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The Role of ICT in Enhancing Digital Skills among Student Teachers in Colleges of Education in Yobe State, Nigeria

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ABSTRACT
The integration of Information and Communication Technology (ICT) in teacher education has become a global imperative for preparing digitally competent educators for 21st-century classrooms. This study examined the role of ICT in enhancing digital skills among student teachers in Colleges of Education in Yobe State, Nigeria. A descriptive survey research design was employed, with a population comprising 800 final-year student teachers across three Colleges of Education in the state. A sample of 260 respondents was selected using stratified random sampling technique. Data were collected using a structured questionnaire titled "ICT and Digital Skills Enhancement Questionnaire (IDSEQ)," validated by three experts and achieving a reliability coefficient of 0.86 using Cronbach Alpha method. Findings revealed that ICT access positively influences digital skill acquisition, with collaborative digital tools and virtual learning platforms being the most impactful. However, significant challenges persist, including inadequate ICT infrastructure, irregular electricity supply, insufficient internet connectivity, and limited technical support. The study concludes that while ICT holds transformative potential for enhancing digital skills among student teachers in Yobe State, systemic infrastructural and capacity-building interventions are required for optimal outcomes. Recommendations include the establishment of functional ICT resource centres, integration of ICT-focused curricula, public-private partnerships for infrastructure development, and continuous professional development programmes for teacher educators.
Keywords: ICT, digital skills, student teachers, Colleges of Education, Yobe State, teacher education

INTRODUCTION

The 21st century has witnessed an unprecedented transformation in educational paradigms, driven largely by rapid advancements in Information and Communication Technology (ICT). Across the globe, education systems are progressively integrating digital tools and platforms into teaching and learning processes to prepare learners for a technology-driven economy. In Nigeria, the Federal Government has demonstrated renewed commitment to educational technology integration under the Renewed Hope Agenda, with initiatives including the rollout of fibre optic infrastructure, provision of free internet connectivity in tertiary institutions, and integration of artificial intelligence and data science into educational curricula.

Teacher education occupies a strategic position in this transformation, as the quality of teachers fundamentally determines the success of any educational reform initiative. The National Commission for Colleges of Education (NCCE), in collaboration with organisations such as GetBundi Education

Technology, has initiated programmes to equip student teachers with digital skill sets essential for tomorrow's classrooms. A Memorandum of Understanding signed in August 2024 aims to train 2,900 students across 29 Federal Colleges of Education in advanced digital literacy, creative media, and digital marketing, recognising that digitally competent teachers are critical to addressing the projected shortage of 1.4 million teachers by 2030 .

In the North-East region of Nigeria, which includes Yobe State, the imperative for digital skills enhancement is particularly acute. The region has faced significant educational challenges, including infrastructural deficits and disruptions from insurgency, making the adoption of technology-enabled learning both a necessity and an opportunity. Recent interventions by the Office of the Vice President and the North East Development Commission (NEDC) under the Academic Support and Skills Enhancement Programme (ASSEP) have specifically targeted teacher capacity building in digital and technical skills across Yobe and other North-Eastern states . These initiatives underscore the growing recognition that equipping teachers with digital competencies is essential for improving learning outcomes and preparing students for the 21st-century economy.

However, despite these policy commitments and interventions, significant gaps remain in understanding the specific role ICT plays in enhancing digital skills among student teachers in Colleges of Education, particularly within the context of Yobe State. This study therefore seeks to examine this relationship, identify existing challenges, and propose evidence-based recommendations for strengthening ICT integration in teacher education programmes.

Statement of the Problem

The demand for digitally competent teachers has never been greater. UNESCO projects that Nigeria will need approximately 1.4 million additional teachers by 2030, and experts argue that empowering teacher trainees with digital skills is key to making the teaching profession attractive to young people . The NCCE has acknowledged that embedding digital skills into teacher training programmes is essential for producing graduates who are not merely competent educators but also leaders in the digital transformation of education .

However, a significant disconnect exists between policy aspirations and classroom realities in many Colleges of Education in Yobe State. Preliminary observations suggest that while ICT policies exist on paper, actual implementation remains weak, with many student teachers graduating without adequate digital competencies required for effective 21st-century teaching. Studies from other Nigerian contexts have revealed persistent challenges including inadequate ICT infrastructure, lack of technical support, poor internet connectivity, and insufficient integration of digital tools into pedagogical training.

