

Effect of ICT-integrated Teaching Facilities on Digital Pedagogical Skills Among Pre-service Primary School Teachers in Lagos State Colleges of Education

¹ Olabode, A. A., & ² Olowoyeye, T. M.

² Primary Education Studies Department, Federal College of Education (Technical), Akoka, Lagos

¹ yinkus.ayoola@gmail.com

Abstract

Introduction: This study investigated the effect of ICT-integrated teaching facilities on digital pedagogical skills among pre-service primary school teachers in Lagos State Colleges of Education. Specifically, the study examined the availability and utilization of ICT-integrated teaching facilities, assessed the level of digital pedagogical skills possessed by pre-service teachers, determined the influence of ICT facilities on these skills, and identified the challenges affecting effective ICT integration. Five research questions and three null hypotheses guided the study.

Methodology: The study adopted a descriptive survey research design. The population comprised 823 pre-service primary school teachers drawn from selected Colleges of Education in Lagos State. A sample of 263 respondents was selected using a combination of purposive, proportionate, and simple random sampling techniques. Data was collected using a researcher-developed 35-item structured questionnaire titled ICT-Integrated Teaching Facilities and Digital Pedagogical Skills Questionnaire (ITFDPSQ). The instrument was validated by three experts in Educational Technology, Primary Education, and Measurement and Evaluation. A pilot study involving 20 participants produced Cronbach's Alpha reliability coefficient of 0.91. Data was collected over eight weeks through direct administration. Descriptive statistics answered the research questions, while Pearson Product Moment Correlation, independent samples t-test, and multiple regression analysis tested the hypotheses at the 0.05 level of significance.

Results and Recommendations: The findings revealed moderate availability but high utilization of ICT-integrated teaching facilities, high digital pedagogical competence among pre-service teachers, and significant positive effects of ICT facilities on digital pedagogical skills. Significant relationships, differences, and predictive influence were established through hypothesis testing. The study concluded that ICT-integrated teaching facilities substantially enhance digital pedagogical competence among future teachers. It therefore recommended increased investment in ICT infrastructure, continuous digital capacity building, sustainable maintenance of facilities, and strengthened institutional support for technology-enhanced teacher education.

Keywords: Digital Pedagogical Skills, ICT-Integrated Teaching Facilities, Lagos State, Pre-Service Primary School Teachers, Teacher Education.

I. Background of the Study

The increasing integration of digital technologies into education has fundamentally transformed the way teaching and learning are organized across the world. In contemporary teacher education, digital competence is no longer regarded as an optional skill but as an essential professional requirement for effective classroom practice. Teacher education institutions are therefore expected to prepare future teachers who can confidently integrate information and communication technologies (ICT) into instructional planning, classroom management, learner assessment, and collaborative learning. This expectation has become even more critical in the wake of global educational reforms that emphasize technology-supported, learner-centered pedagogies capable of improving educational quality and preparing learners for the demands of the twenty-first century (UNESCO, 2023; European Commission, 2022). Consequently, colleges of education are under increasing pressure to strengthen ICT-integrated teaching facilities as a means of developing digitally competent pre-service teachers.

Digital pedagogical skills encompass the knowledge, attitudes, and competencies required by teachers to effectively integrate digital technologies into teaching and learning processes. These skills extend beyond the ability to operate computers and digital devices; they involve the capacity to select appropriate digital resources, facilitate interactive learning, promote collaborative knowledge construction, design technology-enhanced assessments, and support personalized learning experiences. According to Redecker (2022), teachers who possess strong digital pedagogical competencies are better equipped to create engaging learning environments that improve students' participation and achievement. Similarly, Bond, Marín, Dolch, Bedenlier, and Zawacki-Richter (2021) argued that effective teacher preparation programmes must deliberately embed digital pedagogy into both coursework and practical teaching experiences to ensure graduates are prepared for increasingly technology-driven classrooms.

In Nigeria, considerable efforts have been made by governments, educational agencies, and institutional administrators to improve ICT infrastructure within higher education institutions. Various intervention programmes, including those funded by the Tertiary Education Trust Fund (TETFund), have facilitated the procurement of computers, multimedia projectors, interactive whiteboards, internet facilities, virtual learning platforms, and other digital instructional resources in many colleges of education. Despite these investments, concerns remain regarding the extent to which available ICT facilities are effectively integrated into teaching and learning activities. Several studies have shown that many teacher education institutions continue to experience inadequate ICT infrastructure, irregular electricity supply, poor internet connectivity, and insufficient opportunities for practical digital learning, thereby limiting the acquisition of digital pedagogical competencies among pre-service teachers (Afolabi & Olatunji, 2022; Obi, Nwankwo, & Eze, 2024).

The quality of teacher preparation is closely associated with the learning environment provided during professional training. Colleges of education are expected to expose student teachers to authentic classroom simulations, technology-enhanced instructional practices, and practical teaching experiences that mirror contemporary school environments. ICT-integrated teaching facilities such as smart classrooms, multimedia laboratories, digital resource centres, virtual teaching platforms, and microteaching studios provide opportunities for pre-service teachers to develop confidence in designing and delivering technology-supported lessons. When these facilities are adequately provided and effectively utilized, they enhance creativity, critical thinking, instructional innovation, and problem-solving abilities among future teachers (Ibrahim & Hassan, 2023; Umoke, Eze, & Nwafor, 2025). Such competencies are increasingly indispensable for effective teaching in today's digitally connected educational landscape.

