Solo International Collaboration and Publication of Social Sciences and Humanities
E-ISSN: 2988-3512
Vol.3, No.1, 2025, pp. 111-128
DOI: https://doi.org/10.61455/sicopus.v3i01.272

Integration of Smart Technologies in Teaching in Selected Colleges of Education in North-Eastern Nigeria: Issues and Challenges

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Received December 17, 2024; Revised January 16, 2025; Accepted February 21, 2025

Abstract

Objective: This study explores the e-preparedness of Colleges of Education in Nigeria in adopting cutting-edge smart technologies for teaching and learning. As institutions responsible for teacher education, these colleges—classified as federal and state-owned—face increasing complexities that necessitate advanced digital competency. The research aims to assess the availability, functionality, and integration of ICT tools in teaching, identifying key challenges and proposing strategic solutions. **Theoretical Framework:** The theoretical framework is grounded in the ICT ecosystem and its value chain, emphasizing the role of digital technologies in content delivery, professional development, and facility management. **Literature Review:** A review of relevant literature and empirical studies highlights the transformative potential of ICT in teacher education, while also exposing gaps in digital literacy, internet accessibility, and infrastructure reliability. **Methods:** A structured questionnaire was designed, validated, pilot-tested, and administered to a selected sample. The study employed T-test statistical analysis at a 0.05 significance level to test the research hypothesis. **Results:** Findings indicate that while ICT facilities are available, functional, and accessible, the integration of smart technologies in teaching remains suboptimal. Key barriers include inadequate digital literacy, unstable internet access, irregular power supply, insufficient technical expertise, and outdated technological resources. **Implications:** The study's implications suggest an urgent need for a well-defined ICT development policy tailored to the specific needs of Colleges of Education. Recommendations include consistent power supply, continuous professional development for educators, network infrastructure upgrades, and sustainable internet subscriptions. **Novelty:** The novelty of this research lies in its empirical assessment of e-preparedness in Nigerian teacher education institutions, providing actionable insights for policy formulation and institutional enhancement. By addressing critical digital gaps, the study contributes to the ongoing discourse on technology-driven education reform in Nigeria.

Keywords: e-preparedness, smart technologies, ICT integration, teacher education, digital literacy.

INTRODUCTION

The prevailing waves of nanotechnologies in the education landscape are a global imperative necessitating a paradigm shift for the 21st Century pre-service and in-service teachers [1]. This research is geared towards examining the apparent trend and exploring the issues and challenges militating against the effective integration of smart technologies in teaching in Colleges of Education in North-East Nigeria with the view to proffer workable

solutions to mitigate it. The increasing complexities of teaching and learning and the corresponding pressure on available resources justify competency for information literacy to convey knowledge [2].

The introduction of technology in delivering lessons is complex and continues to play an essential role in tertiary education in the country. Winter et al, reported that technology usage provides more insight into some educational activities and new tools that facilitate teachers and students' activities [3]. Learners have had access to the school ICT Lab for different academic uses such as the internet for discussing issues in the classroom to have deep and painstaking information, searching for academic information related to assigned academic tasks, and searching for news to harmonize notes and summaries. Taking into account the integration and usage of ICT in higher institutions of learning and diverse domains, ICT has been a vehicle for aspiration, innovation, and quality academic achievement. From both outdoors in the education sector, both within the school and outdoors, ICT has been a fundamental part of the teaching and learning process [4].

The integration of smart technologies in teacher education has been widely recognized as a transformative force in contemporary pedagogy. However, in the context of Nigerian Colleges of Education, a significant gap remains in the practical application and institutional preparedness for digital learning. While prior research has explored the role of ICT in higher education, few studies have provided a comprehensive assessment of e-preparedness in teacher training institutions, particularly in the dichotomy between federal and state-owned colleges. Additionally, existing studies have primarily focused on access to ICT tools rather than the effectiveness of their integration into instructional methodologies. This gap underscores the need for an empirical analysis of how digital literacy, infrastructural deficits, and policy implementation impact the adoption of emerging educational technologies [4].

