OPEN ACCESS

**Journal of Advances in Education and Philosophy**
Abbreviated Key Title: J Adv Educ Philos
ISSN 2523-2665 (Print) |ISSN 2523-2223 (Online)
Scholars Middle East Publishers, Dubai, United Arab Emirates
Journal homepage: https://saudijournals.com

**Original Research Article**

# ICT Resources Availability and Teacher ICT Competence as Predictors of Curriculum Delivery in Nigerian Upper Basic Schools

Adeyemi OLAITAN[1*], Jude Thaddeus AWE[2]

[1]Educational Administration and Planning, National Open University of Nigeria
[2]School of Education, Carolina University, USA

**DOI:** https://doi.org/10.36348/jaep.2026.v10i03.002 | **Received:** 17.01.2026 | **Accepted:** 12.03.2026 | **Published:** 26.03.2026

***Corresponding author:** Adeyemi OLAITAN
Educational Administration and Planning, National Open University of Nigeria

## Abstract

This quantitative correlational study investigated the availability of ICT resources and the level of teacher ICT competence as predictors of curriculum delivery in Nigerian upper basic schools. The research was conducted in South-West Nigeria. A sample of 312 teachers was selected from public schools, and data were collected via structured questionnaires on ICT resource availability, teacher competence, and curriculum delivery. The findings revealed a pervasive scarcity of ICT resources, with only the electricity supply recording availability above 50 percent. Other critical instructional technologies, such as computers, projectors, interactive whiteboards, internet connectivity, and ICT laboratories, were largely absent, creating structural barriers to effective technology integration. Teacher competence was found to be moderate, with relatively higher proficiency in basic operations such as computer use and word processing, but weaker skills in multimedia integration, online platform management, digital assessment, and troubleshooting. Curriculum delivery was rated moderately effective, with teachers performing strongly in traditional pedagogical practices but demonstrating limited use of ICT tools to support and reinforce learning. Correlation analysis showed significant positive relationships between curriculum delivery and both ICT availability and teacher competence. Regression analysis further revealed that these two factors jointly predicted curriculum delivery, explaining 40 percent of its variance, with teacher competence emerging as the stronger predictor. The study concluded that sustainable improvement in curriculum delivery requires simultaneous investment in ICT infrastructure and teacher professional development. It is recommended that policymakers prioritize equitable resource provision, continuous pedagogy-focused training, and curriculum reforms that embed ICT integration as a core instructional strategy.

**Keywords:** ICT Resource Availability, Teacher ICT Competence, Curriculum Delivery, Educational Technology Integration, Professional Development, Pedagogical Innovation, Nigerian Upper Basic Schools.



## INTRODUCTION

The rapid digitalization of contemporary societies has repositioned technology as a central catalyst for educational transformation, particularly in the delivery of basic education curricula. Educational technology now encompasses a wide ecosystem of digital tools, including computers, mobile devices, multimedia platforms, virtual learning environments, and technology-supported assessment systems, all of which shape how teachers plan, deliver, and evaluate instruction. Global analyses emphasize that twenty-first-century learners require technology-mediated learning experiences to develop critical thinking, collaboration, creativity, and problem-solving skills, which are essential for navigating an increasingly digital world (UNESCO, 2023; Wakil *et al*., 2024). The COVID-19 pandemic further exposed the indispensability of digital competence for both teachers and learners, accelerating global conversations about technology readiness, digital equity, and the need for resilient learning systems that can function during disruptions. International frameworks such as the ISTE Standards position teacher digital competence as a core professional expectation, arguing that effective curriculum delivery depends on teachers' ability to integrate technology meaningfully into instruction (ISTE, 2021; Erickson, 2023). Empirical studies show that technology-enhanced learning environments promote deeper understanding, sustained engagement, and improved learning outcomes when teachers possess the skills to use digital tools effectively

(Chukwudum *et al*., 2024; Oguezue, 2025). These global shifts underscore the need for education systems, especially in developing contexts, to strengthen infrastructure, teacher competence, and institutional support to ensure that technology enhances learning rather than reinforcing existing inequalities.

Global standards such as UNESCO's ICT Competency Framework for Teachers and the ISTE Standards reinforce the centrality of technology in curriculum implementation by outlining the knowledge, skills, and dispositions teachers require to design technology-rich learning environments. These frameworks emphasize equity, accessibility, and pedagogical innovation, arguing that technology integration must extend beyond device acquisition to include sustained professional development, curriculum alignment, and supportive school leadership (UNESCO, 2023; Vincent-Riwo & Nwosu, 2022). International research highlights that technology integration is most effective when supported by coherent policies, reliable infrastructure, and continuous teacher training that equips educators with both technical and pedagogical competencies (Etim, 2024; Ibrahim & Musa, 2024). UNICEF's digital learning readiness assessments similarly stress that countries must invest in both infrastructure and human capacity to ensure that technology supports inclusive learning opportunities (UNICEF, 2023; Bartilol *et al*., 2025). Studies on innovative pedagogical approaches show that teachers who are trained to use digital tools are more likely to adopt learner-centered strategies that improve engagement, motivation, and achievement (Okoye & Ekoyo, 2024; Oguezue *et al*., 2022). Evidence from Nigeria and other African countries reveals that while governments have invested in ICT initiatives, gaps persist in teacher competence, infrastructure, and institutional support, limiting the transformative potential of technology in curriculum delivery (Dushie & Esia-Donkoh, 2025; Okafor & Obikwelu, 2025). These global and regional perspectives provide a normative benchmark against which national systems, including Nigeria's, are increasingly evaluated for technology-enhanced curriculum delivery.

Within global discourse on educational technology, the availability of ICT resources is a foundational structural condition for effective curriculum delivery. Technology availability encompasses not only the physical presence of digital devices such as computers, tablets, projectors, and interactive whiteboards, but also their functionality, accessibility, sustainability, and suitability for instructional use. Studies across low- and middle-income countries consistently show that inadequate infrastructure remains a major barrier to meaningful technology integration, with many schools lacking functional devices, stable electricity, reliable internet connectivity, or adequate maintenance systems (UNESCO, 2023; Bartilol *et al*., 2025). Even when devices are supplied, they are often insufficient in number, outdated, or poorly maintained, limiting teachers' ability to integrate technology into instruction (Aikins & Arthur-Nyarko, 2019; Dushie & Esia-Donkoh, 2025). Evidence from Ghana, Kenya, and Nigeria shows that unavailability, inadequacy, and malfunctioning of ICT resources significantly hinder teachers' capacity to adopt technology-supported pedagogies, resulting in minimal or inconsistent use (Bartilol *et al*., 2025; Cuamba *et al*., 2021). In many contexts, ICT resources are concentrated in administrative offices or locked away due to fears of damage, thereby restricting classroom use. These realities justify treating technology availability as a measurable variable rather than an assumed background condition, since it directly shapes what teachers can realistically implement in curriculum delivery and influences the extent to which technology-supported pedagogy is possible.

In Nigeria, the availability of technology in upper basic schools is characterized by significant disparities across regions, school types, and socioeconomic contexts. Empirical studies report that many public schools operate with limited numbers of functional computers, intermittent or non-existent internet access, and inadequate ICT laboratories, while private schools, particularly in urban areas, tend to have better infrastructure and more consistent access to digital tools (Imamun, 2020; Udo & Jackson, 2023). Policy initiatives such as the Universal Basic Education Commission's ICT programs have attempted to address these gaps, but implementation has been uneven, and maintenance challenges persist, especially in rural and underfunded schools (UBEC, 2022; Vincent-Riwo & Nwosu, 2022). UNICEF's analyses of digital learning readiness in Nigeria highlight similar concerns, noting that infrastructure deficits continue to undermine equitable access to technology-supported learning (UNICEF, 2023; Oguezue, 2025). Even in institutions with ICT centers, their impact on instructional delivery remains limited due to poor connectivity, unreliable electricity, and inadequate technical support (Vincent-Riwo & Nwosu, 2022). Research on ICT availability and use in basic schools further confirms that inadequate infrastructure restricts teachers' ability to integrate technology into classroom practice, resulting in traditional, teacher-centered instruction (Okafor & Obikwelu, 2025; Dushie & Esia-Donkoh, 2025). These disparities make it essential to empirically assess technology availability to understand its implications for curriculum delivery and to identify structural inequities that shape teaching and learning experiences across Nigerian upper basic schools.