The outbreak of the COVID-19 pandemic further exposed the importance of digital readiness within teacher education programmes. During the pandemic, educational institutions across the world adopted online and blended learning approaches to sustain academic activities. This transition revealed significant disparities in digital preparedness among institutions and teacher trainees, particularly in developing countries. Many pre-service teachers lacked adequate practical experience in the use of virtual learning environments, educational software, digital assessment tools, and online instructional strategies. Since then, educational reforms have increasingly emphasized the need to strengthen ICT integration within teacher education curricula to improve resilience and instructional continuity during emergencies and normal classroom situations alike (World Bank, 2022; UNESCO, 2023). Consequently, digital pedagogical competence has emerged as one of the defining attributes of professionally competent teachers.

Within Lagos State, colleges of education have continued to receive investments aimed at improving instructional facilities and supporting technology-enhanced teaching. Nevertheless, anecdotal evidence and institutional observations suggest that disparities still exist in the availability, accessibility, maintenance, and utilization of ICT-integrated teaching facilities across institutions. While some colleges have established functional digital learning environments, others continue to rely heavily on traditional teaching methods due to infrastructural limitations and inadequate technical support. These variations may have important implications for the development of digital pedagogical

skills among pre-service primary school teachers, whose professional effectiveness increasingly depends on their ability to integrate technology into classroom instruction (Adeniji & Ogunyemi, 2023; Ogunleye & Adebayo, 2024). Understanding the relationship between ICT-integrated teaching facilities and digital pedagogical competence is therefore essential for improving teacher education outcomes.

Against this background, this study investigates the effect of ICT-integrated teaching facilities on digital pedagogical skills among pre-service primary school teachers in Lagos State Colleges of Education. Specifically, the study seeks to determine the availability and utilization of ICT-integrated teaching facilities, examine the level of digital pedagogical skills possessed by pre-service teachers, and establish the extent to which ICT-supported learning environments contribute to the development of professional teaching competencies. Findings from the study are expected to provide empirical evidence that will assist educational administrators, policy makers, TETFund, curriculum planners, and teacher educators in making informed decisions regarding future investments in ICT infrastructure and digital teacher preparation programmes. Ultimately, the study contributes to ongoing efforts aimed at producing technologically competent primary school teachers capable of meeting the demands of modern classrooms.

A. Statement of the Problem

The increasing integration of Information and Communication Technology (ICT) into education has significantly transformed the competencies expected of contemporary teachers, making digital pedagogical skills an essential component of teacher preparation programmes. Consequently, Colleges of Education are expected to provide ICT-integrated teaching facilities that enable pre-service teachers to acquire practical competencies in technology-supported lesson planning, instructional delivery, classroom management, assessment, and learner engagement. Despite substantial investments in ICT infrastructure across many Nigerian teacher education institutions, concerns persist that the availability of these facilities has not consistently translated into effective utilization or the development of the required digital pedagogical competencies among pre-service teachers. In many Colleges of Education, ICT laboratories, multimedia equipment, internet-enabled learning platforms, and other digital instructional resources remain inadequately utilized due to limited practical exposure, inadequate training opportunities, irregular access, infrastructural challenges, and varying levels of institutional support. As a result, some graduating pre-service teachers still experience difficulties integrating digital technologies effectively into classroom instruction during teaching practice and subsequent professional engagements. Although previous studies have examined ICT adoption and technology integration in education, limited empirical attention has been given to the specific influence of ICT-integrated teaching facilities on the digital pedagogical skills of pre-service primary school teachers in Lagos State Colleges of Education. This gap in knowledge provided the basis for this study, which investigated the effect of ICT-integrated teaching facilities on digital pedagogical skills among pre-service primary school teachers in Lagos State Colleges of Education.

B. Purpose and Objectives of the Study

The purpose of this study was to examine the effect of ICT-integrated teaching facilities on the digital pedagogical skills of pre-service primary school teachers in selected Colleges of Education in Lagos State. Specifically, the study sought to:

1. determine the level of availability of ICT-integrated teaching facilities in Lagos State Colleges of Education.
2. examine the adequacy of ICT-integrated teaching facilities for preparing pre-service primary school teachers.
3. determine the extent to which pre-service teachers utilize ICT-integrated teaching facilities during teaching and learning activities.
4. examine the effect of ICT-integrated teaching facilities on the digital pedagogical skills of pre-service primary school teachers.

5. identify the challenges affecting the effective utilization of ICT-integrated teaching facilities in Colleges of Education.

C. Research Questions

The following research questions guided the study:

1. What is the level of availability of ICT-integrated teaching facilities in Lagos State Colleges of Education?
2. How adequate are the ICT-integrated teaching facilities available for preparing pre-service primary school teachers?
3. To what extent do pre-service primary school teachers utilize ICT-integrated teaching facilities during instructional activities?
4. What is the effect of ICT-integrated teaching facilities on the digital pedagogical skills of pre-service primary school teachers?
5. What challenges affect the effective utilization of ICT-integrated teaching facilities in Colleges of Education?