The significance of this study lies in its potential to inform policy and institutional strategies aimed at bridging the digital divide in teacher education. As Nigeria seeks to modernize its educational sector, the ability of teacher training institutions to leverage smart technologies is crucial for producing competent educators equipped with 21st-century teaching skills. Addressing barriers such as unreliable power supply, limited technical expertise, and insufficient internet access is imperative for fostering an environment where digital tools enhance learning outcomes. By providing data-driven insights into the current state of ICT readiness, this study contributes to the broader discourse on education reform and digital transformation in developing countries [5].

The novelty of this research lies in its empirical evaluation of e-preparedness within Nigerian Colleges of Education, offering a dual perspective on federal and state institutions. Unlike previous studies that focus on ICT availability, this research delves into the effectiveness of technology adoption, identifying critical factors that hinder optimal implementation. Moreover, the study proposes strategic recommendations tailored to the specific challenges faced by these institutions, advocating for policy reforms, infrastructure development, and capacity-building initiatives. By addressing these gaps, the research provides a roadmap for enhancing the digital competence of teacher education institutions, ultimately contributing to improved teaching quality and student learning experiences in Nigeria [6].

The problem of the study therefore hinges on e-preparedness and effective utilization of the available ICT facilities by the academic staff in teaching in Colleges of Education, in the North-East. The scope of the study is the Federal and State Colleges of Education across North-East Nigeria.

LITERATURE REVIEW

Connecting and combining two or more things to become more effective is the simple and convenient definition of integration [7]. It entails the integration of elements and devices

E-ISSN: 2988-3512

ranging from complex hardware, software, smart chips, networking, and information processing technologies and their application in teaching and learning [8].

Ngoumandjoka indicated that academic work is the most important reason students use the ICT internet at school and outside school premises. The researcher further contended that the more the internet is used for scholarly issues, the more it is perceived to exert a positive influence on learners' academic scores [9]. Equally, Torres-Diaz et al, agreed that ICT usage by learners for recreational purposes rather than academic activities has a positive contribution to their academic grades. They argued that learners who tend to use the ICT internet more for educational materials are less likely to fail their examinations and both summative and formative assignments [10]. Aitokhuehi et al, noted that information and communication technology (ICT) affects positively learners' learning activities when the educators are digitally literate and have a full skill package to integrate it into the curriculum [11].

More so, ICT enables teachers to use diversified ICT logistical tools to transfer, generate, distribute, hoard, and arrange information [12]. Kakkar established significant benefits of integrating ICT in teaching and learning. He revealed that learners who use the internet moderately in their studies perform better than learners who are on the server. It was also found that a profound group of internet addictions were found to have a detrimental effect on their academic performance and mental health [13]. Mami and Hatami-Zad postulate that ICT can subsidize universal education, quality education, and the delivery of quality learning and teaching activities [14]. ICT brings more advantages in a wide range of domains such as educators' professional development and more efficient education management, governance, and administration.

Williams describes ICT integration as a means of using ICT tools (internet, e-learning technologies, CD Roms) to assist in teaching [15]. Farouq argues that ICTs can now be an excuse and the means to move closer to educational goals that we have been unable to achieve for decades and to some new ones. Different researchers have identified several factors influencing ICT integration in teaching [16]. Balanskat, Blamire & Kefalla identified the factors as teacher-level, school-level, and system-level. Other researchers are of the view that ICT integration in teaching and learning is also influenced by organizational factors, attitudes toward technology, and other factors [17], [18]. Neyland, identified factors such as institutional support as well as micro factors such as teacher capability influencing the use of online learning in High schools in Sydney [19]. Sherry & Gibson, claim that the technological, individual, organizational, and institutional factors should be considered when examining ICT integration [20].

Technology is a fast-evolving multi-layered ethical endeavor occasioned by Nano (based) instructional tactics aimed at enhancing productivity and effectiveness of the learning process [21].

