ASSESSMENT OF ICT INTEGRATION IN TEACHING, LEARNING AND ASSESSMENT PRACTICES AMONG COMPUTER EDUCATORS IN HIGHER INSTITUTIONS IN THE NORTH EAST ZONE, NIGERIA

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This study evaluates the integration of information and communication technology (ICT) tools in enhancing teaching and learning within higher education institutions in northeastern Nigeria. Despite the pervasive influence of ICT across various sectors, its impact on education remains limited. This research specifically assesses how computer educators in the northeastern region integrate ICT facilities to enhance educational outcomes. Employing a survey research design, the study targeted 120 computer educators from three institutions (one private university, one state university, and one federal university). Data were collected through a structured questionnaire and analysed using means, standard deviations, and ANOVA testing at a 0.05 significance level. The findings indicate effective ICT integration for material delivery; however, there is inadequate use for student assessment processes.

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Introduction

The integration of information and communication technology (ICT) in education represents a critical advancement towards achieving quality learning environments. While ICT has revolutionized numerous sectors—including medicine, business, and government—its adoption in education has been relatively muted (Cantabrana, Rodríguez, & Calvo, 2019). Effective integration of ICT can tailor educational experiences to meet diverse student needs, enhancing engagement and academic performance. The importance of ICT in the management of higher education cannot be overstated; it facilitates improved administrative processes, data management, and communication channels, which are essential for modern educational institutions.

In Nigeria, the potential of ICT to transform educational practices is significant; however, challenges such as inadequate infrastructure and insufficient digital skills among educators hinder its effective implementation (Igbokwe, 2022; Tella & Adu, 2019). The integration of ICT is particularly relevant for computer educators, as it not only enhances their teaching methodologies but also prepares students for a technology-driven workforce. Research indicates that integrating ICT into teacher education programs leads to improved pedagogical skills and better learning outcomes for students (Zheng, Long, Zhong, & Gyasi, 2022; Giannakos, Jaccheri & Krogstie, 2021).

Moreover, the COVID-19 pandemic has accelerated the adoption of digital tools in education, highlighting both the benefits and challenges associated with online learning environments (Adedoyin & Soykan, 2020). Experiences gained during this period underscore the necessity for teacher education programs to effectively utilize technology in

their curricula. This study aims to assess the current state of ICT integration among computer educators in northeastern Nigeria, providing insights into best practices and identifying barriers to successful implementation.

Statement of the Problem

Despite ongoing efforts to integrate information and communication technology (ICT) into higher education curricula, significant barriers continue to impede effective implementation. Key challenges include limited access to technological resources, inadequate training for educators, and a lack of motivation among teachers to adopt ICT as an instructional tool (Bahri, Zainuddin, & Ahmad, 2021). These barriers not only contribute to poor student performance but also restrict the potential benefits that ICT can offer in educational settings.

Moreover, while higher education institutions have established computer science programs aimed at incorporating ICT into their curricula, many educators still struggle to effectively utilize these technologies in their teaching practices. This gap highlights a critical disconnect between the availability of technological resources and the actual pedagogical application of these tools in the classroom. Addressing these issues is essential for improving instructional delivery and preparing students for a digital future.

The necessity of this study is underscored by the growing reliance on technology in education, particularly in light of recent global shifts towards online learning environments due to events such as the COVID-19 pandemic. As educational institutions increasingly adopt digital tools, understanding the barriers and facilitators of ICT integration becomes imperative. This research aims to identify specific gaps in ICT integration within teaching, learning, and assessment practices in higher education, particularly among computer educators. By exploring these gaps, the study seeks to provide actionable insights that can inform policy development and enhance the quality of education in Nigeria's higher education system.

Objectives of the Study

The primary aim of this research is to assess the integration of ICT facilities in enhancing teaching and learning among computer educators in northeastern Nigeria. The specific objectives are to:

1. Investigate the extent to which ICT facilities are integrated into material delivery procedures for teaching and learning.
2. Examine how individual computer educators utilize ICT facilities in their material delivery procedures.
3. Determine the level of ICT integration in the assessment of learning outcomes in higher institutions.

Research Questions

The study seeks to answer the following research questions:

1. To what extent are ICT facilities integrated into material delivery procedures for teaching and learning in higher institutions?
2. How do individual computer educators utilize ICT facilities in their material delivery procedures?
3. What is the level of integration of ICT facilities in assessing learning outcomes in higher institutions?

Research Hypotheses

The following null hypotheses were formulated to guide this research:

$H0_1$: There is no significant difference in the mean ratings of computer educators from private, state, and federal universities regarding the integration of ICT facilities into material delivery procedures.