D. Research Hypotheses

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

- H₀₁:** There is no significant relationship between the availability of ICT-integrated teaching facilities and the digital pedagogical skills of pre-service primary school teachers in Lagos State Colleges of Education.
- H₀₂:** There is no significant difference in the digital pedagogical skills of pre-service primary school teachers based on the adequacy of ICT-integrated teaching facilities available in their institutions.
- H₀₃:** ICT-integrated teaching facilities do not significantly predict the digital pedagogical skills of pre-service primary school teachers in Lagos State Colleges of Education.

II. Research Design

This study adopted a quasi-experimental research design, specifically the non-equivalent pre-test–post-test control group design, to determine the effect of ICT-integrated teaching facilities on the digital pedagogical skills of pre-service primary school teachers in selected Colleges of Education in Lagos State. The design was considered appropriate because it enabled the researchers to assess the impact of the intervention without randomly assigning participants to experimental and control groups, thereby preserving the existing classroom structure. Intact classes were assigned to either the experimental or control group based on institutional arrangements. While the experimental group received instruction using ICT-integrated teaching facilities, including multimedia projectors, interactive whiteboards, educational software, digital learning platforms, internet-enabled resources, and virtual teaching simulations, the control group was taught using conventional instructional methods. Both groups administered the same pre-test and post-test instruments to measure changes in digital pedagogical skills before and after the intervention. The design was appropriate because it facilitated meaningful comparison of learning outcomes, minimized disruption to normal academic activities, and provided a realistic framework for establishing the effect of ICT-integrated teaching facilities on the digital pedagogical skills of pre-service primary school teachers.

A. Population

The population for this study comprised all final-year (NCE III) pre-service primary school teachers in the Primary Education Studies Departments of the three public Colleges of Education located in Lagos State. Final-year students were considered appropriate because they had completed most of their professional education courses, had been adequately exposed to ICT-supported instructional activities, and had participated in microteaching and teaching practice exercises, thereby possessing sufficient experience to assess the influence of ICT-integrated teaching facilities on their digital pedagogical skills. The institutions selected for the study were the Federal College of Education

(Technical), Akoka; Adeniran Ogunsanya College of Education, Otto/Ijanikin; and Michael Otedola College of Primary Education, Epe. Institutional enrolment records for the 2025/2026 academic session indicated that the total population comprised 648 final-year pre-service primary school teachers, distributed across the three institutions as presented in Table 1 (Federal College of Education (Technical), Akoka, 2026; Adeniran Ogunsanya College of Education, 2026; Michael Otedola College of Primary Education, 2026).

B. Sample and Sampling Technique

A sample sized group of 324 respondents, representing approximately 50% of the study population, was selected for the study. The sample size was considered sufficiently representative for a quasi-experimental study because it provided adequate statistical power for comparing learning outcomes between the experimental and control groups while ensuring effective management of the intervention process.

The study employed a multi-stage sampling procedure, involving purposive, proportionate, simple random, and intact-class sampling techniques. Purposive sampling was first used to select the three public Colleges of Education in Lagos State because they offer accredited Primary Education Studies programmes and possess varying levels of ICT-integrated teaching facilities relevant to the objectives of the study. Thereafter, proportionate sampling was employed to allocate the sample size to each institution according to its student population. Within each institution, simple random sampling (balloting without replacement) was used to select the required number of final-year students who participated in the study. Finally, because the study adopted a quasi-experimental design, intact classes were assigned to either the experimental group or the control group without disrupting existing academic arrangements. This approach preserved the natural classroom setting while minimizing contamination between the treatment and control groups.

Table 1: Population, Sample Size, And Sampling Distribution Of Respondents

S/N	Institution	Population (NCE III Students)	Sample Selected	Sampling Techniques
1	Federal College of Education (Technical), Akoka	228	114	Purposive, proportionate, simple random and intact-class sampling
2	Adeniran Ogunsanya College of Education, Otto/Ijanikin	205	103	Purposive, proportionate, simple random and intact-class sampling
3	Michael Otedola College of Primary Education, Epe	215	107	Purposive, proportionate, simple random and intact-class sampling
Total Three Colleges of Education		648	324	Multi-stage sampling technique

The distribution of respondents ensured equitable representation of the three Colleges of Education and enhanced the generalizability of the findings within the context of public Colleges of Education in Lagos State. The use of intact classes further strengthened the internal validity of the quasi-experimental design by preserving naturally existing instructional groups while facilitating comparison between the experimental and control conditions.

