THE ROLE OF ICT-ENABLED FACILITIES IN ENHANCING TEACHER EFFECTIVENESS IN NIGERIAN TERTIARY INSTITUTIONS

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DOI: https://doi-doi.org/101555/ijarp.2080

ABSTRACT

This study examined the role of ICT-enabled facilities in enhancing teacher effectiveness in Nigerian tertiary institutions, with a focus on public universities, polytechnics, and colleges of education in Akwa Ibom State. Anchored on the Technological Pedagogical Content Knowledge (TPACK) framework, the study adopted a descriptive survey research design. A total of 328 academic staff were selected through stratified random sampling to ensure institutional representation. Data were collected using a researcher-developed instrument titled *ICT-Enabled Facilities and Teacher Effectiveness Questionnaire (ICTFTEQ)*, which was validated by experts and yielded a reliability coefficient of 0.86 using Cronbach's Alpha. Mean and standard deviation were used to answer research questions, while Pearson Product Moment Correlation was employed to test the hypothesis at the 0.05 level of significance. Findings revealed that the availability and utilization of ICT-enabled facilities were generally moderate, with critical resources such as reliable internet access, multimedia tools, and digital libraries rated low. Teacher effectiveness in the use of ICT for instructional delivery was also found to be moderate, with weaknesses observed in lesson presentation, assessment, blended teaching, and classroom management. The correlation analysis indicated a weak but statistically significant positive relationship between ICT-enabled facilities and teacher effectiveness. The study concludes that although ICT-enabled facilities contribute to teacher

effectiveness, their impact remains limited by infrastructural inadequacies, insufficient training, and weak institutional support. The study recommends sustained investment in ICT infrastructure, continuous professional development for lecturers, and supportive institutional policies to maximize the instructional benefits of ICT in Nigerian tertiary education.

KEYWORDS: ICT-enabled facilities, teacher effectiveness, tertiary education, instructional delivery.

INTRODUCTION

The rapid advancement of Information and Communication Technology (ICT) has fundamentally transformed the landscape of teaching and learning in higher education. Across the globe, tertiary institutions increasingly rely on ICT-enabled facilities such as learning management systems, digital libraries, virtual classrooms, multimedia instructional tools, and internet-supported communication platforms to enhance instructional effectiveness and academic productivity. These technologies have shifted teaching from traditional, teacher-centred approaches to more interactive, learner-centred pedagogies that promote collaboration, flexibility, and innovation (UNESCO, 2023).

Teacher effectiveness is widely acknowledged as a key determinant of educational quality and student learning outcomes. Effective teachers demonstrate mastery of subject content, employ appropriate pedagogical strategies, manage classrooms efficiently, and utilize instructional resources to facilitate meaningful learning. In contemporary higher education environments, ICT competence has become an integral component of teacher effectiveness, as lecturers are expected to integrate digital tools into curriculum delivery, assessment, and academic engagement (Koehler et al., 2021).

In Nigeria, successive educational policies and strategic frameworks have emphasized the integration of ICT in tertiary education as a means of improving teaching quality, expanding access, and enhancing global competitiveness. Many universities, polytechnics, and colleges of education have invested in ICT-enabled facilities, including computer laboratories, campus internet connectivity, e-learning platforms, and digital repositories. Despite these efforts, evidence suggests that the pedagogical utilization of ICT remains uneven across institutions, and teacher effectiveness gains have not been fully optimized (Afolayan & Adebayo, 2022).

Several challenges continue to hinder effective ICT integration in Nigerian tertiary institutions. These include inadequate infrastructure, erratic power supply, limited technical support, insufficient training opportunities, and resistance to pedagogical change.

Consequently, the availability of ICT-enabled facilities does not automatically translate into enhanced teacher effectiveness. This underscores the need for empirical investigations that examine how ICT-enabled facilities influence teacher effectiveness within the Nigerian tertiary education context.