$H0_2$: There is no significant difference in the mean responses of computer educators from private, state, and federal universities concerning the integration of ICT facilities as instructional material delivery processes.

$H0_3$: There is no significant difference in the mean ratings of computer educators from private, state, and federal universities regarding the integration of ICT facilities in assessing learning outcomes.

Methodology

Research Design

This study employs a descriptive research design to explore the integration of information and communication technology (ICT) among computer science educators in northeastern Nigeria. This design is appropriate for capturing the current state of ICT adoption and its implications for teaching and learning practices within higher education.

Population

The research population comprises 120 computer science educators, including 90 lecturers and 30 instructors, from three higher education institutions offering computer science programs: Pen Resource Academy University (Private), Yobe State University (State), and Abubakar Tafawa Balewa University (Federal). The selection of these three institutions was based on their established computer science programs and their commitment to integrating ICT into their curricula. By including institutions from different categories, the study aims to capture a wide range of experiences and perspectives regarding ICT integration in higher education.

Sampling Technique and Sample Size

A stratified random sampling technique was utilized to ensure representation across different levels of educators within the institutions. This method allows for a more comprehensive understanding of the diverse experiences and challenges faced by educators at various academic ranks. The total sample size of 120 was determined based on the accessibility of participants and the need to gather sufficient data for robust analysis.

Instrument for Data Collection

Data were collected using a structured questionnaire specifically designed for this study. The questionnaire included both closed-ended and open-ended questions to capture quantitative data on ICT usage as well as qualitative insights into educators' perceptions and experiences.

Validity of the Instrument

To ensure the validity of the instrument, a panel of experts in educational technology reviewed the questionnaire. Their feedback was incorporated to refine the questions, ensuring that they accurately measure the constructs related to ICT integration in teaching, learning, and assessment practices.

Reliability of the Instrument

The reliability of the questionnaire was assessed using Cronbach's alpha coefficient, achieving a score above 0.80, indicating high internal consistency among the items. This suggests that the instrument is reliable for measuring educators' attitudes and practices regarding ICT integration.

Procedure for Data Collection

Data collection was conducted over four weeks. Educators were approached through their respective institutions, where they were provided with information about the study's purpose and significance. Participation was voluntary, and informed consent was obtained from all respondents before distributing the questionnaires.

A structured questionnaire titled **"ICT Integration in Teaching, Learning, and Assessment Practices"** was developed as the

primary research instrument for data collection. The questionnaire was self-constructed to align with the study's objectives and consisted of 25 items measured on a 4-point Likert scale: Often Integrated (4 points), Sometimes Integrated (3 points), Rarely Integrated (2 points), and Never Integrated (1 point). The structure of the questionnaire is as follows:

- **Section B**: 8 items addressing research question 1, focusing on the implementation of ICT in teaching practices.
- **Section C**: 8 items assessing individual utilization of ICT for research question 2.
- **Section D**: 9 items examining ICT integration in assessment practices for research question 3.

To ensure content validity, the instrument was reviewed by two experts from the Science/Education Department at Abubakar Tafawa Balewa University. Their feedback was instrumental in refining the questionnaire to ensure that it accurately measures the constructs related to ICT integration. The reliability of the instrument was assessed through a pilot study conducted with 20 computer educators from the three universities involved in the main study. The pilot test aimed to evaluate the consistency of responses across different items. The reliability coefficients obtained through Cronbach's alpha technique were found to be satisfactory, with values of 0.90, 0.78, and 0.88 for different sections, yielding an overall reliability index of 0.92. This indicates a high level of internal consistency and suggests that the instrument is reliable for measuring educators' attitudes and practices regarding ICT integration.

Data collection involved administering 120 copies of the structured questionnaire to respondents through trained field research assistants, with two assistants assigned to each university. This approach ensured that the distribution process was efficient and that respondents received adequate support in completing the questionnaire. Once completed, the questionnaires were collected for subsequent statistical analysis. This method of data collection not only facilitated a smooth process but also helped maintain the integrity of the responses, as trained assistants were available to clarify any questions or concerns from the participants. The retrieval of completed questionnaires was crucial for ensuring a robust dataset that accurately reflects the perspectives of computer science educators regarding ICT integration in their teaching practices.

Data were analyzed using descriptive statistics (mean and standard deviation) to address research questions while ANOVA was employed to test hypotheses at a significance level of 0.05. Mean scores above 2.50 indicated high integration while scores below indicated poor integration.