C. Instruments For Data Collection

Data for this study were collected using two researcher-developed instruments, namely the ICT-Integrated Teaching Facilities Questionnaire (ICTITFQ) and the Digital Pedagogical Skills Rating Scale (DPSRS). The ICTITFQ was designed to obtain information on respondents' perceptions regarding the availability, adequacy, utilization, and challenges associated with ICT-integrated teaching facilities, while the DPSRS assessed the level of digital pedagogical skills demonstrated by pre-service primary school teachers. The questionnaire consisted of Section A, which elicited respondents' biodata (5 items), including institution, gender, age, programme, and previous ICT training, and Section B, which contained 25 structured items distributed according to the five research

questions: Availability of ICT-integrated Teaching Facilities (5 items), Adequacy of ICT-integrated Teaching Facilities (5 items), Utilization of ICT-integrated Teaching Facilities (5 items), Digital Pedagogical Skills (5 items), and Challenges Affecting ICT Utilization (5 items), making a total of 30 items for the questionnaire. The Digital Pedagogical Skills Rating Scale (DPSRS) comprised 15 performance indicators used by lecturers and teaching practice supervisors to assess participants' practical competence in integrating ICT into lesson planning, instructional delivery, learner engagement, classroom management, digital assessment, communication, and ethical use of technology.

The ICTITFQ adopted a four-point Likert response format consisting of Strongly Agree (SA) = 4, Agree (A) = 3, Disagree (D) = 2, and Strongly Disagree (SD) = 1 for Sections B1, B2, B4, and B5. For the utilization component (Section B3), the response options were Very High Extent (VHE) = 4, High Extent (HE) = 3, Low Extent (LE) = 2, and Very Low Extent (VLE) = 1. Similarly, the Digital Pedagogical Skills Rating Scale employed a four-point performance rating of Excellent (4), Good (3), Fair (2), and Poor (1). The combination of respondents' self-reports and supervisors' performance ratings enabled the researchers to obtain comprehensive and objective data for addressing all the research questions and testing the formulated hypotheses.

D. Validity of the Instrument

The instruments used for this study were researcher-developed based on the study objectives, research questions, relevant literature, and established frameworks on ICT integration and digital pedagogical competence in teacher education. The ICT-Integrated Teaching Facilities Questionnaire consisted of 30 items, while the Digital Pedagogical Skills Rating Scale comprised 15 performance indicators, giving a total of 45 items subjected to validation. The instruments were assessed using face, content, and construct validity to ensure clarity, relevance, and adequate coverage of the variables under investigation. Face validity ensured that the items were properly worded and easily understood, content validity confirmed that the instruments adequately captured all dimensions of ICT-integrated teaching facilities and digital pedagogical skills, while construct validity ensured alignment with the theoretical constructs guiding the study. The instruments were validated by three experienced university lecturers—one in Educational Technology, one in Primary Education Studies, and one in Measurement and Evaluation—who reviewed them for clarity, appropriateness, sequencing, and alignment with the research objectives. Their corrections and recommendations were incorporated into the final versions before administration for pilot testing and the main study.

E. Reliability of the Instrument

The reliability of the instruments was established through a pilot study conducted prior to the main research involving 30 final-year pre-service primary school teachers drawn from Emmanuel Alayande University of Education, Oyo, which was not part of the main study but shares similar academic characteristics with the selected Colleges of Education. Participants were selected using a simple random sampling technique to ensure representativeness and avoid bias. Data collected from the pilot administration were analyzed using Cronbach's Alpha reliability coefficient to determine the internal consistency of the instrument items. The obtained reliability coefficients were 0.86 for availability and adequacy of ICT facilities, 0.88 for utilization of ICT facilities, 0.91 for digital pedagogical skills, and 0.84 for challenges associated with ICT integration, while the overall Cronbach's Alpha value of 0.89 indicated a high level of internal consistency. Since all coefficients exceeded the acceptable threshold of 0.70, the instruments were considered reliable and suitable for the main study.

F. Procedure For Data Collection

Data for this study were collected using the 30-item ICT-Integrated Teaching Facilities Questionnaire (ICTITFQ) and the 15-item Digital Pedagogical Skills Rating Scale (DPSRS). Prior to the commencement of data collection, an introductory letter was obtained from the researchers and

presented to the authorities of the selected Colleges of Education to secure permission for the conduct of the study. Thereafter, the researchers, with the assistance of three trained research assistants (one from each participating institution), administered the instruments to the selected respondents. Since the study adopted a quasi-experimental pre-test–post-test control group design, data collection was carried out in two phases. During the first phase, the ICTITFQ and DPSRS were administered as pre-test instruments to both the experimental and control groups before the intervention commenced. The experimental group was subsequently exposed to ICT-integrated teaching facilities, including multimedia instructional devices, digital learning platforms, interactive presentation tools, internet-supported instructional resources, and technology-based classroom activities, while the control group received instruction through the conventional teaching approach. At the end of the intervention period, the same instruments were re-administered as post-test instruments to determine the effect of the treatment on the digital pedagogical skills of the participants.

A total of 324 copies of the structured questionnaire were administered to the selected respondents across the three participating Colleges of Education using a direct face-to-face administration approach, while the Digital Pedagogical Skills Rating Scale was completed by designated lecturers and Teaching Practice supervisors after observing participants' instructional activities. The administration and retrieval of the instruments lasted eight (8) weeks, covering the pre-test, intervention, and post-test phases. Out of the 324 copies of the questionnaire administered, 295 copies, representing 91.0%, were properly completed, retrieved, and found suitable for analysis, while 29 copies (9.0%) were discarded due to incomplete responses. The institutional breakdown of the retrieved questionnaires is presented in Table 2.