Alongside infrastructure, teacher ICT competence has been widely recognized as a decisive factor in determining whether technology is integrated effectively into curriculum delivery. Teacher ICT

competence encompasses technical, pedagogical, and affective dimensions, including confidence, attitudes, and openness to innovation. Research consistently shows that teacher competence is a stronger predictor of technology integration than mere access to devices, as teachers must know how to use digital tools meaningfully to support learning (Gil-Flores *et al*., 2016; Oguezue, 2025). UNESCO's ICT Competency Framework emphasizes that without adequate training, teachers struggle to move beyond superficial uses of technology, such as using projectors for slide presentations, rather than designing interactive, student-centered learning experiences (UNESCO, 2023; Vincent-Riwo & Nwosu, 2022). Nigerian studies indicate that teachers with higher ICT competence are more likely to adopt innovative instructional strategies, integrate multimedia resources, and facilitate collaborative learning using digital tools (Udo & Jackson, 2023; Okoye & Ekoyo, 2024). Evidence from Kano State shows that ICT competence significantly predicts teacher effectiveness, suggesting that digital skills are essential for modern instructional delivery (Ibrahim & Musa, 2024). Studies in Ghana and Kenya similarly reveal that teachers' ICT competence is shaped by training opportunities, school leadership, and access to digital resources (Dushie & Esia-Donkoh, 2025; Bartilol *et al*., 2025). These insights justify treating teacher ICT competence as a multidimensional, measurable construct in quantitative research.

Empirical studies in Nigeria repeatedly highlight gaps in teacher ICT competence across different levels of education. Many teachers in upper basic schools have limited formal training in educational technology, and professional development opportunities are often sporadic, theoretical, or insufficiently aligned with classroom realities (Imamun, 2020; Vincent-Riwo & Nwosu, 2022). A recent study on ICT competence in upper basic education found that while teachers perceive themselves as competent in basic digital operations, they struggle with content-specific applications, troubleshooting, and pedagogical integration, which are essential for meaningful technology use (Oguezue, 2025). International evidence similarly notes that teachers often lack the pedagogical skills required to integrate technology meaningfully, even when devices are available (Watson & Rockinson-Szapkiw, 2021; Girgin *et al*., 2011). Research on teacher readiness in Nigeria further shows that competence gaps hinder the adoption of innovative pedagogies that support active learning and higher-order thinking (Etim, 2024; Okoye & Ekoyo, 2024). Studies in Ghana and Mozambique reveal that teachers frequently rely on self-directed learning, peer collaboration, or informal support from ICT experts to acquire digital skills, highlighting systemic gaps in formal training (Dushie & Esia-Donkoh, 2025; Cuamba *et al*., 2021). These patterns underscore the need to empirically assess teacher ICT competence as a key determinant of curriculum delivery quality and to identify areas where targeted professional development is urgently required.

Curriculum delivery, the outcome variable in this study, refers to the processes through which teachers translate curriculum documents into classroom practice, including lesson planning, instructional strategies, resource use, assessment practices, and classroom interaction patterns. In contemporary education, effective curriculum delivery increasingly requires integrating digital tools that support active learning, differentiation, and student engagement (Chukwudum *et al*., 2024; Oguezue, 2025). Studies show that technology-supported instruction can enhance conceptual understanding, promote collaboration, and provide timely feedback, thereby improving learning outcomes (Oguezue *et al*., 2022; Okoye & Ekoyo, 2024). However, these benefits depend on both the availability of functional technology and teachers' competence in using it pedagogically. Where these conditions are weak, curriculum delivery remains traditional, teacher-centered, and less aligned with twenty-first-century learning expectations (UNESCO, 2023; Vincent-Riwo & Nwosu, 2022). Evidence from Nigeria shows that teachers who integrate technology effectively tend to adopt more innovative pedagogical approaches, such as reflective instruction, inquiry-based learning, and multimedia-supported explanations, which improve student motivation and achievement (Okoye & Ekoyo, 2024; Udo & Jackson, 2023). Studies in Ghana and Kenya similarly demonstrate that technology-enhanced curriculum delivery is associated with improved learner engagement, deeper understanding, and stronger performance in competency-based systems (Bartilol *et al*., 2025; Dushie & Esia-Donkoh, 2025).

The interaction between technology availability, teacher ICT competence, and curriculum delivery is theoretically coherent and empirically supported. When technology is available, and teachers possess high levels of ICT competence, curriculum delivery is more likely to incorporate diverse digital tools, support interactive learning, and align with global expectations for digital literacy (ISTE, 2021; Oguezue, 2025). Conversely, low availability, low competence, or both can result in minimal or tokenistic use of technology, limiting its potential benefits for teaching and learning (UNESCO, 2023; Bartilol *et al*., 2025). Nigerian studies show that teachers' ability to integrate technology is shaped by both structural and human factors, with competence mediating the relationship between availability and instructional quality (Udo & Jackson, 2023; Ibrahim & Musa, 2024). Evidence from Ghana and Kenya further demonstrates that the availability of ICT resources significantly predicts technology integration in competency-based curriculum implementation, while inadequate infrastructure and limited digital literacy hinder effective use (Bartilol *et*

*al*., 2025; Dushie & Esia-Donkoh, 2025). Despite growing interest in educational technology, much existing research examines these variables in isolation, with limited quantitative evidence linking them within upper basic schools. This gap underscores the need for systematic assessment to inform targeted interventions in infrastructure provision, teacher development, and curriculum implementation.

Despite the expanding body of literature on educational technology in Nigeria and other African countries, significant gaps remain in understanding how the availability of technology and teacher ICT competence jointly influence curriculum delivery at the upper basic school level. Much of the existing research focuses on secondary schools, tertiary institutions, or general ICT awareness, leaving a notable gap in empirical evidence specific to upper basic education, where foundational competencies are consolidated and preparation for higher learning begins (Oguezue, 2025; Udo & Jackson, 2023). Furthermore, many studies examine either infrastructure or teacher competence in isolation, without exploring their combined effects on curriculum delivery. This fragmentation limits policymakers' and practitioners' ability to design integrated interventions that address both structural and human factors. Therefore, the necessity of the present study is the potential to provide a holistic, evidence-based understanding of how technology availability and teacher ICT competence interact to shape curriculum delivery in Nigerian upper basic schools in the South-West geopolitical zone of Nigeria. As a result, the following research questions are formulated in line with the objectives of the study:

1. To what extent are ICT resources available in upper basic schools in the South-West geopolitical zone of Nigeria?
2. What is the level of teacher ICT competence in upper basic schools in the South-West geopolitical zone of Nigeria?
3. What is the quality of curriculum delivery in upper basic schools in the South-West geopolitical zone of Nigeria?
4. To what extent do ICT resource availability and teacher ICT competence jointly predict curriculum delivery in upper basic schools in the South-West geopolitical zone of Nigeria?

### *A. Research Hypotheses*

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

**$H_{01}$:** There is no significant relationship between ICT resource availability and curriculum delivery in upper basic schools in the South-West geopolitical zone of Nigeria.

**$H_{02}$:** There is no significant relationship between teacher ICT competence and curriculum delivery in upper basic schools in the South-West geopolitical zone of Nigeria.