According to Zakariyyah, emerging technologies are playing a pivotal role in shaping the landscape of teaching and learning, offering exciting opportunities to promote meaningful learning outcomes in the three distinct phases of the learning process [22]:

1. Pre-classroom activities
2. Classroom activities
3. Post-classroom activities.

UNESCO (2014) identified ICT facilities to include:

1. Radio-assisted instruction (RAI)
2. Television-assisted instruction (TAI)
3. Computer-assisted instruction (CAI)

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Emerging Technologies in Education

In the foreseeable future, ICT is inevitable in the global lifestyle. Accordingly, the prevailing digital revolution has made education at the disposal of all without any restriction of time and space [23].

Digital transformation according to Ibukun has the potential of reducing the cost of education and ensuring effective access to education in Nigeria. Stressing the need for continuous training and coaching to drive its adaption and competency, he factored funding gaps, dearth of motivation, infrastructural decay, endemic corruption, political will, and lack of vision as major hurdles affecting massive education [24].

Heick identified the following as the best examples of emerging technologies in education:

1. Augmented Reality (AR)
2. Data Analysis or Learning Analysis
3. Artificial Intelligence (AI)
4. Machine Learning (ML)
5. Internet of Things (IoT)
6. Cloud Computing
7. Automation
8. Usage of 5G Technologies
9. App-Based Learning and Gamification
10. ERP Solutions for Schools
11. Digital Master Class
12. Payment Gateway [25].

Specific Technologies

1. The generative pre-trained transformer (ChatGPT) is a text-based artificial intelligence technological tool that can provide real-time constructive computer-generated responses to user's questions [26].
2. Google Drive is a powerful cloud-based storage tool with collaborative features, such as real-time document editing, streamlining file management, automatic backups, and robust security measures. Its impact extends beyond the proximities of classrooms thereby enabling remote and distance learning [27].
3. Microsoft PowerPoint is a visually appealing and interactive presentation, incorporating multimedia elements such as images, videos, audio, charts, and graphs. It equally promotes collaboration through features like clickable hyperlinks, embedded web content, and interactive slides [28].
4. Google Meet is a real-time multimedia platform that facilitates collaborative learning, promoting inclusivity and equity in education Its interaction features enable students to join virtual classrooms from anywhere, allowing teachers to present lessons, address queries, and engage students through breakout rooms and screens [29].
5. Microsoft Excel is an interactive learning resource that offers numerous benefits for teachers in post-classroom activities. With its in-built formulas and functions in Excel, teachers can automatically calculate averages, generate grade reports, track student progress, and data-driven decisions [30].

E-ISSN: 2988-3512

6. The Internet of Things (IoT) is an automation and analytics system for accessing and controlling daily usable equipment and devices using the Internet. An IoT System is a connection of different devices that sense and analyze data and communicate with each other over the networks [31].
7. IoT in education combines the benefits of content delivery and enhances professional development and facility management using:
    a. Smart classrooms
    b. Remote learning/virtual classes
    c. Adaptive learning (tracking students)
    d. Smart campus management (monitoring)
    e. Smart library readers, online readers, smartphones
    f. Internet-enabled research

ICT Skills

ICT skills in education have to do with the technical know-how on effective manipulation of relevant ICT tools to facilitate teaching and learning. Auwal cataloged the top 8 mandatory ICT skills for the 21st Century teachers:

1. Word Processing Skills
2. Spreadsheet Skill
3. Data Base Management Skills
4. Electronic Presentation Skills
5. Internet Navigation Skills
6. Email Management Skills
7. Networking Skills
8. Touch Typing [32].

E-Teacher

This is an effective instructional delivery occasioned by online teaching, where teaching and learning are separated by time and space. E-teaching is an emerging technology which according to Abba in Auwal technology is fast replacing the conventional approach of teaching and learning, cautioning that failure to key into its, stance at opposing modernity. He identified the following as the drivable benefits of e-teaching:

1. Ability to log/track learning activities
2. Continuous monitoring and correction are possible.
3. Possibility of global connectivity and collaboration opportunities among learners
4. Ability to personalize the training for each learner [33].

Online Classroom and Teaching

This an internet-enabled learning which is most prevalent in higher Institutions geared towards providing students to learn flexibly at their face [34]. It is a student-centered methodology in a virtual learning environment, using digital resources [23]. It can include audio, one-on-one video calls, group video calls, webinars, text animation, live charts, etc., tailored to meet everyone's schedules.