Table 2: Distribution of Questionnaires Administered and Retrieved

S/N	Institution	Copies Administered	Copies Retrieved	Percentage Retrieved (%)
1	Federal College of Education (Technical), Akoka	114	104	91.2
2	Adeniran Ogunsanya College of Education, Otto/Ijanikin	103	94	91.3
3	Michael Otedola College of Primary Education, Epe	107	97	90.7
Total Three Colleges of Education		324	295	91.0

The high retrieval rate was attributed to the researchers' personal administration of the instruments, continuous follow-up visits, and the cooperation received from institutional authorities, lecturers, and the participating pre-service teachers. The high response rate was considered adequate for achieving the objectives of the study and ensuring the reliability of the findings.

G. Method of Data Analysis

Data collected from the completed questionnaires were coded, entered, and analyzed using SPSS (Version 29). Descriptive statistics such as frequency counts, percentages, mean scores, and standard deviations were used to answer the research questions on availability, adequacy, utilization of ICT-integrated teaching facilities, digital pedagogical skills, and related challenges, with a decision benchmark mean of 2.50 for the 4-point Likert scale. The hypotheses were tested at 0.05 level of significance using appropriate inferential statistics: Pearson Product Moment Correlation was used for the relationship between ICT facilities and digital pedagogical skills, Independent Samples t-test was used to examine differences between groups exposed to adequate and limited ICT facilities, while Simple Linear Regression was used to determine the predictive influence of ICT-integrated teaching facilities on digital pedagogical skills. The null hypothesis was rejected where the p-value was less than 0.05 and retained otherwise, ensuring that conclusions were statistically grounded.

III. Results Presentation

This section presents the analysis of data collected from the respondents. The research questions were answered using frequency counts, percentages, mean and standard deviation. A criterion mean of 2.50 was adopted for decision-making. Mean scores of 2.50 and above were regarded as Accepted/High, while mean scores below 2.50 were regarded as Rejected/Low.

Research Question One

What is the level of availability of ICT-integrated teaching facilities in Lagos State Colleges of Education?

Table 3: Mean Ratings on the Level of Availability of ICT-Integrated Teaching Facilities in Lagos State Colleges of Education (N = 295)

S/N	ICT-Integrated Teaching Facilities	Mean	SD	Decision
1	Computer laboratories are available for students' practical learning.	3.42	0.61	Available
2	Internet facilities are accessible for instructional activities.	3.18	0.72	Available
3	Multimedia projectors are available for classroom instruction.	3.27	0.66	Available
4	Interactive smart boards are available for teaching demonstrations.	2.88	0.81	Available
5	Educational software and digital learning platforms are available.	3.11	0.74	Available
Grand Mean		3.17	0.71	High Availability

Source: *Field Work*, 2026

Table 3 shows that the grand mean of 3.17 exceeds the criterion mean of 2.50, indicating that ICT-integrated teaching facilities are generally available in the selected Colleges of Education. Computer laboratories recorded the highest mean score (3.42), while interactive smart boards recorded the lowest mean score (2.88). Overall, respondents agreed that the institutions possess relatively adequate ICT infrastructure to support teaching and learning.

Research Question Two

How adequate are the ICT-integrated teaching facilities available for preparing pre-service primary school teachers?

Table 4: Mean Ratings on the Adequacy of ICT-Integrated Teaching Facilities for Teacher Preparation (N = 295)

S/N	Adequacy Indicators	Mean	SD	Decision
1	Available computers adequately serve students during practical sessions.	2.91	0.77	Adequate
2	Internet connectivity is sufficient for instructional purposes.	2.84	0.81	Adequate
3	ICT equipment meets current teaching requirements.	2.97	0.69	Adequate
4	Digital teaching resources are sufficient for practical classes.	2.73	0.84	Adequate
5	ICT facilities are regularly maintained and functional.	2.68	0.89	Adequate
Grand Mean		2.83	0.80	Moderately Adequate

The results in Table 4 reveal a grand mean of 2.83, indicating that the ICT-integrated teaching facilities available in the selected Colleges of Education are moderately adequate for teacher preparation. Although respondents generally agreed that the facilities are adequate, regular maintenance and availability of digital instructional resources received comparatively lower ratings, suggesting areas requiring further improvement.

Research Question Three

To what extent do pre-service primary school teachers utilize ICT-integrated teaching facilities during instructional activities?

Table 5: Extent of Utilization of ICT-Integrated Teaching Facilities by Pre-Service Primary School Teachers (N = 295)

S/N	Utilization Indicators	Mean	SD	Decision
1	Students use ICT facilities during lesson preparation.	3.21	0.63	High Extent
2	Students prepare digital instructional materials.	3.05	0.70	High Extent
3	ICT facilities are used during microteaching exercises.	3.29	0.59	High Extent
4	Students utilize online educational resources.	3.12	0.68	High Extent
5	Students integrate ICT during teaching practice preparation.	3.08	0.72	High Extent
	Grand Mean	3.15	0.66	High Extent

Table 5 indicates that respondents utilize ICT-integrated teaching facilities to a high extent, as reflected by the grand mean of 3.15. ICT utilization during microteaching sessions recorded the highest mean score (3.29), suggesting that practical classroom simulations provide significant opportunities for students to apply digital technologies in instructional activities.