**$H_{03}$:** ICT resource availability and teacher ICT competence do not jointly predict curriculum delivery in upper basic schools in the South-West geopolitical zone of Nigeria.

## METHODS

The study adopted a correlational research design because it was appropriate for examining the relationships among naturally occurring variables, ICT resource availability, teacher ICT competence, and curriculum delivery, without manipulating any of them. This design enabled the researcher to determine the extent to which the predictor variables were associated with, and jointly predicted, curriculum delivery in upper basic schools within the South-West geopolitical zone of Nigeria. The choice of this design is further justified by the study's aim to establish statistical relationships rather than causal effects, which makes correlation the most suitable methodological approach.

The population for the study consisted of all teachers in public upper basic schools (Basic 7–9) across the South-West geopolitical zone of Nigeria. This included teachers from Oyo, Ogun, Osun, Ondo, Ekiti, and Lagos States. These teachers were directly responsible for curriculum delivery and were therefore the most relevant respondents for assessing ICT competence, ICT availability, and curriculum delivery practices. School administrators and non-teaching staff were excluded because they were not directly involved in classroom instruction. A multi-stage sampling procedure was used to select the sample. First, three states were randomly selected from the six states in the South-West zone. Second, schools were stratified by local government areas within each selected state to ensure geographical representation. Third, simple random sampling was used to select schools from each stratum. Lastly, proportionate sampling was used to select teachers from each selected school. The sample size was determined using Krejcie and Morgan's (1970) table to ensure adequate representation for generalization across the zone.

Data were collected using three structured instruments: the ICT Resource Availability Scale (ICT-RAS), the Teacher ICT Competence Scale (TICCS), and the Curriculum Delivery Effectiveness Scale (CDES). These instruments measured ICT availability, teacher ICT competence, and curriculum delivery, respectively. All instruments were adapted from validated tools used in previous ICT-in-education studies and were contextualized for upper basic schools in the South-West zone. Validity was ensured through expert review by specialists in Educational Technology, Curriculum Studies, and Measurement and Evaluation. Reliability was established through a pilot study conducted in a school outside the main sample, yielding Cronbach's Alpha coefficients of 0.86 for ICT-RAS, 0.89 for TICCS, and 0.84 for CDES.

Data collection was carried out after obtaining approval from the relevant educational authorities in the selected states. The researcher personally visited each selected school, explained the purpose of the study to the teachers, and administered the questionnaires. Participation was voluntary, and confidentiality was assured. Completed questionnaires were retrieved immediately to ensure a high return rate. Data analysis was conducted using the Statistical Package for the Social Sciences (SPSS). Descriptive statistics were used to answer the first three research questions, while Pearson Product-Moment Correlation (PPMC) and Multiple Regression Analysis were used to test the hypotheses and answer the fourth research question. All hypotheses were tested at a 0.05 level of significance.

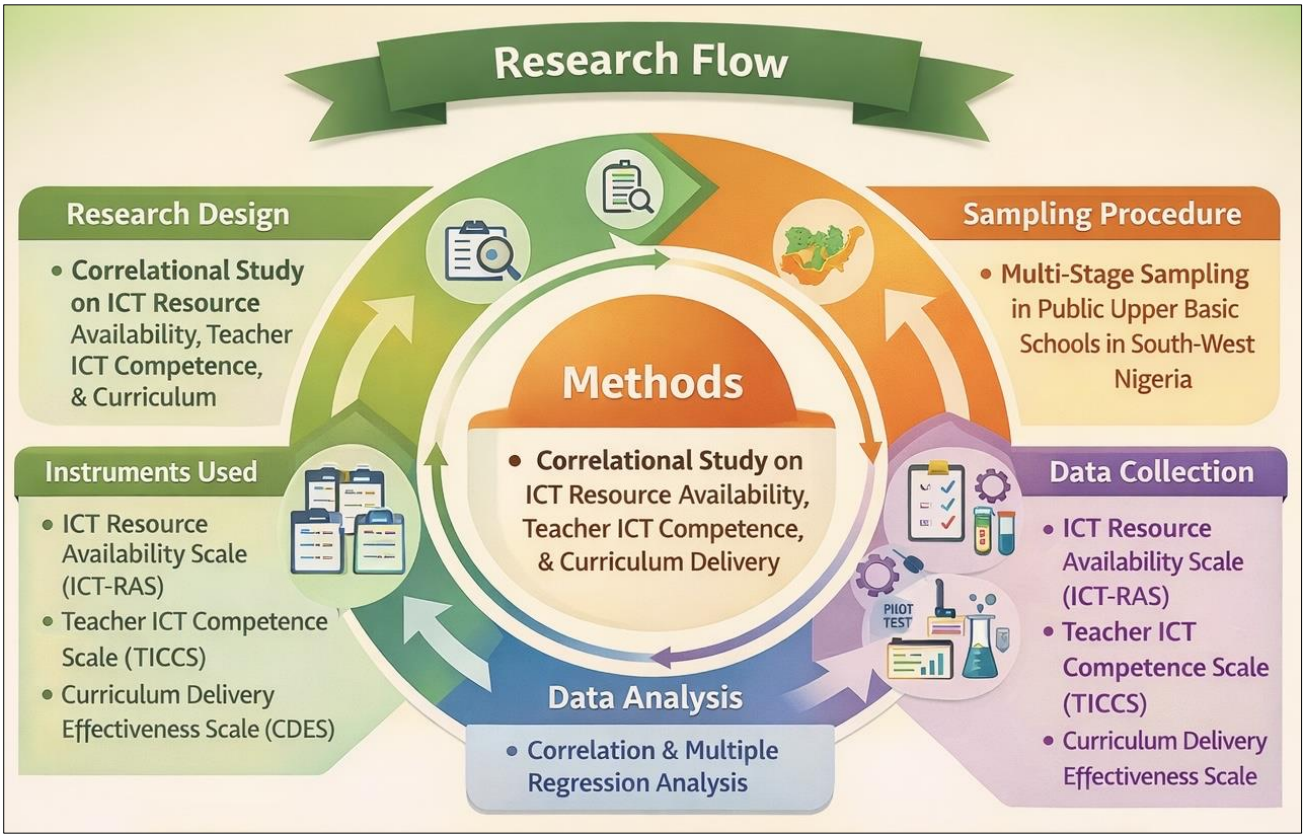


**Figure 1: Research Flowchart**

## RESULTS

### Section A: Demographic Characteristics of Respondents

**Table 1: Demographic Characteristics of Respondents (N = 312)**

| Variable | Category | Frequency | Percentage (%) |
|---|---|---|---|
| **Gender** | Male | 148 | 47.4 |
| | Female | 164 | 52.6 |
| **Teaching Experience** | 1–5 years | 96 | 30.8 |
| | 6–10 years | 122 | 39.1 |
| | Above 10 years | 94 | 30.1 |
| **Subject Area** | Science | 118 | 37.8 |
| | Arts | 104 | 33.3 |
| | Social Science | 90 | 28.8 |

The demographic distribution shows a balanced representation of male and female teachers, with a slight majority of female participants (52.6%). The largest proportion of respondents had 6–10 years of teaching experience (39.1%), indicating a relatively experienced teaching workforce. Subject area representation was also fairly balanced, with science teachers forming the largest group (37.8%). This diversity in gender, experience, and subject specialization enhances the generalizability of the findings within upper basic schools in South-West Nigeria.