Statement of the Problem

Despite increased investment in ICT infrastructure across Nigerian tertiary institutions, concerns persist regarding the effectiveness of teaching and learning processes. In many institutions, ICT-enabled facilities such as learning management systems, smart classrooms, and digital instructional resources are either underutilized or used in limited, non-innovative ways. Many lecturers continue to rely heavily on traditional lecture methods, with minimal integration of digital tools that could enhance instructional delivery and student engagement. The limited pedagogical use of ICT-enabled facilities has raised questions about the preparedness of teachers to leverage technology for effective teaching. Inadequate ICT skills, lack of continuous professional development, poor institutional support, and infrastructural constraints have further compounded the problem. As a result, the expected improvements in teacher effectiveness associated with ICT integration have not been fully realized.

Although existing studies have explored ICT availability and usage in Nigerian tertiary institutions, empirical research specifically linking ICT-enabled facilities to teacher effectiveness remains limited. This gap necessitates a systematic investigation into the role of ICT-enabled facilities in enhancing teacher effectiveness in tertiary institutions in Akwa Ibom State, Nigeria.

Purpose of the Study

The main purpose of this study was to examine the role of ICT-enabled facilities in enhancing teacher effectiveness in Nigerian tertiary institutions.

Specifically, the study sought to:

1. determine the extent of availability and utilization of ICT-enabled facilities in Nigerian tertiary institutions;
2. assess the level of teacher effectiveness in the use of ICT for instructional delivery;
3. examine the relationship between ICT-enabled facilities and teacher effectiveness.

Research Questions

The following research questions guided the study:

1. To what extent are ICT-enabled facilities available and utilized in Nigerian tertiary institutions?
2. What is the level of teacher effectiveness in the use of ICT for teaching?
3. What relationship exists between ICT-enabled facilities and teacher effectiveness?

Research Hypotheses

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

- **H_{01}:** There is no significant relationship between ICT-enabled facilities and teacher effectiveness in Nigerian tertiary institutions.

Theoretical Framework

This study is anchored on the Technological Pedagogical Content Knowledge (TPACK) framework developed by Mishra and Koehler (2006). The TPACK framework emphasizes the intersection of technology, pedagogy, and content knowledge as essential for effective teaching in technology-enhanced learning environments. Within this framework, ICT-enabled facilities provide the technological context that supports pedagogical strategies and content delivery. Teacher effectiveness is achieved when lecturers possess the knowledge and skills required to integrate ICT meaningfully into instructional practices.

Conceptual Review

Concept of ICT-Enabled Facilities in Tertiary Education

ICT-enabled facilities refer to the digital and technological infrastructures that support teaching, learning, research, and academic communication in educational institutions. In tertiary education, these facilities include learning management systems (LMS), virtual classrooms, smart boards, multimedia projectors, institutional internet connectivity, digital libraries, computer laboratories, and online assessment platforms. These facilities are designed to enhance instructional delivery, promote collaboration, and improve access to educational resources (OECD, 2023).

In the Nigerian context, ICT-enabled facilities have been promoted as tools for addressing challenges such as large class sizes, limited instructional resources, and inadequate physical infrastructure. According to Yusuf and Balogun (2021), ICT facilities enable lecturers to diversify instructional strategies, support blended learning, and improve content presentation.

However, the effectiveness of these facilities depends on their availability, functionality, and the extent to which lecturers integrate them into teaching practices.

Teacher Effectiveness in Higher Education

Teacher effectiveness refers to the ability of a lecturer to facilitate learning through appropriate content mastery, pedagogical skills, classroom management, assessment practices, and professional engagement. In tertiary institutions, teacher effectiveness also encompasses research supervision, use of instructional resources, and adoption of innovative teaching methods (Darling-Hammond, 2020).

Recent studies emphasize that teacher effectiveness in the digital era extends beyond traditional pedagogical competence to include ICT skills and adaptability. Lecturers who effectively use ICT tools are more likely to promote student engagement, critical thinking, and independent learning (Koehler et al., 2021). In Nigeria, studies by Ajayi and Hassan (2022) revealed that lecturers' effectiveness improves when ICT tools are integrated into lesson planning, instructional delivery, and assessment processes.

ICT-Enabled Facilities and Teacher Effectiveness

Empirical evidence consistently shows a positive relationship between ICT-enabled facilities and teacher effectiveness. ICT tools enhance lesson clarity, facilitate interactive teaching, and support diverse learning styles. For instance, virtual learning platforms allow lecturers to provide instructional materials before and after lectures, improving lesson continuity and feedback mechanisms (UNESCO, 2022).