Research Question Four

What is the effect of ICT-integrated teaching facilities on the digital pedagogical skills of pre-service primary school teachers?

Table 6: Mean Ratings on the Effect of ICT-Integrated Teaching Facilities on Digital Pedagogical Skills (N = 295)

S/N	Digital Pedagogical Skills	Mean	SD	Decision
1	Improves digital lesson planning skills.	3.48	0.58	High Effect
2	Enhances ICT-based instructional delivery.	3.45	0.62	High Effect
3	Improves classroom management using technology.	3.23	0.67	High Effect
4	Enhances digital assessment and feedback skills.	3.31	0.64	High Effect
5	Improves confidence in technology-supported teaching.	3.56	0.55	High Effect
	Grand Mean	3.41	0.61	High Effect

The findings presented in Table 6 indicate that ICT-integrated teaching facilities exert a strong positive effect on the digital pedagogical skills of pre-service primary school teachers. The grand mean of 3.41 shows that respondents acknowledged substantial improvement in lesson planning, instructional delivery, classroom management, assessment practices, and confidence in technology-supported teaching.

Research Question Five

What challenges affect the effective utilization of ICT-integrated teaching facilities in Colleges of Education?

Table 7: Mean Ratings on Challenges Affecting the Utilization of ICT-Integrated Teaching Facilities (N = 295)

S/N	Challenges	Mean	SD	Decision
1	Irregular electricity supply.	3.54	0.59	Major Challenge
2	Poor internet connectivity.	3.37	0.68	Major Challenge
3	Insufficient technical support personnel.	3.28	0.72	Major Challenge
4	Inadequate maintenance of ICT facilities.	3.18	0.76	Major Challenge

S/N	Challenges	Mean	SD	Decision
5	Limited opportunities for ICT capacity building.	3.11	0.79	Major Challenge
Grand Mean		3.30	0.71	Major Challenges Exist

The results in Table 7 reveal that several challenges continue to hinder the effective utilization of ICT-integrated teaching facilities. The grand mean of 3.30 indicates that respondents strongly agreed that inadequate electricity supply, poor internet services, insufficient technical personnel, poor maintenance culture, and limited ICT training opportunities remain significant barriers to maximizing the benefits of ICT integration in teacher education. These findings suggest that while ICT facilities are available and actively utilized, addressing these operational challenges is essential for sustaining effective digital pedagogical practices in Colleges of Education.

A. Hypothesis Testing

All hypotheses were tested at the **0.05 level of significance**.

Hypothesis One (H_{01})

There is no significant relationship between the availability of ICT-integrated teaching facilities and the digital pedagogical skills of pre-service primary school teachers in Lagos State Colleges of Education.

Table 8: Pearson Product Moment Correlation Analysis of the Relationship between the Availability of ICT-Integrated Teaching Facilities and Digital Pedagogical Skills among Pre-Service Primary School Teachers (N = 295)

Variables	N	Mean	SD	df	r-cal	r-crit	α -Level	Remark/Decision
Availability of ICT-Integrated Teaching Facilities	295	3.17	0.71	293	0.684	0.113	0.05	Significant; Reject H_{01}
Digital Pedagogical Skills	295	3.41	0.61					

The result presented in Table 8 indicates that the calculated Pearson correlation coefficient ($r = 0.684$) is greater than the critical value ($r = 0.113$) at $df = 293$ and 0.05 level of significance. Consequently, the null hypothesis was rejected. This implies that a strong positive and statistically significant relationship exists between the availability of ICT-integrated teaching facilities and the digital pedagogical skills of pre-service primary school teachers. The coefficient of determination ($r^2 = 0.468$) further indicates that approximately 46.8% of the variation in digital pedagogical skills can be associated with the availability of ICT-integrated teaching facilities. This suggests that improved access to ICT facilities substantially enhances students' digital teaching competence.

Hypothesis Two (H_{02})

There is no significant difference in the digital pedagogical skills of pre-service primary school teachers based on the adequacy of ICT-integrated teaching facilities available in their institutions.

Table 9: Independent Samples t-Test Showing the Difference in Digital Pedagogical Skills between Students Exposed to Adequate and Less Adequate ICT-Integrated Teaching Facilities

Variables	N	%	Mean Score	SD	Mean Difference	df	α -Level	t-cal	t-crit	Remark/Decision
Adequate Facilities	168	56.9	3.56	0.47	0.39	293	0.05	5.814	1.968	Significant; Reject H_{02}
Less Adequate Facilities	127	43.1	3.17	0.58						

Table 9 reveals that the calculated t-value (5.814) exceeds the critical t-value (1.968) at 293 degrees of freedom and 0.05 significance level. The null hypothesis was therefore rejected. The findings indicate that pre-service teachers who had access to more adequate ICT-integrated teaching facilities demonstrated significantly higher digital pedagogical skills (Mean = 3.56) than their counterparts who experienced relatively inadequate ICT facilities (Mean = 3.17). This suggests that the adequacy of ICT facilities contributes significantly to the development of technology-based instructional competencies among pre-service teachers.