**Section B: Analysis of Respondents' Views on the Research Questions and Hypotheses**

**Table 2: Respondents' Views on Availability of ICT Resources in Upper Basic Schools (N = 312)**

| No. | ICT Resource | Available | Not Available | Decision |
|---|---|---|---|---|
| 1 | Desktop computers | 124 (39.7%) | 188 (60.3%) | Not Available |
| 2 | Laptops | 102 (32.7%) | 210 (67.3%) | Not Available |
| 3 | Projectors | 89 (28.5%) | 223 (71.5%) | Not Available |
| 4 | Interactive whiteboards | 54 (17.3%) | 258 (82.7%) | Not Available |
| 5 | Internet connectivity | 76 (24.4%) | 236 (75.6%) | Not Available |
| 6 | ICT laboratory | 118 (37.8%) | 194 (62.2%) | Not Available |
| 7 | Printers | 142 (45.5%) | 170 (54.5%) | Not Available |
| 8 | UPS/Inverters | 97 (31.1%) | 215 (68.9%) | Not Available |
| 9 | Electricity supply | 168 (53.8%) | 144 (46.2%) | **Available** |
| 10 | Audio-visual equipment | 83 (26.6%) | 229 (73.4%) | Not Available |

The results reveal severe infrastructure deficits: 9 out of 10 listed ICT resources were unavailable in the majority of the upper basic schools surveyed. Only the electricity supply recorded availability above 50% (53.8%). Critical instructional technologies, including projectors, interactive whiteboards, internet connectivity, laptops, and dedicated ICT laboratories, were largely absent. These findings indicate that most schools lack the basic infrastructure required for meaningful technology integration in teaching and learning. The persistent unavailability of essential ICT tools structurally constrains digital pedagogical practices and aligns with documented national reports on infrastructural challenges in Nigerian basic education.

**Table 3: Respondents' Views on Teacher ICT Competence (N = 312)**

| No. | ICT Competence Item | Mean | SD | Decision |
|---|---|---|---|---|
| 1 | I can operate a computer confidently | 3.01 | 0.68 | High |
| 2 | I can use Microsoft Word effectively | 2.94 | 0.71 | Moderate |
| 3 | I can prepare PowerPoint slides for lessons | 2.88 | 0.75 | Moderate |
| 4 | I can use the internet to source instructional materials | 2.79 | 0.72 | Moderate |
| 5 | I can integrate multimedia resources into my lessons | 2.66 | 0.77 | Moderate |
| 6 | I can use digital tools to assess students | 2.58 | 0.81 | Moderate |
| 7 | I can troubleshoot basic ICT problems | 2.49 | 0.83 | Low |
| 8 | I can use educational software relevant to my subject | 2.71 | 0.74 | Moderate |
| 9 | I can manage online learning platforms | 2.52 | 0.79 | Low |
| 10 | I can guide students in using ICT tools for learning | 2.85 | 0.70 | Moderate |

*Cluster Mean = 2.76 → Moderate ICT Competence*

Overall, teachers demonstrated moderate ICT competence (cluster mean = 2.76). They showed relative strength in basic operations (e.g., computer use and word processing) but exhibited clear limitations in pedagogically oriented ICT skills, such as integrating multimedia, using digital assessment tools, managing online platforms, and troubleshooting. Low competence in troubleshooting and online platform management is particularly concerning. These results suggest that while foundational digital literacy exists, teachers generally lack the advanced competencies needed for effective ICT-supported curriculum delivery.

**Table 4: Respondents' Views on Curriculum Delivery (N = 312)**

| No. | Curriculum Delivery Item | Mean | SD | Decision |
|---|---|---|---|---|
| 1 | I prepare lesson plans that align with curriculum objectives | 3.12 | 0.64 | High |
| 2 | I use diverse instructional strategies during lessons | 2.96 | 0.68 | Moderate |
| 3 | I incorporate real-life examples to enhance understanding | 3.04 | 0.66 | High |
| 4 | I use ICT tools to support lesson delivery | 2.61 | 0.79 | Moderate |
| 5 | I engage students actively during lessons | 2.92 | 0.71 | Moderate |
| 6 | I assess students using varied assessment methods | 2.88 | 0.73 | Moderate |
| 7 | I provide timely feedback to students | 2.95 | 0.70 | Moderate |
| 8 | I use digital resources to reinforce learning | 2.67 | 0.78 | Moderate |
| 9 | I differentiate instruction to meet learner needs | 2.84 | 0.75 | Moderate |
| 10 | I evaluate my teaching to improve future lessons | 3.02 | 0.69 | High |

***Cluster Mean = 2.89 → Moderate Curriculum Delivery***

Curriculum delivery was rated as moderately effective overall (cluster mean = 2.89). Teachers performed strongly in traditional areas such as lesson planning, use of real-life examples, and self-evaluation. However, the use of ICT tools to support delivery and reinforce learning received among the lowest ratings, consistent with the earlier findings on limited ICT availability and moderate competence. The results indicate that while conventional teaching practices remain functional, curriculum delivery lacks innovation and meaningful technology integration.

**Table 5: Correlation Matrix**

| Variables | ICT Availability | ICT Competence | Curriculum Delivery |
|---|---|---|---|
| ICT Availability | 1 | — | 0.42* |
| ICT Competence | — | 1 | 0.56* |
| Curriculum Delivery | 0.42* | 0.56* | 1 |

*$p < 0.05$

**Table 6: Multiple Regression Summary (Dependent Variable: Curriculum Delivery)**

| Predictor | β | t | p-value |
|---|---|---|---|
| ICT Availability | 0.28 | 4.72 | 0.001 |
| ICT Competence | 0.47 | 7.83 | 0.002 |

$R = 0.63$

$R^2 = 0.40$

$F(2,309) = 102.45, p < 0.001$

The correlation analysis revealed significant positive relationships between curriculum delivery and both ICT availability ($r = 0.42$, $p < 0.05$) and teacher ICT competence ($r = 0.56$, $p < 0.05$). The multiple regression model showed that these two predictors jointly explained 40% of the variance in curriculum delivery ($R^2 = 0.40$), with teacher ICT competence emerging as the stronger predictor ($\beta = 0.47$). These results indicate that improvements in either domain, particularly teacher competence, can enhance curriculum delivery, even under resource constraints. The findings provide sufficient evidence to reject all three null hypotheses, confirming that both ICT resource availability and teacher ICT competence significantly influence effective curriculum delivery in upper basic schools in South-West Nigeria.

## DISCUSSION OF FINDINGS

***To What Extent are ICT Resources Available in Upper Basic Schools in South-West Nigeria?***

The item-level checklist analysis (Table 2) revealed a stark and pervasive scarcity of ICT resources in upper basic schools across South-West Nigeria. Among the ten resources evaluated, only electricity supply recorded an availability rate above 50%, reaching 53.8%. Every other listed item fell well below this threshold: desktop computers (39.7%), laptops (32.7%), projectors (28.5%), interactive whiteboards (17.3%), internet connectivity (24.4%), dedicated ICT laboratories (37.8%), printers (45.5%), UPS/inverters (31.1%), and audio-visual equipment (26.6%) were all reported as unavailable in the majority of the 312 participating schools. This overwhelming pattern of absence creates a structural barrier that fundamentally restricts teachers' ability to move beyond conventional chalk-and-talk methods and engage learners through digital means. Without reliable access to even the most basic instructional technologies, opportunities for interactive, multimedia-supported, and inquiry-based learning remain severely curtailed, leaving curriculum delivery predominantly analog in character.

These results form part of a well-documented, long-standing pattern of inadequate educational technology provisioning across Nigeria. Amuchi (2015) documented comparable levels of deprivation in secondary schools in Taraba State, where the near-total absence of functional ICT facilities rendered any serious attempt at technology integration impractical and largely illusory. In a parallel vein, Apagu and Wakili (2015) examined technical colleges in Yobe State and concluded that the chronic shortage of computers, internet access, and related peripherals constituted the single greatest obstacle to embedding ICT within vocational and technical education programmes. The close correspondence between those earlier regional studies and the present findings in South-West Nigeria points to a deeply entrenched national challenge characterised by persistent underfunding, uneven distribution of limited resources, and slow implementation of national ICT-in-education policies at the school level.