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It provides freedom to learn, teach, and develop skills. High motivational value, on-demand availability, and bridging the educational gap in terms of gender, and rural-urban factors among others, are the value chain of e-classrooms and teaching. However, it requires strong network connectivity and a reliable computing device system.

The following are online platforms:

1. Zoom
2. WhatsApp
3. Telegram
4. Skype
5. Facebook live
6. Google Meet
7. Edx
8. Instagram live
9. Google Classroom
10. Module
11. Prodigy math game
12. Kahoot
13. Edmodo
14. MOOC
15. Coursera

The role of ICT in classroom teaching and learning includes:

1. Facilitate storage and retrieval of information
2. Promotes inventions and creativity
3. Enhancing Internet/intranet networking
4. Offers several learning styles
5. Promotes greater independence in learning
6. Encourages collaboration
7. Fascinates learning situation

Technology lends itself as a multidimensional tool in the learning process, hence the need for teachers to avail themselves of the latest teaching tools designed for effective teaching and learning. Integrating technology in education can foster students' engagement in auditory-visual learning to meet their unique needs as individual learners within the broader classroom climate.

Collaborating with Amadu et al, Ali cataloged the following as the drivable benefits of technology in education [36], [37].

1. Motivating higher productivity
2. Makes teaching easy, interesting, and engaging
3. Improves engagement and retention
4. Making students excited to learn
5. Enabling students to learn at their face

E-ISSN: 2988-3512

6. Accommodating multiple learning styles
7. Develops problem-solving
8. Promotes collaborative learning
9. Linking learners to learning tools
10. Accessibility of information and education resources
11. Tracking learners progress

However, besides the promising benefits of integrating technology in education, the trend is not unconnected with the following potential pitfalls:

1. Over-emphasis on information rather than investigation
2. Promotes passive learning
3. Replacement of teachers

Similarly, the dark sides to be contended in the use of technological innovations include:

1. Legal challenges (trademarks, patents, copyrights, royalties, etc.)
2. Addictive behavior (techno addiction, clinical addiction)
3. Anxiety (techno anxiety, information anxiety)
4. Overload (technostress) [38], [39].

Exploring factors influencing the application of innovative teaching methods in teaching, Aliyu identified the following as potential obstacles militating against the effective application of ICT in teaching Islamic Studies:

1. Limited ICT facilities
2. Costly internet access
3. Limited skills
4. Limited electricity
5. Institutional support
6. Inadequate ICT professionals [37].

In a related study, Aliyu anchored with Dalha and Manduku et al, revealing the support of the application of ICT in teaching and learning, which is contrary to Mwalongo who cautioned the reliability and authenticity of online references as a perceived bottleneck of ICT usage thereby preferring the sustainability of the traditional practice [40], [41].

Addressing the loopholes, he recommended the provision and installation of ICT facilities, training and retaining, and establishment of multi-media outfits with requisite ICT tools among others, as the most convenient measures.

METHODOLOGY

As descriptive research, a survey study was employed to generate data and analyze findings for decision-making. Accordingly, twelve (12) colleges of education were selected out of the fifteen (15) colleges with four (4) Federal colleges and eight (8) State Colleges. Random sampling was required in drawing ten (10) academic staff as a representative sample of the twelve (12) colleges of Education.

A three-level Likert-type rating scale questionnaire was developed, validated, pilot-tested, and administered to the one hundred and twenty (120) respondents. Thereupon, the T-test statistical method was used in computing the research findings.