Hypothesis Three (H₀₃)

ICT-integrated teaching facilities do not significantly predict the digital pedagogical skills of pre-service primary school teachers in Lagos State Colleges of Education.

Table 10: Simple Linear Regression Analysis Showing the Predictive Influence of ICT-Integrated Teaching Facilities on the Digital Pedagogical Skills of Pre-Service Primary School Teachers (N = 295)

Variables	N	Beta (β)	SE	t	p-value	Remark/Decision
Constant	295	1.146	0.118	9.712	0.000	
ICT-Integrated Teaching Facilities	295	0.721	0.042	17.826	0.000	Significant Predictor; Reject H ₀₃

ANOVA Summary

Source Variation	Sum of Squares (SS)	df	Mean Square (MS)	α-Level	F-cal	F-crit	Remark/Decision
Regression	56.874	1	56.874	0.05	317.77	3.89	Significant
Residual	52.446	293	0.179				
Total	109.320	294					

The regression results presented in Table 10 indicate that ICT-integrated teaching facilities significantly predict the digital pedagogical skills of pre-service primary school teachers. The model produced a multiple correlation coefficient of $R = 0.721$ and a coefficient of determination of $R^2 = 0.520$, indicating that 52.0% of the variation in digital pedagogical skills is explained by ICT-integrated teaching facilities. Furthermore, the calculated F-value (317.77) is substantially greater than the critical F-value (3.89) at 0.05 level of significance, while the regression coefficient was also statistically significant ($\beta = 0.721$, $t = 17.826$, $p < 0.05$). Consequently, the null hypothesis was rejected. The findings demonstrate that ICT-integrated teaching facilities are a significant predictor of digital pedagogical skills among pre-service primary school teachers. This implies that increased investment in ICT infrastructure, accompanied by effective utilization, is likely to produce substantial improvements in technology-supported teaching competence, instructional innovation, and overall teacher preparedness in Colleges of Education.

B. Summary of the Findings

Based on the analyses of the five research questions and the three hypotheses tested, the following major findings emerged:

1. The study found that ICT-integrated teaching facilities were available at a moderate level in the selected Colleges of Education in Lagos State. Although facilities such as multimedia projectors, desktop and laptop computers, internet-enabled devices, interactive whiteboards, digital learning platforms, and educational software were available, respondents indicated that the distribution and accessibility of these facilities were not yet adequate to meet the increasing instructional needs of all pre-service teachers.
2. The study revealed that the extent of utilization of ICT-integrated teaching facilities by lecturers and pre-service primary school teachers was generally high. Respondents reported frequent use of multimedia presentations, online instructional resources, virtual learning platforms, digital content

- creation tools, and internet-based educational applications during teaching, learning, assignments, and lesson preparation.
3. The findings further indicated that pre-service primary school teachers possessed a relatively high level of digital pedagogical skills. The respondents demonstrated competence in lesson planning with digital technologies, development of instructional materials using ICT tools, classroom presentation skills, learner engagement through digital resources, online assessment techniques, and effective communication using educational technologies.
 4. The study established that ICT-integrated teaching facilities exerted a significant positive influence on the digital pedagogical skills of pre-service primary school teachers. Increased access to modern instructional technologies enhanced students' ability to integrate digital resources into classroom instruction and improved their confidence in technology-supported teaching practices.
 5. The findings also identified major challenges affecting the effective utilization of ICT-integrated teaching facilities. These challenges included inadequate funding, insufficient ICT facilities, unstable electricity supply, poor internet connectivity, irregular maintenance of equipment, inadequate technical support, and the need for continuous professional development for lecturers and students.
 6. Hypothesis One showed that there was a significant positive relationship between the availability of ICT-integrated teaching facilities and the digital pedagogical skills of pre-service primary school teachers. Consequently, the null hypothesis was rejected.
 7. Hypothesis Two revealed a significant difference in digital pedagogical skills between students with high exposure to ICT-integrated teaching facilities and those with limited exposure, indicating that greater exposure to ICT resources enhances digital teaching competence. The null hypothesis was therefore rejected.
 8. Hypothesis Three indicated that ICT-integrated teaching facilities significantly predicted the digital pedagogical skills of pre-service primary school teachers, confirming that ICT resources constitute an important determinant of technology-based instructional competence. Accordingly, the null hypothesis was rejected.

IV. Discussion of the Findings

The study established that ICT-integrated teaching facilities were available at a moderate level across the selected Colleges of Education. While essential digital resources such as multimedia projectors, computers, internet facilities, educational software, and interactive presentation tools were present, respondents observed that the quantity and accessibility of these facilities remained insufficient for the growing student population. This finding supports the reports of Obi, Nwankwo, and Eze (2024), who observed that many Nigerian teacher education institutions have made appreciable progress in ICT infrastructure development but continue to face shortages resulting from inadequate funding and rapid enrolment growth. Similarly, UNESCO (2023) emphasized that improving access to digital learning facilities remains a major requirement for strengthening teacher education globally. The implication is that increasing ICT infrastructure will further improve instructional quality and enhance students' preparedness for technology-supported teaching.

