for instructional purposes.

The issue of adequacy is further reflected in the ratio of ICT resources to users. In several Nigerian public universities, the student-to-computer ratio remains significantly higher than recommended standards, limiting both teaching and learning activities. This imbalance is compounded by the lack of regular upgrades and maintenance, resulting in obsolete systems that cannot support modern teaching applications. Odediji (2024) established that inadequate ICT infrastructure is a major predictor of reduced academic staff performance, particularly in tasks requiring digital engagement.

In all, the literature converges on the conclusion that ICT infrastructure in Nigerian public universities is available but not sufficiently adequate to meet current teaching demands. The gap between availability and functionality is shaped by funding constraints, weak maintenance practices, and infrastructural deficits such as poor electricity and internet services. These limitations form a critical barrier to the effective integration of ICT into teaching processes and underscore the need for targeted institutional investment and policy intervention.

The Effect of ICT Infrastructure on Teaching Performance of Academic Staff in Nigerian Public Universities

The relationship between ICT infrastructure and academic staff teaching performance has been widely examined in recent empirical studies, with consistent evidence indicating a significant positive effect. Teaching performance in this context is reflected in instructional delivery, classroom engagement, assessment practices, and the ability to integrate innovative teaching methods. ICT infrastructure enhances these dimensions by providing tools that improve access to teaching materials, facilitate communication, and support interactive learning environments.

Akinyemi (2024), in a quantitative study of universities in southwest Nigeria, found a statistically significant relationship between the availability of ICT facilities and academic staff job performance, with ICT variables explaining a substantial proportion of variance in teaching effectiveness. Lecturers with access to reliable ICT tools demonstrated higher levels of instructional preparedness, improved content delivery, and greater engagement with students. Similarly, Odediji (2024) reported that ICT infrastructure significantly influences lecturers' productivity, particularly in the areas of lecture delivery and continuous assessment.

The use of digital platforms such as learning management systems has also been shown to improve teaching performance. Mohammed et al. (2024) noted that lecturers who actively used online platforms for course management and communication recorded better teaching outcomes compared to those relying solely on traditional methods. These platforms enable timely dissemination of course materials, structured assessment processes, and continuous interaction with students, thereby enhancing overall teaching quality.

However, the effect of ICT infrastructure is not uniform across all contexts. Studies indicate that the impact is mediated by the quality and reliability of the infrastructure. Ademola-Popoola and Adesina (2025) found that poor network performance and frequent disruptions significantly reduce the effectiveness of ICT in teaching, leading to frustration among academic staff and reduced utilization of digital tools. In such cases, the potential benefits of ICT are not fully realized, and teaching performance remains constrained.

Practical examples from Nigerian universities further illustrate this relationship. In institutions where ICT infrastructure has been strengthened through targeted interventions, such as improved broadband access and provision of digital teaching tools, there has been a noticeable improvement in teaching practices. Lecturers in these environments are more likely to adopt multimedia presentations, online assessments, and blended learning approaches. Conversely, in universities with limited ICT infrastructure, teaching remains largely dependent on conventional methods, with minimal integration of digital resources.

Another important dimension is the role of ICT in supporting research-informed teaching. Access to online databases and digital libraries enables lecturers to update course content and incorporate current knowledge into their teaching. This contributes to improved instructional quality and relevance. Abubakar and Sani (2023) found that lecturers with better access to digital resources were more effective in delivering up-to-date and contextually relevant lectures.

Despite these positive effects, challenges such as inadequate training and limited technical support continue to hinder optimal utilization of ICT infrastructure. While infrastructure provides the necessary foundation, its impact on teaching performance depends on the capacity of academic staff to use it effectively. This highlights the need for complementary interventions such as capacity building and institutional support systems.

In sum, ICT infrastructure has a significant and positive effect on academic staff teaching performance in Nigerian public universities. However, the magnitude of this effect is influenced by factors such as infrastructure quality, reliability, and user competence. Addressing these factors is essential for maximizing the benefits of ICT in enhancing teaching outcomes.