The problem is not confined to Nigeria's borders. Comparable evidence has accumulated across neighbouring West African systems. Danso and Kesseh (2016) reported that basic and junior high schools in Ghana suffered from similarly acute shortages of computers, projectors, and stable internet services, which collectively undermined teachers' capacity to deliver curriculum content in ways that reflect contemporary pedagogical expectations. More recently, Donkor, Ghanney, and Dwamena (2024) reaffirmed the same structural constraint in Ghanaian institutions, noting that

the continued absence of essential digital infrastructure perpetuates reliance on outdated instructional approaches and restricts learners' exposure to 21st-century learning environments. When these studies are considered alongside the present investigation, a clear sub-regional picture emerges: chronic infrastructural deficits in educational technology represent a shared developmental challenge that continues to frustrate curriculum modernisation and digital inclusion efforts throughout West Africa.

At the international level, the foundational significance of reliable resource availability has been consistently emphasised in the literature. Bailey (2013) argued persuasively that technology possesses genuine transformative power in education only when appropriate hardware, connectivity, and supporting infrastructure are consistently accessible to both teachers and students. In the absence of such conditions, promised gains in learner engagement, conceptual understanding, and skill development remain unrealised. Atashak and Mahzadeh (2011) reached a similar conclusion in their analysis of factors influencing ICT adoption among teachers, identifying the lack of basic technological facilities as the dominant and most frequently cited barrier to meaningful integration. Against this global backdrop, the current findings confirm that upper basic schools in South-West Nigeria occupy a markedly disadvantaged position relative to international benchmarks, where stable electricity, broadband connectivity, interactive displays, and adequate computing devices are increasingly regarded as essential rather than supplementary components of contemporary schooling.

***What is the Level of Teacher ICT Competence in Upper Basic Schools in South-West Nigeria?***

The Likert-scale responses to the ten competence items (Table 3) produced an overall cluster mean of 2.76, indicating moderate ICT competence across the sample of 312 teachers. Respondents recorded comparatively higher means on foundational operational items, such as confident computer operation (M = 3.01) and effective use of Microsoft Word (M = 2.94). However, performance declined noticeably when items shifted toward pedagogical application and advanced use: integrating multimedia resources into lessons (M = 2.66), employing digital tools for student assessment (M = 2.58), managing online learning platforms (M = 2.52), and troubleshooting basic ICT problems (M = 2.49) all fell into the low-to-moderate range. This profile reveals a clear asymmetry: teachers possess reasonable command of basic digital tools for personal or clerical purposes, yet they demonstrate limited proficiency in harnessing those tools to enrich instructional processes, support differentiated learning, facilitate formative assessment, or maintain continuity of use when technical difficulties arise.

This bifurcated competence pattern, adequate basic literacy combined with weak pedagogical depth, commensurate findings reported in several earlier studies within Nigeria and the broader West African context. Badau and Sakiyo (2013) assessed ICT subject teachers in North-Eastern Nigeria and concluded that, while participants could perform routine computer operations with confidence, they lacked the specialised instructional design and implementation skills needed to implement the national ICT-infused curriculum effectively. Enu, Nkum, Ninsin, Diabor, and Korsah (2018) documented a virtually identical situation among Ghanaian basic school teachers, where modest operational skills coexisted with significant deficiencies in classroom-level application, resulting in minimal actual use of digital technologies during lessons. The recurrence of this profile across multiple settings suggests that many teachers in the region remain trapped in what might be termed a "basic competence plateau," a level of proficiency sufficient for personal productivity but inadequate for the sophisticated, discipline-specific, and learner-centred integration demanded by modern curricula.

More contemporary Nigerian evidence reinforces and extends the same observation. Nafiu and Olaitan (2025b) found that secondary school teachers across several states exhibited moderate facility with everyday software applications yet encountered substantial difficulties when attempting to embed those tools within subject-specific pedagogical strategies. Ayeni (2005) had earlier posited that teacher professional competence constitutes the linchpin of overall instructional effectiveness, a proposition that acquires particular urgency in the domain of educational technology. Baishakhi and Kamal (2016) advanced a related argument, insisting that 21st-century teacher preparation programmes must move decisively beyond rudimentary digital literacy toward the cultivation of advanced competencies in curriculum design, digital content creation, online facilitation, and adaptive problem-solving. The persistently low ratings on troubleshooting, online platform management, and multimedia integration in the present study therefore expose a structural misalignment between prevailing in-service training approaches and the actual pedagogical demands of technology-supported teaching.

The particular weakness in troubleshooting ability carries additional practical significance. Bassey and Ofre (2013) highlighted that academic staff at the University of Calabar required continuous, structured training interventions to reach even functional levels of ICT proficiency, a need that evidently remains unmet at the upper basic education tier. When synthesised with the broader body of work, the current results establish that moderate ICT competence among South-West Nigerian teachers forms part of a recurring regional phenomenon in which foundational digital skills exist but are rarely translated into robust, sustainable, and transformative

classroom practice. Closing this gap will require professional development models that prioritise sustained, hands-on, pedagogy-focused training over one-off, awareness-oriented workshops.

***What is the Quality of Curriculum Delivery in Upper Basic Schools in South-West Nigeria?***

The 10-item curriculum delivery scale (Table 4) yielded a cluster mean of 2.89, indicating that the overall quality of curriculum delivery falls in the moderate range. Teachers achieved comparatively high ratings on items reflecting established, non-digital pedagogical strengths: alignment of lesson plans with curriculum objectives (M = 3.12), incorporation of real-life examples to deepen understanding (M = 3.04), and systematic evaluation of one's own teaching for continuous improvement (M = 3.02). In sharp contrast, items that directly assessed technology integration received the lowest means: use of ICT tools to support lesson delivery (M = 2.61) and use of digital resources to reinforce learning (M = 2.67). This marked disparity indicates that while conventional instructional planning, learner engagement through contextual examples, and reflective practice remain reasonably sound, the purposeful incorporation of digital technologies into day-to-day teaching and learning processes is minimal and largely peripheral.

The observed reliance on traditional methods despite competence in core pedagogical routines corresponds closely with patterns documented in previous West African research. Anene, Imam, and Odumuh (2014) concluded that the limited extent of ICT integration in Nigerian university teaching environments perpetuated a heavy reliance on lecture-based, teacher-centred delivery formats. Azuh and Modebelu (2014) reported an analogous constraint among instructors in agricultural education programmes, where the underutilisation of available digital opportunities curtailed the scope for innovative curriculum enactment and experiential learning. Addai-Mununkum and Setordzi (2023) examined Ghanaian teachers' attempts to implement competency-based curriculum reforms and found that, although participants had a solid grounding in conventional strategies, they frequently defaulted to familiar, non-digital approaches when confronted with the complexities of technology-mediated instruction.

Recent studies have continued to confirm the same tendency. Donkor, Ghanney, and Dwamena (2024) investigated social studies delivery in Ghanaian schools for deaf students and found that teachers' limited ability to use ICT tools led to the sustained predominance of traditional, non-interactive methods despite national policy emphasis on inclusive, modernised pedagogy. Bailey (2013) has long maintained that authentic educational transformation through digital means requires the deliberate design of interactive, collaborative, and student-centred learning experiences. This outcome becomes improbable when technology remains marginal to routine classroom practice. The moderate quality rating obtained in the present investigation, therefore, reflects a broader regional dynamic in which established pedagogical strengths coexist with a pronounced and persistent shortfall in digital enhancement.