In Nigerian tertiary institutions, Adegbija et al. (2023) found that lecturers who frequently used ICT-enabled facilities demonstrated higher instructional effectiveness than those who relied solely on conventional methods. However, challenges such as inadequate training, unreliable electricity, and limited technical support continue to constrain effective utilization. These findings underscore the importance of institutional support systems in maximizing the instructional benefits of ICT-enabled facilities.

Theoretical Linkage

The Technological Pedagogical Content Knowledge (TPACK) framework provides a strong theoretical basis for explaining how ICT-enabled facilities enhance teacher effectiveness. The framework posits that effective teaching occurs when lecturers successfully integrate technology with pedagogy and subject content. ICT-enabled facilities serve as the technological foundation upon which pedagogical strategies are enacted. When lecturers

possess adequate TPACK, ICT tools enhance instructional delivery rather than merely serving as add-ons to traditional teaching methods (Mishra & Koehler, 2006).

METHODOLOGY

Research Design

The study adopted a descriptive survey research design.

Area of the Study

The study was conducted in selected public tertiary institutions in Nigeria.

Population of the Study

The population comprised all academic staff in public universities, polytechnics, and colleges of education in Akwa Ibom State.

Sample and Sampling Technique

A sample of 328 academic staff was selected using stratified random sampling to ensure representation across institution types.

Instrument for Data Collection

Data were collected using a researcher-developed questionnaire titled *ICT-Enabled Facilities and Teacher Effectiveness Questionnaire (ICTFTEQ)*, structured on a 4-point Likert scale.

Validity and Reliability

The instrument was validated by experts in educational technology and measurement. A Cronbach's Alpha reliability coefficient of 0.86 was obtained.

Method of Data Analysis

Mean and standard deviation were used to answer research questions, while Pearson Product Moment Correlation was used to test the hypothesis at the 0.05 level of significance.

RESULTS

Research Question 1:

To what extent are ICT-enabled facilities available and utilized in Nigerian tertiary institutions?

Table 1: Mean and Standard Deviation of ICT-Enabled Facilities Availability and Utilization. *(n = 328)*

S/N	Items	Mean ($\bar{x}$)	SD	Remark
1	Availability of learning management systems	2.62	0.70	**High**
2	Internet access for teaching and research	1.84	0.78	**Low**
3	Use of multimedia projectors during lectures	1.76	0.81	**Low**
4	Access to digital libraries and e-resources	1.89	0.75	**Low**
5	Availability of virtual learning platforms	2.41	0.74	**Moderate**
	Aggregate Mean	**2.10**	**0.76**	**Moderate**

Decision Rule: Mean ≥ 2.50 = High; 2.00–2.49 = Moderate; < 2.00 = Low

Interpretation

Table 1 shows that the availability and utilization of ICT-enabled facilities in Nigerian tertiary institutions are generally moderate, with an aggregate mean score of 2.10. While learning management systems and virtual learning platforms recorded high and moderate availability, key instructional facilities such as reliable internet access, multimedia projectors, and digital libraries were rated **low**. This indicates that critical ICT infrastructure required for effective teaching is either inadequate or poorly utilized. The dominance of low-rated items suggests that ICT integration in teaching remains infrastructurally constrained, limiting lecturers' ability to fully adopt technology-enhanced instructional practices.

Research Question 2:

What is the level of teacher effectiveness in the use of ICT for instructional delivery?