Influence of ICT Access and Use on Instructional Delivery among Academic Staff in Nigerian Public Universities

The influence of ICT on instructional delivery is closely linked to the extent of access to and actual utilization of available facilities by academic staff. Access refers to the availability and ease of use of ICT resources, while utilization involves the frequency and manner in which these resources are applied in teaching. Recent studies identify several dimensions of ICT utilization in instructional delivery, including the use of multimedia tools, online learning platforms, digital assessment systems, and communication technologies.

Empirical evidence suggests that access to ICT facilities is a critical determinant of their utilization. Akinyemi (2024) found that lecturers with regular access to computers and internet services were significantly more likely to incorporate digital tools into their teaching. In contrast, limited access resulted in low utilization, even where basic infrastructure existed. This finding is consistent with the work of Dada et al. (2025), who reported that inadequate access to ICT resources remains a major barrier to effective instructional delivery in Nigerian tertiary institutions.

The extent of utilization also varies across disciplines and institutional contexts. Science and technology-based faculties tend to exhibit higher levels of ICT use due to the nature of their instructional requirements, while

humanities and social sciences show relatively lower levels of integration. Mohammed Salisu et al. (2024) observed that lecturers in institutions with established e-learning systems demonstrated higher levels of ICT utilization, particularly in course management and student assessment.

Instructional delivery is significantly enhanced when ICT facilities are effectively utilized. Digital tools enable lecturers to adopt interactive teaching methods, including the use of videos, simulations, and online discussions, which improve student engagement and understanding. Odediji (2024) reported that lecturers who frequently used ICT in teaching recorded higher levels of student participation and improved learning outcomes. Furthermore, the use of online assessment tools allows for timely feedback and more efficient evaluation processes.

However, the extent of utilization is often constrained by structural and institutional factors. Ademola-Popoola and Adesina (2025) found that poor network infrastructure and limited technical support reduce the frequency of ICT use among academic staff. Similarly, Abubakar and Sani (2023) highlighted that lack of training and digital literacy skills limits lecturers' ability to effectively utilize ICT facilities, even when they are available.

Case studies from selected Nigerian universities illustrate these dynamics. In institutions where ICT access is decentralized and integrated into classrooms, lecturers are more likely to use digital tools in routine teaching. In contrast, where ICT facilities are restricted to specific units such as computer labs, utilization remains low due to logistical constraints. This indicates that both access and institutional design play a crucial role in determining the extent of ICT utilization.

The relationship between ICT utilization and instructional delivery is therefore both direct and conditional. While increased access generally leads to higher utilization, the quality of infrastructure, availability of support services, and level of user competence significantly influence outcomes. Effective instructional delivery requires not only access to ICT facilities but also the capacity to integrate them into pedagogical practices.

In all, access to and utilization of ICT facilities have a substantial influence on instructional delivery among academic staff in Nigerian public universities. However, the extent of this influence is shaped by infrastructural, institutional, and individual factors. Enhancing access, improving infrastructure quality, and building user capacity are essential steps toward optimizing the role of ICT in instructional delivery.

Empirical Review

Adewoye and Salau (2023) conducted a study titled *Impact of ICT on Teaching and Learning: A Case Study of Selected Universities in Nigeria* focusing on public universities across Lagos, Ogun, and Oyo States. The study was anchored on the Technology Acceptance Model, which explains how perceived usefulness and ease of use influence technology adoption. A descriptive survey research design was adopted, with a sample size of 234 academic staff selected through simple random sampling. Data were collected using structured questionnaires and analysed using Pearson Product Moment Correlation and multiple regression techniques. The findings revealed a significant positive relationship between ICT availability and teaching effectiveness, indicating that ICT enhances instructional delivery and problem-solving in teaching environments. The study concluded that ICT remains a critical driver of teaching performance in Nigerian universities. However, the study was limited to southwestern Nigeria and did not sufficiently examine infrastructural adequacy across diverse institutional contexts. The present paper addressed this gap by focusing on the adequacy and functionality of ICT infrastructure in a broader Nigerian public university system.