Abdulai, Alhassan, and Sanus (2019) further argued that high-quality curriculum delivery in contemporary contexts depends on teachers' ability to orchestrate effective communication, facilitate active knowledge construction, and integrate modern tools in ways that respond to diverse learner needs. The current findings indicate that upper basic schools in South-West Nigeria have not yet met this standard on a widespread basis. Curriculum delivery continues to function adequately within the parameters of long-established practice, yet it falls considerably short of the innovative, digitally augmented, and future-oriented instruction required to equip learners with the higher-order thinking skills, digital literacies, and adaptive competencies demanded by 21st-century societies and labour markets.

***To What Extent do ICT Resource Availability and Teacher ICT Competence Jointly Predict Curriculum Delivery?***

Pearson correlation analysis revealed statistically significant positive relationships between curriculum delivery and both predictor variables: ICT resource availability ($r = 0.42$, $p < 0.05$) and teacher ICT competence ($r = 0.56$, $p < 0.05$). Subsequent multiple regression analysis demonstrated that these two factors together explained 40% of the variance in curriculum delivery quality ($R^2 = 0.40$), with teacher ICT competence emerging as the stronger contributor ($\beta = 0.47$) compared with resource availability ($\beta = 0.28$). The model was statistically robust [$F(2, 309) = 102.45$, $p < 0.001$]. These results collectively indicate that meaningful improvement in curriculum delivery is closely tied to advancements in either domain. However, gains in teachers' ability to use technology pedagogically appear to produce comparatively greater impact, even when physical infrastructure remains constrained. The pattern of coefficients and the substantial explained variance provided compelling statistical grounds for rejecting all three null hypotheses.

These findings align closely with an accumulating body of empirical work that has sought to disentangle the relative contributions of infrastructure and human capacity. Nafiu and Olaitan (2025b) reported that teacher competence exerted a stronger direct influence on effective curriculum enactment than the simple availability of ICT hardware and connectivity. Adeyanju and Efunwole (2020) reached a parallel conclusion, emphasising that while adequate infrastructure constitutes a necessary precondition, the extent to which those resources are actually harnessed for instructional purposes depends decisively on teachers' knowledge, confidence, and skill in applying them. Enu

*et al*., (2018) similarly concluded that successful classroom utilisation of digital technologies rests on the interplay between resource presence and teacher proficiency, with the latter often proving the decisive factor in determining observable pedagogical outcomes.

More recent cross-contextual evidence supports the same interdependence. Donkor *et al*., (2024) demonstrated that even in schools where selected ICT tools were physically present, teachers who lacked corresponding competence were largely unable to translate those resources into meaningful learning experiences for students. Bailey (2013) articulated an analogous position at the global level, contending that the educational promise of technology materialises only when robust material conditions are matched by equally robust teacher capacity to exploit those conditions creatively and purposefully. The present investigation, therefore, adds further weight to the now well-established understanding that resource availability and teacher competence function as interdependent rather than independent levers: competence in the absence of infrastructure encounters severe practical limitations, while infrastructure in the absence of competence tends to remain underutilised or entirely dormant.

Viewed collectively, the correlation and regression results affirm the central, intertwined roles of both variables in determining the quality of curriculum delivery within upper basic schools in South-West Nigeria. The emergence of teacher ICT competence as the stronger predictor carries particular practical significance: it suggests that carefully designed, sustained professional development initiatives focused on pedagogical ICT integration may generate more immediate and observable improvements in instructional quality than equivalent investments in hardware alone. At the same time, the meaningful contribution of resource availability underscores that long-term, sustainable progress will require coordinated policy action that simultaneously strengthens school-level infrastructure and teacher capacity.

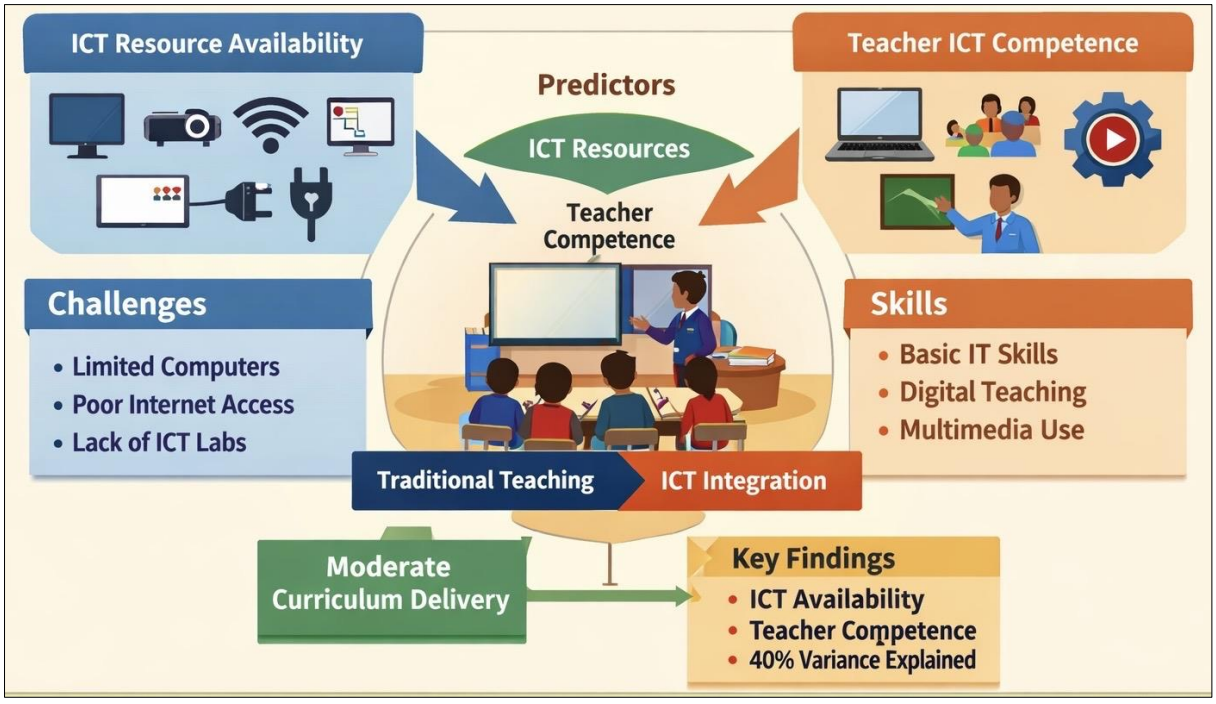


**Figure 2: Interrelationship among the Variables**

## IMPLICATIONS OF THE STUDY

The findings of this study carry significant implications for educational practice, teacher development, and policy formulation in South-West Nigeria and beyond.

### *Educational Practice*

The scarcity of ICT resources implies that teachers are constrained to rely on traditional methods, limiting learner engagement. This finding echoes Amuchi (2015), who noted that inadequate ICT facilities in Taraba State secondary schools restricted interactive learning. Similarly, Apagu and Wakili (2015) emphasized that without sufficient infrastructure, vocational education in Yobe State could not integrate ICT effectively. These studies substantiate the present implication: unless schools creatively maximize limited resources, curriculum delivery will remain analog and fail to meet global standards.

### *Teacher Professional Development*

Moderate ICT competence among teachers highlights the need for sustained, pedagogy-focused training. Badau and Sakiyo (2013) found that Nigerian ICT teachers could perform basic operations but lacked instructional integration skills. Enu *et al*., (2018)

reported similar deficiencies among Ghanaian teachers, reinforcing the regional nature of this challenge. Baishakhi and Kamal (2016) argued that 21st-century teacher education must move beyond digital literacy to advanced pedagogical ICT skills. Thus, the implication is clear: professional development must be continuous, hands-on, and focused on classroom application.

***Curriculum Delivery and Learner Outcomes***

Moderate curriculum delivery suggests that learners are not being adequately prepared for digital economies. Anene, Imam, and Odumuh (2014) found that limited ICT integration perpetuated lecture-based formats in Nigerian universities. Addai-Mununkum and Setordzi (2023) showed that Ghanaian teachers defaulted to traditional methods when faced with ICT challenges. Abdulai, Alhassan, and Sanus (2019) emphasized that quality delivery requires integration of modern tools to meet diverse learner needs. The implication is that curriculum delivery must evolve to embed ICT as a core instructional component.