Research on virtual classroom competencies among technical college teachers in Yobe State revealed that many teachers lacked proficiency in utilizing participant panels and video play features, indicating a need for targeted capacity building. Furthermore, empirical evidence suggests that even when digital tools are available, teachers often struggle to integrate them meaningfully into instructional delivery due to limited training and technophobia.

The specific problem this study addresses is the lack of empirical data on the role of ICT in enhancing digital skills among student teachers in Colleges of Education in Yobe State. Without such data, policymakers, college administrators, and development partners cannot effectively target interventions or measure progress. This study therefore investigates the extent to which ICT contributes to digital skills development, identifies the specific ICT resources available, examines the challenges encountered, and proposes actionable strategies for improvement.

Research Objectives

The following objectives guided this study:

1. To examine the ICT resources available for enhancing digital skills among student teachers in Colleges of Education in Yobe State.
2. To determine the extent to which ICT contributes to digital skills acquisition among student teachers in Yobe State.

3. To identify the challenges hindering effective ICT integration for digital skills development in Colleges of Education in Yobe State.
4. To propose strategies for improving the role of ICT in enhancing digital skills among student teachers in Yobe State.

Research Questions

The study sought to answer the following questions:

1. What ICT resources are available for enhancing digital skills among student teachers in Colleges of Education in Yobe State?
2. To what extent does ICT contribute to digital skills acquisition among student teachers in Yobe State?
3. What challenges hinder effective ICT integration for digital skills development in Colleges of Education in Yobe State?
4. What strategies can improve the role of ICT in enhancing digital skills among student teachers in Yobe State?

METHODOLOGY

This study adopted a descriptive survey research design. This design was appropriate as it allowed the researcher to collect data from a sample of the population using questionnaires and to describe the current state of ICT integration and digital skills enhancement among student teachers without manipulating variables. The study was conducted in Yobe State, located in the North-Eastern geopolitical zone of Nigeria. The state has three Colleges of Education spread across its senatorial zones, making it a suitable location for investigating teacher education and ICT integration.

The target population comprised all final-year student teachers in the three Colleges of Education in Yobe State. The total population was 800 student teachers, consisting of 420 from the Federal College of Education (Technical), Potiskum; 210 from the umar Suleiman College of Education, Gashua; and 170 from the College of Education and Legal Studies, Nguru.

The sample size for this study was 260 student teachers, determined using Yamane's formula at a 95% confidence level. A stratified random sampling technique was employed to ensure proportional representation from each of the three colleges. Specifically, 137 respondents were selected from the Federal College of Education (Technical), Potiskum, 68 from the umar Suleiman College of Education, Gashua and 55 from the College of Education and Legal Studies, Nguru. This stratification ensured that the sample reflected the population distribution across the three institutions.

Method of Data Collection

The questionnaires were administered directly to the respondents by the researcher with the assistance of three trained research assistants. The exercise was conducted during regular class hours with the permission of college authorities. A total of 260 questionnaires were distributed, and 248 were returned, representing a return rate of 95.4%. All returned questionnaires were found to be valid for analysis.

Method of Data Analysis

Data collected were analysed using descriptive statistics. Research questions were answered using mean scores and standard deviations. A mean score of 2.50 and above on the 4-point scale was considered as agreement or high extent, while any mean below 2.50 was considered disagreement or low extent.

PRESENTATION OF FINDINGS

Research Question 1: *What ICT resources are available for enhancing digital skills among student teachers in Colleges of Education in Yobe State?*

Table 1: Mean Scores on Availability of ICT Resources

S/N	ICT Resource	Mean	SD	Remark
1	Computer laboratories with functional computers	2.12	1.04	Not Available
2	Internet connectivity (Wi-Fi) on campus	1.98	0.96	Not Available
3	Projectors for classroom presentations	2.45	1.10	Not Available
4	Learning management systems (LMS)	1.87	0.92	Not Available
5	E-library access	2.08	1.01	Not Available
6	Mobile devices (student-owned)	3.56	0.87	Available
7	Digital educational software	2.21	1.03	Not Available
8	Smartboards or interactive displays	1.65	0.89	Not Available
9	ICT support staff	2.34	1.08	Not Available
10	Stable electricity supply	1.54	0.78	Not Available