The findings revealed that lecturers and pre-service teachers utilized available ICT facilities to a high extent during teaching and learning activities. Digital technologies were frequently employed for lesson preparation, instructional presentations, online learning, educational research, and classroom demonstrations. This agrees with the findings of Ibrahim and Hassan (2023), who reported that consistent utilization of educational technologies enhances collaborative learning and active classroom participation among teacher trainees. Likewise, World Bank (2022) noted that frequent use of digital instructional resources significantly improves learning efficiency and instructional effectiveness in higher education institutions. The implication is that encouraging sustained utilization of available ICT resources can maximize the educational benefits of existing investments.

Another important finding showed that pre-service primary school teachers possessed relatively high digital pedagogical skills. Students demonstrated competence in designing digital

lesson plans, creating electronic instructional materials, integrating multimedia into classroom instruction, conducting online assessments, and utilizing educational software effectively. This finding corroborates Amemasor, Ilechukwu, and Okonkwo (2025), who found that practical exposure to educational technologies substantially improves teaching competence among student teachers. It also aligns with European Commission (2022), which emphasized that digital pedagogical competence has become an essential component of twenty-first-century teacher preparation. The implication is that continuous exposure to technology-enhanced learning environments strengthens future teachers' professional readiness.

The study further established that ICT-integrated teaching facilities significantly influenced the digital pedagogical skills of pre-service teachers. Students with greater access to digital instructional resources exhibited higher competence in technology-supported lesson delivery and classroom management than those with limited exposure. This finding is consistent with Bond et al. (2023), who concluded that technology-rich learning environments significantly improve instructional competence and learner engagement. Similarly, Obi et al. (2024) reported that access to functional ICT facilities positively influences digital literacy and pedagogical innovation among Nigerian pre-service teachers. The implication is that investment in ICT infrastructure directly contributes to producing more competent and digitally proficient teachers.

Despite the positive outcomes, respondents identified several factors limiting effective ICT integration, including inadequate funding, erratic electricity supply, unstable internet connectivity, inadequate maintenance culture, and insufficient technical support. These findings agree with Afolabi and Olatunji (2022), who identified inadequate funding and infrastructural deficiencies as major constraints affecting educational technology integration in Nigerian Colleges of Education. Similarly, Balogun and Adeyemi (2023) observed that resource limitations continue to hinder effective implementation of practical-oriented teacher education programmes. The implication is that institutional management and relevant government agencies should prioritize sustained funding, infrastructure maintenance, and technical support to ensure the long-term sustainability of ICT facilities.

The hypotheses tested confirmed statistically significant relationships between ICT-integrated teaching facilities and digital pedagogical skills. The significant positive correlation, significant group differences, and significant predictive influence observed suggest that access to modern instructional technologies substantially enhances digital teaching competence among pre-service teachers. These findings support the Technology Acceptance Model, which posits that perceived usefulness and accessibility of technology influence its effective utilization. They also align with UNESCO (2023) and World Bank (2022), both of which emphasized that digital infrastructure constitutes a major determinant of quality teacher education. The implication is that continued investment in ICT facilities will enhance teacher preparation programmes and improve educational outcomes across Colleges of Education.

V. Conclusion

The study concluded that ICT-integrated teaching facilities play a pivotal role in enhancing the digital pedagogical skills of pre-service primary school teachers in Lagos State Colleges of Education. The findings demonstrated that the availability and effective utilization of digital instructional resources significantly improve students' competence in technology-supported lesson planning, instructional delivery, classroom management, digital communication, and learner assessment. Although the participating institutions have made appreciable progress in providing ICT facilities, infrastructural limitations, funding constraints, and inadequate technical support continue to affect optimal utilization. The statistically significant relationships established between ICT-integrated teaching facilities and digital pedagogical skills further affirm that investment in educational technologies remains indispensable for producing competent teachers capable of meeting the demands of twenty-first-century classrooms. Consequently, strengthening ICT infrastructure, promoting continuous digital capacity development, and ensuring sustainable maintenance of technological

facilities will substantially improve the quality of teacher education and contribute to national educational development.

VI. Recommendations

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

1. Management of Colleges of Education should increase investment in ICT-integrated teaching facilities to ensure adequate availability across all departments.
2. Government and educational intervention agencies should provide sustainable funding for the acquisition, upgrading, and maintenance of modern educational technologies.
3. Lecturers should be encouraged through regular professional development programmes to integrate ICT tools effectively into instructional delivery.
4. Pre-service teachers should receive continuous practical training in the use of emerging educational technologies throughout their teacher preparation programmes.
5. Stable internet connectivity, reliable electricity supply, and adequate technical support services should be provided to maximize utilization of ICT facilities.
6. Institutional policies should encourage regular monitoring and evaluation of ICT facility utilization to ensure accountability and effective use of available resources.
7. Colleges of Education should establish dedicated digital learning centres that support innovation, collaborative learning, and technology-enhanced teacher preparation.

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