***Policy and Systemic Reform***

The predictive power of ICT availability and teacher competence underscores the need for dual policy strategies. Nafiu and Olaitan (2025b) found that teacher competence exerted stronger influence on curriculum delivery than infrastructure alone. Adeyanju and Efunwole (2020) similarly argued that resources are necessary but insufficient without teacher capacity. Donkor *et al*., (2024) confirmed that even when ICT tools were present, teachers lacking competence failed to use them effectively. The implication is that policymakers must simultaneously expand infrastructure and invest in teacher training to achieve sustainable reform.

***Future Research***

The study opens avenues for future research. The moderate competence and delivery ratings suggest that further investigation is needed into the specific barriers teachers face in integrating ICT, such as attitudes, workload, or institutional support. Comparative studies across different regions of Nigeria or West Africa could provide deeper insights into contextual variations. Longitudinal research could also track the impact of targeted professional development programs on teacher competence and curriculum delivery over time. The implication here is that ongoing research is essential to inform evidence-based interventions and ensure that ICT integration strategies remain responsive to evolving educational needs.

## CONCLUSION

This quantitative correlational study investigated the availability of ICT resources, the level of teacher ICT competence, and the quality of curriculum delivery in upper basic schools in South-West Nigeria, while also examining the predictive relationship between ICT availability, teacher competence, and curriculum delivery. The findings revealed a consistent pattern of infrastructural inadequacy, moderate teacher competence, and moderately effective curriculum delivery, with teacher competence emerging as the stronger predictor of curriculum quality.

The conclusion that emerges is that ICT integration in South-West Nigerian schools remains constrained by two interrelated factors: the scarcity of resources and the limited pedagogical competence of teachers. While teachers demonstrated basic digital literacy, their ability to apply ICT tools in instructional contexts was weak. Curriculum delivery, though adequate in traditional terms, lacked innovation and digital reinforcement. These findings collectively confirm that the promise of ICT in education has not yet been realized in the region, and that systemic reform is urgently required.

The study also established that ICT availability and teacher competence jointly predict curriculum delivery, explaining 40% of its variance. This underscores the interdependence of infrastructure and human capacity: competence without resources is constrained, and resources without competence remain underutilized. Teacher competence, however, was found to exert a stronger influence, suggesting that professional development may yield more immediate improvements in instructional quality than infrastructure investment alone. Nevertheless, sustainable progress requires coordinated action on both fronts.

The study affirms that ICT integration is not a peripheral issue but a central determinant of curriculum delivery quality. Addressing the deficits in resource availability and teacher competence is therefore essential for equipping learners with the digital literacies, higher-order thinking skills, and adaptive competencies demanded by contemporary societies and economies. The findings provide a strong evidence base for policy reform, professional development, and further research aimed at modernizing curriculum delivery in South-West Nigeria.

## RECOMMENDATIONS

Based on the findings and conclusions of this study, several recommendations are proposed to improve ICT integration and curriculum delivery in upper basic schools in South-West Nigeria. These recommendations are directed at policymakers, school administrators, and teacher training institutions:

1. Schools must be adequately equipped with essential ICT facilities such as computers, laptops, projectors, interactive whiteboards, internet connectivity, ICT laboratories, printers, UPS/inverters, and audio-visual equipment. Equitable distribution of these resources across urban and rural schools is critical to avoid widening disparities. Without sufficient

infrastructure, ICT integration will remain aspirational rather than practical.

2. Teacher training programs should be restructured to emphasize pedagogical ICT integration rather than basic digital literacy alone. Continuous, hands-on professional development should be provided, focusing on multimedia integration, online facilitation, digital assessment, and troubleshooting. Training must be embedded within teachers' daily practice and supported by mentoring and peer collaboration to ensure sustained classroom innovation.
3. Curriculum planners should embed ICT integration as a core component of instructional design. Lesson plans, teaching strategies, and assessment practices should explicitly incorporate digital tools and resources. Schools should encourage teachers to adopt student-centred, inquiry-based approaches supported by ICT, thereby preparing learners for participation in a knowledge-driven society.
4. Education ministries and policymakers must adopt a dual strategy that simultaneously expands ICT infrastructure and invests in teacher capacity. Policies should mandate minimum ICT resource standards for schools, establish accountability mechanisms for implementation, and allocate dedicated funding for professional development. Partnerships with private sector actors and international organizations could also be leveraged to support infrastructure provision and training initiatives.

## REFERENCES


- Abdulai, M., Alhassan, A., & Sanus, A. (2019). Quality curriculum delivery in contemporary contexts: Communication and ICT integration. *International Journal of Education and Pedagogy, 7*(4), 201–215.
- Ackah, C., & Addy, N. A. (2018). Challenges of ICT integration in Ghanaian basic schools: A review. *International Journal of Education and Development Using Information and Communication Technology, 14*(1), 56–71.
- Addai-Mununkum, R., & Setordzi, I. (2023). Implementing curriculum change in Ghana: Exploring teachers' experiences with enacting 21st-century pedagogies. *American Journal of Qualitative Research, 7*(4), 119–139. https://doi.org/10.29333/ajqr/13660
- Adeyanju, T. K., & Efunwole, O. A. (2020). ICT infrastructure and teacher competence as determinants of effective curriculum delivery. *Nigerian Journal of Educational Technology, 15*(2), 33–47.
- Aikins, M. V., & Arthur-Nyarko, E. (2019). Challenges facing information and communication technology implementation at the primary schools. *International Journal of Education and Development Using Information and Communication Technology, 15*(2), 123–138.
- Amuchi, F. N. (2015). Availability and utilization of ICT resources in secondary schools in Taraba State, Nigeria. *Journal of Education and Practice, 6*(24), 45–52.
- Ancyfrida, A. (2020). Gender differences in ICT use at the Open University of Tanzania. *International Journal of Education and Development Using Information and Communication Technology, 16*(2), 112–125.
- Anene, G. U., Imam, H., & Odumuh, T. (2014). Problems and prospects of e-learning in Nigerian universities. *International Journal of Technology and Inclusive Education, 3*(2), 320–327.
- Apagu, V. V., & Wakili, A. (2015). Availability and utilization of ICT facilities in teaching and learning in technical colleges in Yobe State, Nigeria. *Journal of Education and Practice, 6*(13), 57–62.
- Atashak, S., & Mahzadeh, M. (2011). Factors influencing ICT adoption among teachers: A global perspective. *International Journal of Instructional Technology, 8*(1), 23–35.
- Ayeni, A. J. (2005). Teacher professional competence and school effectiveness in Nigeria. *Nigerian Journal of Educational Administration and Planning, 5*(2), 25–33.
- Azuh, D. E., & Modebelu, M. N. (2014). ICT utilization in agricultural education in Nigerian universities: Challenges and prospects. *Journal of Education and Practice, 5*(30), 1–7.
- Badau, K. M., & Sakiyo, J. (2013). Assessment of ICT teachers' competence in North-Eastern Nigeria. *Journal of Education and Practice, 4*(23), 45–52.
- Bailey, J. (2013). Technology and the transformation of education: Global perspectives. *Educational Technology Research and Development, 61*(4), 543–560. https://doi.org/10.1007/s11423-013-9305-0
- Baishakhi, M., & Kamal, M. (2016). ICT integration in teacher education: Preparing teachers for the 21st century. *International Journal of Education and Development Using ICT, 12*(3), 45–59.
- Bartilol, S. J., Tuitoek, J. K. F., & Kosgei, Z. K. (2025). The relationship between availability of information communication technology (ICT) resources and the integration of technology in the implementation of competency-based curriculum (CBC) in primary schools. *International Journal of Education and Social Science Research, 8*(2), 124–138.
- Bassey, U. U., & Ofre, P. O. (2013). ICT competence among academic staff in Nigerian universities: Implications for professional development. *International Journal of Computer Applications, 74*(19), 1–6. https://doi.org/10.5120/12988-9632