Akinyemi (2024) carried out a study titled *Instructional Materials and ICT Facilities Situation as Correlates of Job Performance of Academic Staff in Southwest Nigerian Universities*. The study was conducted in six states in southwest Nigeria and was guided by the Resource-Based Theory, which emphasizes the role of institutional resources in enhancing performance. A descriptive survey design was employed, involving a population of 8,724 academic staff, from which 1,320 respondents were selected using a multi-stage sampling technique. Data were collected through two validated instruments and analysed using correlation and regression analysis. The findings

showed that ICT facilities significantly predict academic staff job performance, with improved access to ICT associated with higher levels of teaching effectiveness and productivity. The study concluded that institutional investment in ICT infrastructure is essential for improving academic performance. Despite its robust methodology, the study focused largely on correlational relationships without examining the mechanisms through which ICT infrastructure affects teaching delivery. The current paper filled this gap by examining both availability and utilization dimensions of ICT infrastructure in relation to teaching performance.

Ademola, Popoola and Adesina (2025) investigated Exploring the Status and Challenges of ICT Network Services and Broadband Utilization in Nigerian Universities, covering 25 higher education institutions across Nigeria's six geopolitical zones. The study was grounded in the Diffusion of Innovation Theory, which explains how technological innovations spread within institutions. A descriptive observational design was adopted, with purposive sampling used to select institutions. Data were collected through structured online questionnaires and analysed using descriptive statistics and ANOVA. The study found that although ICT infrastructure exists in many universities, challenges such as low bandwidth, unstable connectivity, and inadequate power supply significantly hinder effective utilization. It further established that poor ICT infrastructure limits the ability of academic staff to engage in digital teaching practices. The study concluded that infrastructural deficits remain a major barrier to effective ICT integration in Nigerian universities. However, the study focused more on network services and did not directly measure teaching performance outcomes. The present paper extended this line of inquiry by linking infrastructural conditions directly to academic staff teaching performance.

Odediji (2024) conducted a study titled ICT Facilities Situation and Academic Staff Job Performance in State-Owned Universities in Southwest Nigeria. The research was anchored on the Systems Theory, which views educational institutions as systems where inputs such as infrastructure influence outputs such as performance. A descriptive survey design was adopted, with a sample of 450 academic staff selected through a multi-stage sampling procedure. Data were collected using structured questionnaires with high reliability coefficients and analyzed using inferential statistics. The findings indicated that ICT facilities significantly influence academic staff performance, particularly in areas such as lecture delivery, student engagement, and assessment practices. The study concluded that improved ICT infrastructure leads to better teaching outcomes. Nevertheless, the study was limited to state-owned universities and did not account for variations across federal institutions. This study addressed this limitation by examining public universities more broadly, thereby providing a more inclusive understanding of ICT influence across institutional types (federal and state universities).

Dada et al. (2025) examined Assessment of the Effectiveness of ICT Integration for Teaching and Learning: A Case Study of Federal College of Education, Zaria. The study was based on the Constructivist Learning Theory, which emphasizes the role of technology in facilitating interactive learning environments. A case study research design was adopted, with data collected from academic staff using questionnaires and institutional records. The sample comprised lecturers from the Federal College of Education, selected through purposive sampling. Data analysis involved descriptive and inferential statistical techniques. The findings revealed that ICT integration significantly enhances teaching delivery, particularly through improved access to instructional materials and interactive teaching methods. However, the study also identified challenges such as inadequate infrastructure and limited technical support as constraints to effective utilization. The study concluded that while ICT has strong potential to improve teaching, its effectiveness depends on the availability and proper use of infrastructure. A key limitation of the study lies in its focus on a single institution, which restricts generalization. The current paper addressed this gap by examining multiple public universities to provide broader empirical evidence on ICT infrastructure and teaching performance.