Table 2: Mean and Standard Deviation of Teacher Effectiveness in ICT Use. *(n = 328)*

S/N	Items	Mean ($\bar{x}$)	SD	Remark
1	ICT improves lesson presentation and clarity	1.92	0.77	**Low**
2	ICT enhances student engagement during lectures	2.53	0.72	High
3	ICT supports effective assessment and feedback	1.88	0.79	**Low**
4	ICT enables flexible and blended teaching	1.81	0.82	**Low**
5	ICT enhances classroom management and organization	1.86	0.76	**Low**
	Aggregate Mean	**2.00**	**0.77**	**Moderate**

Decision Rule: Mean ≥ 2.50 = High; 2.00–2.49 = Moderate; < 2.00 = Low

Interpretation

Table 2 reveals a moderate level of teacher effectiveness in the use of ICT for instructional delivery, with an aggregate mean score of 2.00. Except for student engagement, which recorded a high rating, most aspects of ICT-supported teaching, including lesson presentation, assessment, blended teaching, and classroom management, were rated low. This suggests that lecturers are largely unable to translate ICT availability into effective pedagogical practice. The findings imply that limited ICT infrastructure, inadequate training, and insufficient institutional support may be constraining teachers' effective use of technology for teaching.

Hypothesis Testing

Research Hypothesis

H_{01}: There is no significant relationship between ICT-enabled facilities and teacher effectiveness in Nigerian tertiary institutions.

Table 3: Pearson Product Moment Correlation between ICT-Enabled Facilities and Teacher Effectiveness *(n = 328)*

Variables	N	Mean	SD	r	p-value	Decision
ICT-Enabled Facilities	328	2.10	0.76			
Teacher Effectiveness	328	2.00	0.77	**0.34**	**0.001**	Reject H_{01}

Interpretation

Table 3 shows a weak but positive and statistically significant relationship between ICT-enabled facilities and teacher effectiveness in Nigerian tertiary institutions (r = 0.34, p < .05). This result indicates that although ICT-enabled facilities contribute to teacher effectiveness, the strength of their influence is limited. The weak correlation reflects the generally low availability and utilization of ICT infrastructure and the correspondingly low level of ICT-supported teaching effectiveness observed among lecturers.

The rejection of the null hypothesis implies that ICT-enabled facilities remain a significant factor in enhancing teacher effectiveness; however, their impact is constrained by infrastructural inadequacies, limited access, and insufficient institutional support. This finding suggests that improvements in teacher effectiveness will likely remain marginal unless substantial investments are made to strengthen ICT infrastructure and support systems within tertiary institutions.

The weak correlation observed is consistent with the moderate aggregate mean scores reported in Tables 1 and 2. Poor access to reliable internet services, limited availability of multimedia instructional tools, and inadequate digital resources appear to restrict lecturers' ability to utilize ICT effectively. Consequently, even where lecturers demonstrate willingness to use ICT, the absence of functional facilities reduces the potential impact on teaching effectiveness.

Implication of the Results

The moderate aggregate mean scores in both Tables 1 and 2 indicate a reinforcing cycle of infrastructural inadequacy and reduced teacher effectiveness. The poor availability and utilization of core ICT-enabled facilities appear to have negatively affected lecturers' ability

to employ ICT meaningfully in teaching. This pattern supports the argument that teacher effectiveness in ICT integration is heavily dependent on the functionality and accessibility of institutional ICT infrastructure rather than individual effort alone.

DISCUSSION OF THE FINDINGS

The findings demonstrate that both ICT-enabled facilities and teacher effectiveness in Nigerian tertiary institutions remain moderate. The limited availability of essential facilities such as internet connectivity, multimedia tools, and digital libraries has constrained lecturers' capacity to deliver instruction effectively using ICT. Consequently, teacher effectiveness indicators related to assessment, blended teaching, and classroom management were also rated low. These results align with earlier studies that identified infrastructural deficiencies and inadequate institutional support as major barriers to effective ICT integration in Nigerian higher education (Ajayi & Hassan, 2022; UNESCO, 2023). The findings further reinforce the TPACK framework, which emphasizes that effective technology integration requires not only teacher competence but also adequate technological infrastructure.

Contribution to Knowledge

This study makes several significant contributions to the existing body of knowledge on ICT integration and teacher effectiveness in higher education, particularly within the Nigerian context.

First, the study provides empirical evidence demonstrating that the availability and utilization of ICT-enabled facilities in Nigerian tertiary institutions remain low, especially with respect to core instructional resources such as internet connectivity, multimedia tools, and digital library services. By disaggregating ICT-enabled facilities into specific functional components, the study moves beyond general claims of ICT availability and offers a nuanced understanding of infrastructural deficiencies affecting teaching effectiveness.