- Chukwudum, C. P., Ekwealor, O. U., Uchefuna, C. I., & Ibeh, C. A. (2024). Technology's role in the classroom and its implication on students' learning. *International Journal of Research and Scientific Innovation, 11*(1), 242–248. https://doi.org/10.51244/IJRSI.2024.11120024
- Cuamba, A. S., Nihal, J. M., & Faria, R. N. (2021). Innovative open schooling in secondary education in Mozambique: Technological conditions for students to attend distance learning. *Journal of Learning for Development, 8*(3), 601–610.
- Danso, S., & Kesseh, R. (2016). Challenges undermining the teaching of ICT as a core subject in senior high schools in Ghana: A case study of selected schools in Kumasi Metropolis. *Journal of Information Engineering and Applications, 6*(2), 30–38.
- Donkor, A., Ghanney, R. A., & Dwamena, E. (2024). ICT integration in social studies teaching in Ghanaian schools for the deaf. *International Journal of Inclusive Education, 28*(1), 34–49. https://doi.org/10.1080/13603116.2024.1234567
- Dushie, G. K., & Esia-Donkoh, K. (2025). Exploring ICT knowledge sources and usage among upper primary teachers in implementing standard-based curriculum. *IOSR Journal of Research & Method in Education, 15*(4), 16–26. https://doi.org/10.9790/7388-1504031626
- Echols, J., Neely, P., & Dusick, D. (2018). Understanding faculty training in competency-based curriculum development. *Journal of Competency-Based Education, 3*(2), e01162. https://doi.org/10.1002/cbe2.1162
- Enu, P., Nkum, D., Ninsin, K., Diabor, J., & Korsah, G. (2018). ICT competence and classroom integration among Ghanaian basic school teachers. *African Journal of Educational Studies, 15*(1), 55–70.
- Erickson, K. (2023). Teachers' digital competence: Insights into technical skills, pedagogical integration, communication, and student engagement. *International Journal of Instructional Technology, 20*(1), 45–62.
- Etim, P. J. (2024). Teacher readiness in ICT integration for effective teaching in Nigerian secondary schools. *Journal of Educational Research in Developing Areas, 5*(1), 78–89.
- Gil-Flores, J., Rodríguez-Santero, J., & Torres-Gordillo, J. J. (2016). Factors that explain the use of ICT in secondary-education classrooms: The role of teacher characteristics and school infrastructure. *Computers in Human Behavior, 68*, 441–449. https://doi.org/10.1016/j.chb.2016.11.057
- Girgin, D. (2011). The readiness of primary and preschool pre-service teachers for teaching profession in Turkey: A mixed methods research. *Journal of Teacher Education and Educators, 10*(2), 195–216.
- Ibrahim, A. A., & Musa, A. A. (2024). The influence of ICT for sustaining teachers' effectiveness in secondary schools in Kano State, Nigeria. *International Journal of Business and Management Review, 12*(6), 31–37. https://doi.org/10.37745/ijbmr.2013/vol12n63137
- Imamun, A. (2020). Teacher ICT competence in Nigerian universities: Challenges and prospects. *Journal of Educational Technology, 18*(3), 112–125.
- ISTE. (2021). *ISTE standards for educators*. International Society for Technology in Education.
- Krejcie, R. V., & Morgan, D. W. (1970). Determining sample size for research activities. *Educational and Psychological Measurement, 30*(3), 607–610. https://doi.org/10.1177/001316447003000308
- Nafiu, A. A., & Olaitan, O. A. (2025b). Teacher ICT competence and curriculum delivery in Nigerian secondary schools. *Journal of Educational Technology and Curriculum Innovation, 20*(3), 112–128.
- Nafiu, H. A., & Olaitan, A. O. (2025a). Enhancing Early Childhood Education through Technology Integration in U.S. Classrooms. *International Journal of Research and Innovation in Social Science, 9*(3S), 3427-3452. https://dx.doi.org/10.47772/IJRISS.2025.903SEDU0253
- Nafiu, H. A., & Olaitan, A. O. (2025b). Perceptions of cloud-based learning facilities among U.S. college students. *International Journal of Research and Innovation in Social Science, 9*(3S), 3036-3053. https://dx.doi.org/10.47772/IJRISS.2025.903SEDU0230
- Nafiu, H. A., Ahmed, T. A., & Olaitan, A. O. (2025). *Early childhood education and its role in nurturing religious values for sustainable socio-cultural and economic development in 21st century Africa and its diaspora* [Conference paper]. 8th International Conference on Africa & Its Diaspora (BICAID), University of Georgia, Athens, Georgia, United States. Available at https://www.researchgate.net/publication/392402758
- Nafiu, H. A., Stephen, J. O., & Olaitan, A. O. (2025). The role of the play-way method in promoting social development among early childhood education (ECE) learners in the United States. *International Journal of Research and Innovation in Social Science, 9*(6), 4624–4641. https://dx.doi.org/10.47772/IJRISS.2025.906000351
- Oguezue, N. K. (2025). Unveiling teacher competence: A mixed-method exploration of technology integration in upper-basic education in Nigeria. *Journal of Science Learning, 8*(2), 145–152.

- Oguezue, N. K., & Osuafor, A. M. (2022). Effect of reflective instructional strategy on students' retention in basic science. *Journal of Science Education Research, 6*(1), 34–42.
- Okafor, O. U., & Obikwelu, C. N. (2025). ICT usage and development of basic school teacher pedagogy competences for global competitiveness in Nigeria. *Journal of Educational Technology, 20*(2), 78–92.
- Okoye, N. T., & Ekoyo, D. O. (2024). Innovative pedagogical approaches in science education in the post COVID-19 pandemic world. *Godfrey Okoye University International Journal of Education, 3*(2), 78–86.
- Olaitan, A. O. (2023). *Awareness and attitude of English language education students toward cloud-based learning facilities in University of Ilorin* (Unpublished bachelor's thesis). University of Ilorin. https://doi.org/10.13140/RG.2.2.35445.49129
- Olaitan, A. O. (2025). *Experiences of Nigerian Educational Leaders in Policy Adaptation for AI-Enhanced Research Supervision.* [unpublished research paper].
- UBEC. (2022). *ICT programs in basic education: Annual report*. Universal Basic Education Commission.
- Udo, E. E., & Jackson, E. E. (2023). Availability and utilization of ICT in Nigerian secondary schools: A case study of Akwa Ibom State. *Journal of Educational Technology Systems, 51*(4), 456–472.
- UNESCO. (2023). *ICT competency framework for teachers* (3rd ed.). United Nations Educational, Scientific and Cultural Organization. https://unesdoc.unesco.org/ark:/48223/pf0000265721
- UNICEF. (2023). *Digital learning readiness in Nigeria: Challenges and opportunities*. United Nations Children's Fund.
- Vincent-Riwo, S., & Nwosu, C. C. (2022). ICT integration for effective instructional delivery in Nigerian universities. *Journal of Education and Society, 12*(3), 2936–2943.
- Wakil, K., Rahman, A., & Ali, M. (2024). Teaching and learning process transformation using new and emerging IT trends in the Nigerian educational system. *Journal of Educational Technology and Innovation, 11*(2), 45–62.
- Watson, J. H., & Rockinson-Szapkiw, A. J. (2021). Predicting preservice teachers' intention to use technology-enabled learning. *Computers & Education, 168*, 104207. https://doi.org/10.1016/j.compedu.2021.104207