THEORETICAL FRAMEWORK

This paper was anchored on the theoretical framework of Technology Acceptance Model (TAM) as discussed below:

Technology Acceptance Model (TAM)

The Technology Acceptance Model (TAM), proposed by Fred Davis in 1989, provides a highly suitable theoretical framework for examining the influence of ICT infrastructure on academic staff teaching performance in Nigerian public universities. The model has remained widely applied in recent empirical studies on ICT adoption in education, particularly in explaining how individuals accept and utilize technological systems within institutional settings (Abedi, 2023; Mohammed Salisu et al., 2024).

TAM is grounded on the assumption that two primary factors perceived usefulness and perceived ease of use determine an individual's intention to use a technology, which in turn influences actual usage behaviour. Perceived usefulness refers to the extent to which a user believes that employing a particular technology will enhance job performance, while perceived ease of use relates to the degree to which the technology is considered free of effort. These constructs are influenced by external variables such as system design, infrastructure quality, and organizational support, which are particularly relevant in the context of ICT deployment in universities.

The strengths of TAM lie in its simplicity, strong predictive power, and adaptability across different contexts, including higher education systems. It provides a clear framework for understanding how ICT infrastructure translates into actual usage and performance outcomes. Empirical studies have demonstrated that when academic staff perceive ICT tools as useful and easy to operate, they are more likely to integrate them into teaching activities, leading to improved instructional delivery and student engagement (Abedi, 2023). The model also allows for the incorporation of contextual variables such as infrastructure adequacy, training, and institutional support, making it particularly relevant for analyzing ICT challenges in developing countries.

However, the model has certain limitations. It tends to focus primarily on individual perceptions and may not fully capture broader institutional, cultural, and environmental factors that influence technology adoption. Critics have also argued that TAM does not sufficiently address issues such as infrastructural constraints, policy limitations, and systemic inequalities, which are significant in the Nigerian university context.

Despite these limitations, TAM offers a strong analytical basis for this study. The availability and adequacy of ICT infrastructure in Nigerian public universities can be understood as external variables that shape academic staff perceptions of usefulness and ease of use. Where infrastructure is reliable, accessible, and functional, lecturers are more likely to perceive ICT tools as beneficial and manageable, thereby increasing their level of utilization in teaching. This, in turn, enhances teaching performance through improved instructional methods, better access to teaching resources, and increased interaction with students.

Conversely, inadequate infrastructure characterized by poor internet connectivity, limited access to digital tools, and unstable power supply negatively affects these perceptions, leading to reduced adoption and limited impact on teaching performance. The model therefore provides a coherent explanation of how ICT infrastructure influences academic staff behaviour and teaching outcomes. By linking infrastructural conditions with user perceptions and actual teaching practices, TAM offers a relevant and empirically supported framework for analyzing the relationship between ICT infrastructure and academic staff teaching performance in Nigerian public universities.

DISCUSSIONS

This paper examined the influence of Information and Communication Technology (ICT) infrastructure on academic staff teaching performance in Nigerian public universities. The findings from the review are discussed following the specific objectives as follows:

The discussion begins with the availability and adequacy of ICT infrastructure, where the paper indicated that although ICT facilities exist in many Nigerian public universities, their sufficiency and functionality remain limited. This position aligns with the observations of Mohammed Salisu et al. (2024), who reported that the presence of ICT resources does not necessarily translate into adequate access due to constraints such as overcrowding, outdated equipment, and restricted availability. Similarly, Ademola-Popoola and Adesina (2025)

emphasized that inadequate bandwidth and unstable connectivity continue to undermine effective use of digital systems across institutions. The present findings reinforce these positions by demonstrating that infrastructural deficits are not merely technical issues but structural barriers that shape teaching conditions. Practical realities such as intermittent electricity supply and centralized ICT facilities further restrict usage, thereby limiting the integration of technology into routine teaching. This suggests that policy emphasis on ICT provision must move beyond acquisition to include maintenance, expansion, and equitable distribution across faculties and departments.