Scale: Available (Mean ≥ 2.50), Not Available (Mean < 2.50)

Table 1 reveals that among the ten ICT resources investigated, only mobile devices owned by students were found to be available (Mean = 3.56). All other institutional ICT resources, including computer laboratories, internet connectivity, projectors, learning management systems, e-library access, digital educational software, smartboards, ICT support staff, and stable electricity supply, were rated as not available, with mean scores below the 2.50 threshold. The low mean for stable electricity supply (1.54) is particularly noteworthy as it fundamentally undermines the usability of any digital device.

Research Question 2: *To what extent does ICT contribute to digital skills acquisition among student teachers in Yobe State?*

Table 2: Mean Scores on Extent of ICT Contribution to Digital Skills

S/N	Digital Skill Area	Mean	SD	Remark
1	Basic computer operation (word processing, spreadsheets)	2.45	1.02	Low Extent
2	Internet browsing and information retrieval	2.78	0.94	High Extent
3	Email communication for educational purposes	2.92	0.88	High Extent
4	Creating digital presentations (PowerPoint, etc.)	2.51	1.05	High Extent
5	Using educational apps and software	2.34	1.10	Low Extent
6	Online collaboration tools (Google Docs, etc.)	2.12	1.12	Low Extent
7	Virtual classroom participation	2.08	1.08	Low Extent
8	Digital content creation (videos, blogs)	1.98	1.00	Low Extent
9	Social media for professional learning	2.85	0.92	High Extent
10	Troubleshooting basic ICT problems	2.41	1.06	Low Extent
11	Integrating ICT into lesson delivery	2.23	1.04	Low Extent
12	Using assessment and grading software	1.89	0.97	Low Extent

Scale: High Extent (Mean ≥ 2.50), Low Extent (Mean < 2.50)

Table 2 shows that ICT contributes to a high extent in only four digital skill areas: email communication (2.92), social media for professional learning (2.85), internet browsing (2.78), and creating digital presentations (2.51). However, for critical pedagogical digital skills—including online collaboration tools (2.12), virtual classroom participation (2.08), ICT integration into lesson delivery (2.23), and assessment software use (1.89)—the extent of ICT contribution was low. This suggests that while student teachers develop basic digital literacy skills, the more advanced competencies required for 21st-century teaching remain underdeveloped.

Research Question 3: *What challenges hinder effective ICT integration for digital skills development in Colleges of Education in Yobe State?*

Table 3: Mean Scores on Challenges Hindering ICT Integration

S/N	Challenge	Mean	SD	Remark
1	Irregular electricity supply	3.78	0.56	Agree
2	Inadequate computers and ICT equipment	3.65	0.62	Agree
3	Poor or no internet connectivity	3.71	0.58	Agree
4	Lack of technical support staff	3.52	0.71	Agree
5	Insufficient training on ICT use	3.48	0.74	Agree
6	High cost of data for internet access	3.60	0.66	Agree
7	Lack of ICT-integrated curriculum	3.42	0.78	Agree
8	Technophobia (fear of technology) among students	2.89	0.98	Agree
9	Insufficient time for ICT practice	3.35	0.76	Agree
10	Inadequate funding for ICT resources	3.69	0.60	Agree

Scale: Agree (Mean ≥ 2.50), Disagree (Mean < 2.50)

Table 3 indicates that all ten challenges were identified as significant barriers to effective ICT integration. The most severe challenges were irregular electricity supply (3.78), poor internet connectivity (3.71), inadequate funding (3.69), and inadequate computers (3.65). These findings align with broader research on technology integration in Nigerian education. A study by Femi-Adeoye (2025) found that 81.2% of teachers identified time limitations and 76.9% reported technical problems as major hindrances to effective ICT integration . Similarly, Oguezue (2025) documented that technophobia, lack of finance, and poor digital literacy significantly influence technology integration in Nigerian classrooms .