Presentation of Data Analysis

Table 1: Integration of ICT Facilities in Material Delivery Procedures

S/N	ICT Facilities	M	STD DEV.	REM
1	Computer: for input of data, process, and material delivery procedure	2.95	0.98	HI
2	Email: for sending and receiving information	2.75	0.96	HI
3	Telephone (mobile): To deliver lectures and material delivery	2.96	0.89	HI
4	Video conferencing: Presentation of lecture	2.14	0.91	LI
5	Teleconferencing: To deliver instructional materials	2.42	0.88	LI

6	Internet: for sending materials to the class	2.94	0.86	HI
7	YouTube: for virtual learning	2.43	0.79	LI
8	Google Classroom: for class discussion	2.78	0.85	LI

REM: Remark, HI: High Integration, LI: Low Integration

Table 1 indicates that four out of eight items had mean responses above the benchmark of 2.50, demonstrating effective integration by computer educators regarding material delivery procedures.

Table 2: Individual Utilization of ICT Facilities

S/N	ICT Facilities	M	STD DEV.	REM
1	Web-based: Integration of web-based to enhance Individualized teaching and learning	2.98	0.82	HI
2	Internet: It aids individual computer educators to access e-resources	2.72	0.88	HI
3	MP4: Integration of tutorial packages on MP4	2.87	0.95	HI
4	MP3: Integration of tutorial packages on MP3	2.69	0.98	HI
5	Search engine: To enhance self-learning	2.93	0.87	HI
6	Social media platform: To achieve several options for learning environment at their own time	2.66	0.62	HI
7	Online method: Using the online method in the source of documents for individualized teaching and learning	2.79	0.69	HI
8	E-Library: `Integration of e-library for students to learn at their own pace	2.82	0.82	HI

REM: Remark, HI: High Integration, LI: Low Integration

Table 2 shows that most responses regarding individual utilization had mean scores above the threshold indicating high levels of integration among computer educators.

Table 3: Integration of ICT Facilities in Assessment

S/N	ICT Facilities	M	STD DEV.	REM
1	The integration of ICT facilities in assessing digital learning in the subject(s) you learn	2.24	0.94	LI
2	To integrate ICT facilities in checking for professional career opportunities	2.40	1.11	LI

3	The integration of ICT facilities to monitor and assess progress and performance report	2.44	0.78	LI
4	The integration of ICT facilities in the marking of student's examination scripts	2.42	0.79	LI
5	The integration of ICT facilities in the learning platform for Downloading/uploading learning materials	2.32	0.79	LI
6	Computer educators use ICT facilities in results presentations	3.42	0.64	HI
7	The integration of ICT facilities in designing students' projects	3.16	0.79	HI
8	The integration of ICT facilities in the typing of exam questions for students	3.44	0.75	HI

Table 3 reveals that five out of eight items showed mean responses below the benchmark indicating inadequate use of ICT facilities for assessing student learning outcomes.

Hypotheses Testing & Results

Hypothesis $H0_1$: There is no significant difference within the mean opinion of Computer educators in Private, State, and Federal Universities on the integration of ICT facilities as materials delivery procedure in teaching and learning in higher institutions.

Table 4: Analysis of variance (ANOVA) on the difference in the mean rating scores on the extent of integration of ICT Facilities for material delivery procedure in teaching and learning in higher institutions.

Source	Some of squares	df	Mean Square	F-ratio	Sig.	Remark
Between Groups	3.609	2	1.854	2.826	0.050	Not Sig.
Within Groups	71.144	110	0.654			
Total	74.754	112				

ANOVA results indicated no significant differences among educator groups regarding material delivery procedures. The F-ratio was found to be not significant at the 0.05 level of significance, with F (2,110) = 2.826 and p>0.05. The computed F-ratio of 2.826 with a p-value of 0.080 exceeded the 0.05 level of significance at 110 degrees of freedom. As a result, the null hypothesis was rejected, indicating that there is no significant difference within the mean opinions of computer educators from private, state, and federal universities on the integration of ICT facilities as material delivery procedures for teaching and learning in higher institutions.

Hypothesis $H0_2$: There is no significant difference in the mean responses of Computer Educators in the Private, State, and Federal Universities on the integration of ICT in the integration of ICT Resources as the instructional material delivery process by each computer educator in North East region

Table 5: Analysis of variance (ANOVA) on the difference in the mean responses of Computer Educators in Private, State, and Federal Universities on the integration of ICT in the integration of ICT facilities as the instructional material delivery process by each computer educator in North East region

Source	Sum of squares	df	Mean Square	F-ratio	Sig.	Remark
Between Groups	0.22	2	0.106	0.111	0.05	Not Sig.
Within Groups	61.815	110	0.658			
Total	62.035	112				

Table 5 above presents the ANOVA results similarly showing no significant differences among educator groups concerning instructional material delivery processes. The F-ratio was found to be not significant at the 0.05 level of significance, with $F(2,110) = 0.111$ and $p>0.05$. The computed F-ratio of 0.111 with a p-value of 0.05 exceeded the 0.05 level of significance at 112 degrees of freedom. Consequently, the null hypothesis was rejected, indicating that there is no significant difference in the mean opinions of computer educators from private, state, and federal universities in the Northeast region regarding the integration of ICT facilities as material delivery procedures for teaching and learning in higher institutions.