E-ISSN: 2988-3512

Population and Samples

Table 1. Showing Federal and State Colleges of Education Across the North-East

S/N	Federal Colleges of Education	S/N	State Colleges of Education
1	FCE Yola	1	Aminu Sale COE Azare
2	FCE (T) Potiskum	2	COE Zing
3	FCE (T) Gombe	3	COE Hong
4	FCE Jama'are	4	COE Waka-Biu
5	FCE Gwoza	5	COE Science and Technology Bama
		6	Umar Sulaiman COE Gashua
		7	COE Billiri
		8	Adamu Tafawa Balewa COE Kangere
		9	Gombe State COE Nafada
		10	College of Education and Legal Nguru

Table 2. Showing the Sampled Colleges of Education

S/N	Federal Colleges of Education	S/N	State Colleges of Education
1	FCE Yola	1	Aminu Sale COE Azare
2	FCE (T) Potiskum	2	COE Zing
3	FCE (T) Gombe	3	COE Hong
4	FCE Jama'are	4	COE Waka-Biu
		5	COE Science and Technology Bama
		6	Umar Sulaiman COE Gashua
		7	COE Billiri
		8	Adamu Tafawa Balewa COE Kangere

Table 3. Showing Respondents from the Selected Samples

S/N	Colleges	Respondents
1	FCE Yola	10
2	COE Hong	10
3	FCE (T) Gombe	10
4	COE Billiri	10
5	FCE Potiskum	10
6	Umar Sulaiman COE Gashua	10
7	COE Zing	10
8	FCE Jama'are	10
9	Aminu Saleh COE Azare	10
10	Adamu Tafawa Balewa COE, Kangere	10
11	Umar Ibn Ibrahim COE Science and Technology, Bama	10

E-ISSN: 2988-3512

12	COE Waka-Biu	10
	TOTAL	**120**

RESULTS AND DISCUSSION

Data Analysis

Hypothesis One

There is an appreciable level of digital literacy of the academic staff of the Colleges of Education in the North-East?

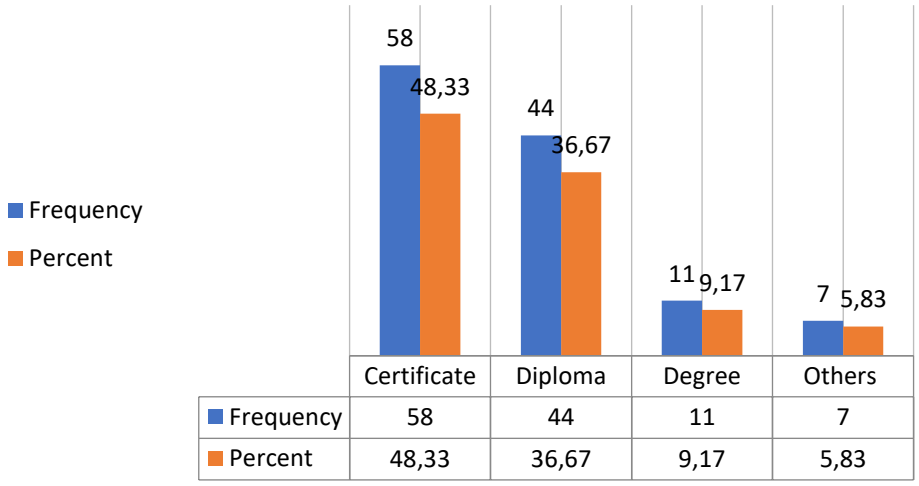


Figure 1. Level of digital literacy of the academic staff of the Colleges of Education in the North-East

The academic qualifications of academic staff in North-East Colleges of Education are represented in Figure 1 The findings revealed a notable trend of certificate holders (58 individuals, 48.33%), while Diploma holders', (36.67%) ranked the second-largest group (44 individuals 36.67%). A comparatively small number of degree holders is less than 10% representing 9.17%.

Hypothesis Two

$H_0$2: There are no functional ICT facilities in the Colleges of Education in the North-East.

$H_1$2: There are functional ICT facilities in the Colleges of Education in the North-East.

Table 4. T-Test result on Functionality of ICT Facilities

	N	T-Cal	df	Sig.(2-tailed)	Mean	Std. Deviation	Std. Error Mean	P-Value	Decision
Functional	120	6.556	9	0.007	61.5	17.54	8.77	**0.007**	reject H_0
Functional To Some Extent	120	7.603	9	0.005	37.5	8.813	4.406	**0.005**	reject H_0
Not Functional	120	2.978	9	0.059	18.25	9.57	4.785	**0.059**	reject H_0

For $\alpha = 0.05$ (two-tailed), t-critical ≈ 2.262

Degrees of freedom:

Within groups: $df = N - k = 12 - 3 = 9$

Decision Rule:

Reject Ho if T- Cal > T- Crit

Table 4 presents the analytical results of the functionality of ICT facilities in Colleges of Education in the Northeast using a two-tailed t-test at a significance level (α) of 0.05. The decision rule states that we reject the null hypothesis (H_0) if T-Cal > T-Crit (2.262) or if P-Value < 0.05.