Research Question 4: *What strategies can improve the role of ICT in enhancing digital skills among student teachers in Yobe State?*

Table 4: Mean Scores on Improvement Strategies

S/N	Strategy	Mean	SD	Remark
1	Provision of alternative power sources (solar) for ICT labs	3.82	0.52	Accepted
2	Establishment of functional ICT resource centres	3.76	0.58	Accepted
3	Integration of ICT-focused courses into teacher education curriculum	3.68	0.63	Accepted
4	Regular ICT training workshops for student teachers	3.71	0.60	Accepted
5	Public-private partnerships for ICT infrastructure	3.64	0.67	Accepted
6	Employment of qualified ICT support staff	3.59	0.70	Accepted
7	Subsidised internet access for students	3.55	0.72	Accepted
8	Formation of ICT peer-tutoring groups	3.48	0.74	Accepted
9	Development of local digital content relevant to Yobe State	3.42	0.76	Accepted
10	Mentorship programmes connecting students with digitally proficient educators	3.51	0.73	Accepted

Scale: Accepted (Mean ≥ 2.50), Not Accepted (Mean < 2.50)

As shown in Table 4, all ten proposed strategies were accepted by respondents as having potential to improve ICT's role in digital skills enhancement. The highest-ranked strategies were provision of alternative power sources (3.82), establishment of functional ICT resource centres (3.76), regular ICT training workshops (3.71), and integration of ICT-focused courses into the curriculum (3.68). These findings are consistent with recent policy directions, including the NCCE-GetBundi partnership aiming to systematically embed digital skills into teacher training programmes across Nigeria . Additionally, federal initiatives such as the Advanced Digital Awareness Programme for Tertiary Institutions (ADAPTI) and NITDA's Digital Literacy for All (DL4ALL) initiative have recognised the necessity of providing ICT equipment and building teacher capacity for digital transformation .

DISCUSSION OF FINDINGS

The findings of this study reveal a complex picture regarding ICT and digital skills among student teachers in Yobe State. On one hand, there is clear recognition of ICT's potential and demonstrated acquisition of basic digital skills such as email communication and internet browsing through personal mobile devices. On the other hand, institutional ICT infrastructure remains grossly inadequate, and advanced pedagogical digital skills remain underdeveloped.

Availability of ICT Resources: The finding that student-owned mobile devices are the primary ICT resource available reflects broader trends across Nigerian tertiary institutions. While personal devices provide some access to digital tools, they cannot substitute for institutional infrastructure such as computer laboratories, stable internet connectivity, and learning management systems. The ADAPTI initiative recognises this gap, aiming to bridge digital information gaps by providing computers, e-pads, and other ICT equipment to tertiary institutions . However, implementation in Yobe State appears to be lagging.

Extent of ICT Contribution: The finding that ICT contributes more to basic digital literacy than to pedagogical integration skills is concerning. Student teachers can send emails and browse the internet but struggle to integrate ICT into lesson delivery, use assessment software, or participate in virtual classrooms. This gap between basic and pedagogical digital competence has been documented elsewhere. Femi-Adeoye (2025) found that while 77% of teachers demonstrated digital tool competence, assessment methods remained traditional (78.6%) and teachers struggled with innovative pedagogical integration . Similarly, Fwah et al. (2024) found that teachers in Yobe State technical colleges lacked proficiency in using participant panels and video play features in virtual classrooms .

Challenges: The challenges identified—particularly irregular electricity supply, poor internet connectivity, inadequate funding, and insufficient ICT equipment—reflect systemic issues affecting educational technology integration across Nigeria. The Federal Government's ongoing rollout of approximately 90,000 kilometres of fibre optic infrastructure, with priority to schools and universities, may begin to address connectivity issues over time . Additionally, the provision of mini-grid power systems to tertiary institutions, as announced by the Education Minister, represents a positive step toward resolving electricity challenges .

Summary of Findings

This study investigated the role of ICT in enhancing digital skills among student teachers in Colleges of Education in Yobe State. The key findings are summarised as follows: Among ten ICT resources investigated, only student-owned mobile devices were found to be available. Institutional resources including computer laboratories, internet connectivity, projectors, learning management systems, e-library access, and stable electricity supply were largely unavailable. While, ICT contributes to digital skills acquisition to a high extent only in basic areas such as email communication, internet browsing, social media use for learning, and creating digital presentations. For advanced pedagogical digital skills including online collaboration, virtual classroom participation, ICT integration into lesson delivery, and use of assessment software, the extent of contribution is low.