Hypothesis $H0_3$: There is no significant difference within the mean rating of Computer Educators in the Private, State, and Federal Universities on the integration of ICT Facilities in the assessment of learning in higher institutions in the Northeast region

Table 6: Analysis of variance (ANOVA) on the difference in the mean responses on the integration of ICT facilities in the assessment of learning in the higher institutions in North East region

Source	Sum of squares	df	Mean Square	F-ratio	Sig.	Remark
Between Groups	0.552	2	0.326	0.466	0.05	Not Sig.
Within Groups	68.429	110	0.719			
Total	68.981	112				

The ANOVA results in Table 5 above confirmed no significant differences regarding assessment practices among educator groups. The F-ratio was found to be not significant at the 0.05 level of significance, with $F(2,110) = 0.466$ and $p>0.05$. The computed F-ratio of 0.466 with a p-value of 0.05 exceeded the 0.05 level of significance at 112 degrees of freedom. Consequently, the null hypothesis was rejected, indicating that there is no significant difference in the mean opinions of computer educators from private, state, and federal universities in the Northeast region regarding the integration of ICT facilities in the assessment of learning in higher institutions.

Discussion of Findings

This research assessed the integration of Information and Communication Technology (ICT) in teaching, learning, and assessment

practices among computer educators in higher education institutions in northeastern Nigeria. The findings revealed a significant disparity between the effective use of ICT for instructional delivery and its inadequate application in assessment processes.

Addressing Research Hypotheses

1. Hypothesis $H0_1$: There is no significant difference in the mean ratings of computer educators from private, state, and federal universities regarding the integration of ICT facilities into material delivery procedures.

   Findings: ANOVA results indicated no significant differences among educator groups ($F(2,110) = 2.826$, $p > 0.05$). This suggests a consensus among educators on the integration of ICT for material delivery across different types of institutions.

2. **Hypothesis $H0_2$**: There is no significant difference in the mean responses concerning the integration of ICT facilities as instructional material delivery processes.

   Findings: Similar to H01, ANOVA results showed no significant differences ($F(2,110) = 0.111$, $p > 0.05$), reinforcing that educators across institutions share comparable views on ICT integration for instructional purposes.

3. **Hypothesis H03**: There is no significant difference regarding the integration of ICT facilities in assessing learning outcomes.

   Findings: This hypothesis was not explicitly detailed in the provided data; however, overall findings indicated low levels of ICT integration for assessment purposes, suggesting an area needing improvement.

The findings align with previous research indicating that while there is effective integration of certain ICT tools for material delivery—such as computers and email—there remains a notable deficiency in utilizing these technologies for assessment purposes (Igbokwe et al., 2022). This consistency highlights a common challenge faced by educators across various contexts.

Training and Motivation

Previous studies have pointed out that many educators lack adequate training or motivation to fully integrate technology into their teaching practices (Igbokwe et al., 2022). This aligns with the current study's findings that suggest targeted training programs focused on assessment technologies could bridge this gap.

Possible Reasons Behind Findings

The disparity between high integration levels for instructional delivery versus low levels for assessments may be attributed to several factors:

Inadequate Training

Many educators may not have received sufficient training on how to effectively use ICT tools for assessments, leading to underutilization.

Motivational Factors

A lack of motivation or perceived value in using technology for assessments could deter educators from adopting these tools.

Infrastructure Challenges

Limited access to necessary technological resources may also impede effective ICT integration in assessment practices.

Conclusion

The research underscores the need for educational institutions to focus on enhancing ICT integration not only for teaching but also significantly for assessment purposes. By addressing training gaps and providing adequate resources, institutions can improve educational outcomes and better prepare students for a technology-driven future.

Recommendations

1. Professional Development: Continuous training programs should be established to enhance digital competencies among educators by educational institutions.

2. Infrastructure Investment: The government must ensure that necessary technological infrastructure is available across higher education institutions.
3. Innovative Practices: Institutions should encourage innovative teaching practices that leverage available technologies effectively.

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