Functional ICT Facilities

T-Cal = 6.556 > T-Crit = 2.262, and P-Value = 0.007 < 0.05, the mean score is 61.5 with a standard deviation of 17.54.

Decision: Reject H_0. This means ICT facilities are significantly functional in the Colleges of Education.

ICT Facilities Functional to Some Extent

T-Cal = 7.603 > T-Crit = 2.262, and P-Value = 0.005 < 0.05, the mean score is 37.5, with a standard deviation of 8.813.

Decision: Reject H_0. This suggests that while ICT facilities are functional, they are not fully utilized or optimally maintained in some colleges.

Not Functional ICT Facilities

T-Cal = 2.978 > T-Crit = 2.262, but P-Value = 0.059 > 0.05, the mean score is 18.25, with a standard deviation of 9.57.

Decision: Reject H_0, but the P-value is slightly above 0.05, meaning the evidence is weaker compared to the other two categories. This suggests that while some institutions lack functional ICT facilities, they are not widespread enough to conclude complete non-functionality.

Hypothesis Three

H_{03}**:** There are no available ICT facilities in the Colleges of Education in the North-East.

H_{13}**:** There are available ICT facilities in the Colleges of Education in the North-East.

Table 5. T-Test result on Availability of ICT Facilities

	N	T-Cal	df	Sig. (2-tailed)	Mean	Std. Dev	Std. Error Mean	P-Value	Decision
Available	120	8.075	9	0.004	79.50	18.699	9.350	0.004	reject H_0
Available To Some Extent	120	4.322	9	0.023	25.50	9.950	4.975	0.023	reject H_0
Not Available	120	2.480	9	0.089	15.00	8.869	4.435	0.089	reject H_0

For α = 0.05 (two-tailed), t-critical ≈ 2.447

E-ISSN: 2988-3512

Degrees of freedom:

Within groups: $df = N - k = 12 - 3 = 9$

Decision Rule:

Reject Ho if T- Cal > T- Crit

Similarly, table 5 evaluates the availability of ICT facilities using a two-tailed t-test with a significance level (α) of 0.05. The decision rule states that we reject the null hypothesis (H_0) if T-Cal > T-Crit (2.447) or if P-Value < 0.05.

ICT Facilities Are Available

T-Cal = 8.075 > T-Crit = 2.447, and P-Value = 0.004 < 0.05, Mean = 79.50, Standard Deviation = 18.699

Decision: Reject H_0. The result strongly indicates that ICT facilities are widely available in the Colleges of Education. The high mean (79.50) suggests that a majority of institutions have access to ICT resources. The standard deviation (18.699) shows some variation, meaning that while most colleges have ICT facilities, their level of availability may differ across institutions.

ICT Facilities Are Available to Some Extent

T-Cal = 4.322 > T-Crit = 2.447, and P-Value = 0.023 < 0.05, Mean = 25.50, Standard Deviation = 9.950

Decision: Reject H_0: This suggests that while ICT facilities exist, their availability in some institutions is limited or partial.

ICT Facilities Are Not Available

T-Cal = 2.480 > T-Crit = 2.447, but P-Value = 0.089 > 0.05, Mean = 15.00, Standard Deviation = 8.869.

Decision: Reject H_0 (but with marginal significance): Although the null hypothesis is rejected, the P-value (0.089) is slightly above 0.05, meaning the statistical significance is weaker compared to the first two categories.

Hypothesis Four

H_{04} **:** There are no ICT facilities in the Colleges of Education in the North-East accessible to academic staff.

H_{14} **:** There are ICT facilities in the Colleges of Education in the North-East accessible to academic staff.