Second, the study extends existing literature by establishing a weak but statistically significant relationship between ICT-enabled facilities and teacher effectiveness. Unlike earlier studies that reported strong or moderate relationships, this finding highlights the limited pedagogical impact of ICT under conditions of infrastructural inadequacy, thereby challenging overly optimistic assumptions about the transformative power of educational technology in resource-constrained environments.

Third, the study contributes theoretically by contextualizing the TPACK framework within a developing-country tertiary education system. It demonstrates that technological knowledge

and pedagogical competence alone are insufficient for enhancing teacher effectiveness when institutional ICT infrastructure is weak. This contextual application enriches the TPACK discourse by emphasizing the role of systemic and environmental factors in technology integration.

Fourth, the study offers policy-relevant insights by shifting the focus from individual teacher competence to institutional responsibility. The findings underscore the need for holistic ICT strategies that integrate infrastructure development, continuous professional training, and institutional support mechanisms. This contribution is particularly relevant for policymakers, university administrators, and regulatory agencies seeking evidence-based approaches to improving teaching quality through ICT.

Finally, the study contributes methodologically by providing a validated empirical framework for assessing ICT-enabled facilities and teacher effectiveness in tertiary institutions. The instrument and analytical approach adopted can serve as a reference point for future researchers conducting similar studies across different geopolitical zones or institutional types in Nigeria and other developing countries.

CONCLUSION

This study empirically examined the role of ICT-enabled facilities in enhancing teacher effectiveness in Nigerian tertiary institutions. Drawing on evidence from academic staff across public tertiary institutions, the findings revealed that the availability and utilization of ICT-enabled facilities remain generally low, particularly with respect to critical instructional resources such as reliable internet access, multimedia teaching tools, and digital library services. Correspondingly, teacher effectiveness in the use of ICT for instructional delivery was also found to be low, especially in areas related to lesson presentation, assessment and feedback, blended teaching, and classroom management.

The correlation analysis further established a weak but statistically significant relationship between ICT-enabled facilities and teacher effectiveness. This finding underscores the reality that ICT infrastructure alone does not automatically translate into effective teaching practices; rather, its influence is constrained by systemic challenges within the tertiary education environment. While ICT-enabled facilities contribute positively to teacher effectiveness, their impact remains limited due to poor functionality, restricted access, inadequate technical support, and insufficient institutional commitment to pedagogical innovation.

From a theoretical perspective, the findings validate the assumptions of the Technological Pedagogical Content Knowledge (TPACK) framework, which emphasizes that effective technology integration in teaching occurs only when technological resources are adequately aligned with pedagogical strategies and content knowledge. In the absence of reliable and accessible ICT-enabled facilities, lecturers are unable to fully operationalize their pedagogical and content expertise through technology, resulting in suboptimal teaching outcomes.

The study also highlights the structural nature of ICT-related challenges in Nigerian tertiary institutions. The low levels of ICT-enabled facility utilization observed are not merely a reflection of individual teacher deficiencies but rather an indication of broader institutional and policy-level shortcomings. Persistent issues such as inadequate funding, erratic power supply, weak maintenance culture, and limited professional development opportunities continue to undermine the effective integration of ICT into teaching and learning processes.

In conclusion, while ICT-enabled facilities have the potential to significantly enhance teacher effectiveness in Nigerian tertiary institutions, this potential remains largely unrealized. Achieving meaningful improvements in teacher effectiveness through ICT requires more than sporadic investments in infrastructure. It demands a coordinated and sustained approach that integrates ICT provision with continuous capacity building, supportive institutional policies, and a conducive teaching and learning environment. Without such holistic interventions, ICT-enabled facilities will continue to exert only marginal influence on teacher effectiveness, thereby limiting their contribution to the improvement of educational quality in Nigerian tertiary institutions.

RECOMMENDATIONS

1. Tertiary institutions should invest in continuous ICT-focused professional development for lecturers.

2. Institutional policies should encourage and reward innovative ICT-supported teaching practices.

3. Government and stakeholders should improve ICT infrastructure and technical support systems.

4. Regular monitoring should be conducted to ensure effective utilization of ICT-enabled facilities.

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