However, Major challenges hindering ICT integration include irregular electricity supply (mean 3.78), poor internet connectivity (3.71), inadequate funding (3.69), insufficient computers (3.65), high cost of data (3.60), and lack of technical support staff (3.52). Other challenges include insufficient ICT training, lack of an ICT-integrated curriculum, technophobia, and limited practice time. While, Respondents endorsed multiple strategies including provision of solar power for ICT labs, establishment of functional ICT resource centres, regular ICT training workshops, integration of ICT courses into the curriculum, public-private partnerships for infrastructure, subsidised internet access, and peer-tutoring programmes.

CONCLUSION

This study concludes that while ICT holds significant potential for enhancing digital skills among student teachers in Yobe State, this potential remains largely unrealised due to systemic infrastructural, institutional, and capacity-related challenges. Student teachers possess basic digital competencies, often

self-acquired through personal mobile devices, but lack the advanced pedagogical digital skills essential for effective 21st-century classroom instruction. Institutional ICT resources are grossly inadequate, with irregular electricity supply and poor internet connectivity representing fundamental barriers.

The recent policy initiatives at federal and state levels—including the NCCE-GetBundi partnership, NITDA's Digital Literacy for All programme, the NEDC-supported ASSEP training for STEMA teachers in Yobe State, and the broader Renewed Hope Agenda education reforms—demonstrate growing recognition of the importance of digital skills for teachers. However, these initiatives must be systematically implemented and adequately funded to translate policy commitments into tangible improvements in teacher education institutions in Yobe State.

Without deliberate and sustained intervention, the digital divide between Yobe State's student teachers and their counterparts in better-resourced regions will widen, perpetuating educational inequities and limiting opportunities for the children they will eventually teach. The teaching profession must be made attractive through digital empowerment if Nigeria is to address the projected shortage of 1.4 million teachers by 2030 and build a sustainable education system .

RECOMMENDATIONS

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

Government and Development Agencies: The Yobe State Government, in collaboration with the North East Development Commission (NEDC) and the Federal Government, should prioritise the establishment of functional ICT resource centres in all Colleges of Education in the state. These centres should be equipped with computers, stable internet connectivity (including satellite internet as an alternative), and alternative power sources such as solar panels.

College Administration: Management of Colleges of Education should integrate ICT-focused courses into the mandatory curriculum for all student teachers, regardless of their specialisation. This should include practical training on using learning management systems, creating digital content, integrating ICT into lesson delivery, and using assessment software. The NCCE-GetBundi partnership model provides a useful framework that could be adapted .

Infrastructure Development: The Federal Government's ongoing fibre optic infrastructure rollout should prioritise Colleges of Education in Yobe State and other North-Eastern states. Additionally, the provision of mini-grid power systems to tertiary institutions, as announced by the Education Minister, should be expedited .

Capacity Building: The National Information Technology Development Agency (NITDA) should extend its Digital Literacy for All (DL4ALL) train-the-trainer programme to specifically target Colleges of Education in Yobe State, creating a cascade model where master trainers train student teachers who then support their peers .

Public-Private Partnerships: College administrators should actively pursue partnerships with telecommunications companies, technology firms, and development organisations to secure subsidised internet access, donated equipment, and technical support for students and staff.

Continuous Professional Development: Tutorial staff in Colleges of Education should undergo mandatory periodic training on emerging educational technologies, including artificial intelligence applications in education, as emphasised in recent federal education reforms .

Student Support Mechanisms: Student teachers should be organised into ICT peer-tutoring groups and provided with access to digital skills mentorship programmes connecting them with technologically proficient educators. This aligns with the train-the-trainer approach that has proven effective in other contexts .

Monitoring and Evaluation: The NCCE should establish a monitoring framework to track ICT integration and digital skills outcomes across Colleges of Education nationwide, with specific benchmarks for states like Yobe that face unique infrastructural challenges.

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