Table 6. T-Test result on Accessibility of ICT Facilities

	N	T-Cal	df	Sig. (2-tailed)	Mean	Std. Deviation	Std. Error Mean	P-Value	Decision
Accessible	120	6.420	9	0.008	59.25	17.212	8.606	0.008	reject H_0
Accessible To Some Extent	120	8.438	9	0.003	41.50	8.888	4.444	0.003	reject H_0
Not Accessible	120	2.759	9	0.070	19.25	11.057	5.528	0.070	Accept H_0

E-ISSN: 2988-3512

For α = 0.05 (two-tailed), t-critical ≈ 3.182

Degrees of freedom:

Within groups: $df = N - k = 12 - 3 = 9$

Decision Rule:

Reject Ho if T- Cal > T- Crit

Table 6 presents the analytical values of the accessibility of ICT facilities using a two-tailed t-test with a significance level (α) of 0.05. The decision rule states that we reject the null hypothesis (H_0) if T-Cal > T-Crit (3.182) or if P-Value < 0.05.

ICT Facilities Are Accessible

T-Cal = 6.420 > T-Crit = 3.182, and P-Value = 0.008 < 0.05, Mean = 59.25, Standard Deviation = 17.212

Decision: Reject H_0: The result strongly suggests that ICT facilities are widely accessible in the Colleges of Education. The mean (59.25) indicates that the majority of institutions have reasonable access to ICT resources. However, the standard deviation (17.212) suggests some variability, meaning that while many colleges have good accessibility, some still face challenges in fully accessing these resources.

ICT Facilities Are Accessible to Some Extent

T-Cal = 8.438 > T-Crit = 3.182, and P-Value = 0.003 < 0.05, Mean = 41.50, Standard Deviation = 8.888

Decision: Reject H_0: This suggests that while ICT facilities exist, their accessibility in some institutions is limited. The mean (41.50) indicates that in these institutions, access is available but not consistent or fully functional. The relatively moderate standard deviation (8.888) shows that accessibility levels vary, with some institutions having easier access than others.

ICT Facilities Are Not Accessible

T-Cal = 2.759 < T-Crit = 3.182, and P-Value = 0.070 > 0.05, Mean = 19.25, Standard Deviation = 11.057.

Decision: Accept H_0: The results suggest that some institutions do not have ICT access, but this finding is not statistically significant at α = 0.05. The mean (19.25) indicates that these institutions face serious challenges in accessing ICT resources. However, because T-Cal < T-Crit and P-Value > 0.05, the statistical evidence is not strong enough to conclude the widespread inaccessibility of ICT facilities.

Hypothesis Five

H_{05} **:** There is no significant difference in the effectiveness of ICT utilization by academic staff in Colleges of Education in the North-East.

H_{15} **:** There is a significant difference in the effectiveness of ICT utilization by academic staff in Colleges of Education in the North-East.

E-ISSN: 2988-3512

Table 7. Tests Of the Significance of The Relationship Between the Effective Utilization of ICT And the Non-Utilization of Such Facilities by Academic Staff in North-East Colleges of Education

	t-value	df	Sig. (2-tailed)	Mean Difference		
					Std. Deviation	Std. Error Mean
Frequency	2.626	3	.079	60.000	45.695	22.847

For α = 0.05 (two-tailed)

Degrees of freedom:

Within groups: $df = k - 1 = 4 - 1 = 3$

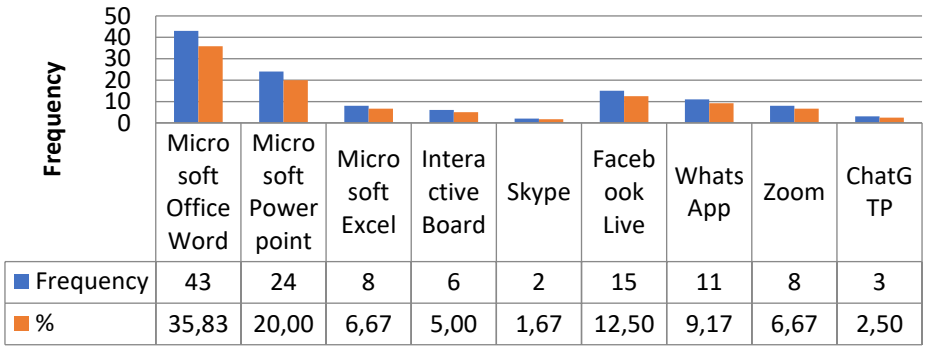
Decision Rule:

Reject Ho if P-Value < 0.05

Table 7 shows the hypothesis test on the effectiveness of ICT utilization by academic staff in North-East Colleges of Education. A one-sample test statistic was used to compare the mean differences. Since the p-value is extremely great (p-value 0.079 is greater than 0.05), we accept the null hypothesis. This means that there is no significant difference in the effectiveness of ICT utilization by academic staff in Colleges of Education in the North-East. Based on the provided data in Table 7, there is no statistically significant difference between the effective utilization and non-utilization of ICT by academic staff in North-East Colleges of Education. The p-value of 0.079 exceeds the common significance threshold of 0.05, leading to the retention of the null hypothesis.

Hypothesis Six

The commonly used technology in teaching in Colleges of Education in North East?



	Microsoft Office Word	Microsoft Power point	Microsoft Excel	Interactive Board	Skype	Facebook Live	Whats App	Zoom	ChatGTP
Frequency	43	24	8	6	2	15	11	8	3
%	35,83	20,00	6,67	5,00	1,67	12,50	9,17	6,67	2,50

Figure 2. Commonly used Technology in teaching in your institution?

Figure 2 presents data on the utilization of various technologies in teaching within various institutions, detailing the frequency of use, percentage of respondents, mean, and standard deviation for each technology. The Frequency and Percentage columns indicate the number and proportion of respondents who reported using each technology. Microsoft Office Word is the most commonly used tool, with 43 respondents (35.83%), followed by Microsoft PowerPoint with 24 respondents (20.00%).

The mean values provided are relatively low, which may suggest that the data has been normalized in a specific manner. A higher standard deviation indicates greater variability in usage among respondents. For instance, Microsoft Office Word has a standard deviation of 3.89, suggesting a wider range of responses compared to Skype, which has a standard deviation

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of 0.17. Academic staff members favor more conventional productivity tools like Microsoft Office Word and PowerPoint, according to the statistics, while they are less likely to use emerging technologies like ChatGPT and Skype.

Major Finding of the Study

i. Certificates and diplomas are the notable trends in levels of digital literacy of the academic staff of the Colleges of Education in the North-East.

ii. Limited skills, inadequate resources, or inconsistent access.

iii. E-library has the highest non-functionality rate.

iv. ICT facilities are generally functional, but the degree of effectiveness varies. Institutions with partial functionality need targeted interventions to enhance operational efficiency.

v. ICT facilities are available in most institutions, but some colleges still experience gaps in access, likely due to resource distribution issues. Efforts should focus on expanding ICT availability to ensure equity.

vi. Most institutions have access to ICT facilities, but not all. Improving access through infrastructure development and policy interventions is necessary.

vii. Microsoft Office Word and PowerPoint, are commonly used than emerging tools like ChatGPT and Skype.

CONCLUSION

Given the technological advancement that transformed education, the increasing complexity of learning and corresponding pressure on available resources justifies the need for competency in information literacy for effective teaching and learning. To incorporate smart classes into the framework of the regular education system, emerging technologies should be embraced by teachers to enable them to mainstream into the prevailing nanotechnologies in teaching. Recommendations: Addressing digital gaps through skills-based capacity development training. Investment in digital infrastructure, increasing funding, and implementing supportive policies can significantly enhance ICT accessibility across Colleges of Education in the North-East. The need for better maintenance, or infrastructural improvements. The need for targeted efforts to improve digital access in Colleges of Education in the North-East.

Acknowledgments

I acknowledge and appreciate all anonymous reviewers for providing valuable input on this paper.

Author Contribution

Tijjani Usman Karofi Ph.D: Conceptualization, Methodology, Writing – review & editing.

Conflicts of Interest

The author declares no conflict of interest.

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E-ISSN: 2988-3512

E-ISSN: 2988-3512