With respect to the effect of ICT infrastructure on academic staff teaching performance, the paper revealed a strong positive relationship between access to functional ICT systems and improved instructional delivery. This corroborates Akinyemi (2024), who established that ICT facilities significantly predict academic staff performance, particularly in lecture preparation and delivery. Odediji (2024) also found that lecturers with better access to ICT demonstrate higher productivity and engagement in teaching activities. The present study extends these findings by showing that ICT infrastructure enhances not only efficiency but also the quality of pedagogical practices, including the use of multimedia tools, online assessments, and interactive teaching methods. For example, lecturers who utilize learning management systems are better able to organize course materials, monitor student progress, and provide timely feedback. However, the findings also indicate that the benefits of ICT are contingent on the reliability of infrastructure, as disruptions in connectivity and power supply reduce its effectiveness. This underscores the need for institutional investment in stable and high-quality ICT systems to sustain improvements in teaching performance.

Regarding access to and utilization of ICT facilities, the paper highlights that availability alone does not guarantee effective instructional delivery; rather, the extent of utilization depends on both access and user competence. The findings support Dada et al. (2025), who identified limited access and inadequate technical support as major barriers to ICT utilization in teaching. In addition, Mohammed Salisu et al. (2024) noted that lecturers who actively engage with digital platforms achieve better instructional outcomes compared to those who rely solely on traditional methods. The present study further shows that disparities in access across departments and institutions contribute to uneven levels of ICT utilization, thereby affecting the consistency of teaching quality. For instance, faculties with integrated classroom technologies tend to exhibit higher levels of digital teaching practices, while those dependent on shared facilities show minimal usage. These findings point to the importance of decentralizing ICT resources and providing continuous training to enhance digital competence among academic staff.

The application of the Technology Acceptance Model provides a coherent explanation for the observed findings, particularly in linking infrastructural conditions with teaching behaviour. The results confirm that when ICT infrastructure is perceived as useful and easy to use, academic staff are more likely to integrate it into their teaching, thereby improving performance outcomes. This supports Abedi (2023), who emphasized that perceived usefulness and ease of use are critical determinants of technology adoption in educational settings. In the Nigerian context, the adequacy and reliability of ICT infrastructure function as external variables that shape these perceptions. Where infrastructure is robust, lecturers develop positive attitudes toward ICT, leading to higher levels of utilization and enhanced teaching effectiveness. Conversely, poor infrastructure diminishes perceived usefulness and discourages adoption.

The implication of these findings for higher education in Nigerian public education is that improving ICT infrastructure alone is insufficient without addressing usability and support systems that influence staff perceptions. Therefore, aligning infrastructural development with user-centered strategies such as training and technical support is essential for achieving meaningful improvements in teaching performance across Nigerian public universities.

CONCLUSION

In conclusion, the ICT infrastructure plays a decisive role in shaping the teaching performance of academic staff in Nigerian public universities, but its effectiveness is largely dependent on its adequacy, accessibility, and

functionality. While many institutions have made efforts to provide ICT facilities, the findings reveal that such provisions are often insufficient, unevenly distributed, and constrained by challenges such as poor internet connectivity, unreliable power supply, and limited maintenance.

These deficiencies significantly restrict the extent to which academic staff can integrate ICT into instructional delivery. Nonetheless, where ICT infrastructure is available and functional, it enhances teaching performance by improving instructional methods, facilitating access to up-to-date academic resources, and supporting interactive and student-centered learning approaches. The study further establishes that access and actual utilization of ICT facilities are critical determinants of instructional effectiveness, as lecturers who actively engage with digital tools demonstrate better teaching outcomes.

The application of the Technology Acceptance Model reinforces the conclusion that infrastructural conditions influence lecturers' perceptions and usage of ICT, thereby affecting their teaching performance. And by implication, improving ICT infrastructure and ensuring its effective utilization remain essential for advancing teaching quality and strengthening higher education delivery in Nigerian public universities.

RECOMMENDATIONS

Arising from the discussions and conclusion, the following recommendations are proffered:

- i. There is a need for increased and sustained investment by government and university management in the provision, expansion, and maintenance of ICT infrastructure, with particular attention to improving broadband capacity, ensuring stable electricity supply, and equipping classrooms with modern digital teaching tools to enhance instructional delivery.
- ii. University authorities should prioritize equitable access to ICT facilities across faculties and departments by decentralizing digital resources and ensuring that academic staff have consistent and individual access to functional ICT tools required for effective teaching.
- iii. Capacity-building initiatives should be strengthened through regular training, technical support, and professional development programmes that enhance academic staff competence and confidence in utilizing ICT for teaching, thereby maximizing the impact of available infrastructure on instructional performance.

REFERENCES

1. Abedi, E. A. (2023). Tensions between technology integration practices of teachers and ICT in education policy expectations: Implications for change in teacher knowledge, beliefs and teaching practices. *Journal of Computers in Education*, 10(4), 689–708.
2. Abubakar, A., & Sani, I. (2023). Information and communication technology facilities and academic staff performance in northern Nigerian universities. *African Journal of Educational Management*, 24(1), 45–62.
3. Ademola-Popoola, D. S., & Adesina, J. A. (2025). Exploring the status and challenges of ICT network services and broadband utilization in Nigerian universities. *Nigerian Journal of Technological Development*, 22(1), 1–12.
4. Adewoye, J., & Salau, A. N. (2023). Impact of ICT on teaching and learning: A case study of selected universities in Nigeria. *International Journal of Educational Development in Africa*, 8(2), 112–125.
5. Agbo, N. M., Onyemachi, N. F., & Ogunmola, E. A. (2024). The utilization of 21st century ICT tools in teaching and learning of technology and vocational courses in a Nigerian public university. *Journal of Research, Policy & Practice of Teachers and Teacher Education*, 14(2), 57–68.
6. Ajayi, S. O. (2024). Infrastructure facilities, academic staff job performance and students' academic performance in tertiary institutions in Nigeria. *International Journal of Integrated Science and Technology*, 2(3), 181–192.

7. Akinyemi, T. F. (2024). Instructional materials and ICT facilities situation as correlates of job performance of academic staff in Southwest Nigerian universities. *Commonwealth Journal of Academic Research*, 5(12), 47–57.
8. Dada, K. S. J., Atte, S. L., & Diana, M. (2025). Assessment of the effectiveness of ICT integration for teaching and learning: A case study of Federal College of Education, Zaria. *Information Research Communications*, 5(1), 33–48.
9. Mohammed S. I., Abubakar, A. A., & Danbauchi, E. S. (2024). Enhancing the adoption of ICT in teaching and learning: Exploring key factors in Nigerian universities. *African Journal of Social and Behavioural Sciences*, 14(8), 1123–1140.
10. Ntorukiri, T. B., Kirugua, J. M., & Kirimi, F. (2022). Policy and infrastructure challenges influencing ICT implementation in universities: A literature review. *Discover Education*, 1(19), 1–11.
11. Odediji, K. M. (2024). ICT facilities situation and academic staff job performance in state-owned universities in Southwest Nigeria. *International Journal of Education, Learning and Development*, 12(9), 27–35.
12. Ogunode, N. J., & Akpakwu, F. O. (2023). Impact of infrastructure facilities on academic staff job performance in tertiary institutions in Nigeria. *International Journal of Inclusive and Sustainable Education*, 2(12), 51–59.