



Appraising the in cooperation of Information and Communication Technology (ICT) and Its Role on Learning Activities in Colleges of Education across North-West Nigeria

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ABSTRACT

This study aimed to evaluate the integration of Information and Communication Technology (ICT) and its impact on learning activities in Colleges of Education across North-West Nigeria. A survey research design was employed, involving a sample of 346 academic staff drawn from a total population of 3,107 academic staff across nine public Colleges of Education as of June 2024. Data was collected using a self-designed structured questionnaire titled Assessment of Information and Communication Technology in Teaching and Learning Activities for Colleges of Education Questionnaire (AICTTLAQ). The instrument, based on a 5-point Likert scale, covered demographic data and key variables related to ICT use in teaching and learning. It was validated by experts from English, Computer Science, and Science Education departments at the Federal University of Education, Zaria. Reliability was confirmed using the Cronbach's Alpha method. Data analysis involved both descriptive and inferential statistics, with t-tests used to test two null hypotheses at a 0.05 significance level. The findings revealed a significant relationship between the level of ICT integration and student academic engagement and significant positive effect of ICT use in teaching on students' academic achievement (mean difference. The study recommended substantial government investment in ICT infrastructure—such as internet access, computer labs, and multimedia teaching aids—to foster technology-enhanced learning. It also emphasized the need for regular updates and implementation of ICT policies to ensure standardization, monitoring, and quality assurance in teaching and learning processes.

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INTRODUCTION

The integration of Information and Communication Technology (ICT) in education has emerged as a transformative force in contemporary pedagogy, reshaping the dynamics of knowledge delivery, access, and learner engagement across the globe (Anastasopoulou et al., 2024). From interactive multimedia tools to cloud-based learning platforms and virtual classrooms, ICT has redefined instructional paradigms, making education more inclusive,

personalized, and data-driven (Almufarreh & Arshad, 2023). According to Murenzi et al. (2021), the Fourth Industrial Revolution propels nations toward digitized economies, the imperative to embed ICT competencies within all levels of education has never been more critical.

In Nigeria, national education policies and strategic frameworks such as the National Policy on ICT in Education underscore the pivotal role of ICT in improving educational quality, efficiency, and equity (Gupta, 2015). Despite

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these aspirations, the practical incorporation of online learning platforms particularly in Colleges of Education responsible for training future teachers remains patchy, underfunded, and inconsistently executed. The North-West geopolitical zone, characterized by socio-economic disparities, infrastructural deficits, and historical underinvestment in education, presents a complex landscape where digital transformation efforts encounter systemic and contextual barriers.

Colleges of Education in this region are uniquely positioned to influence the future of Nigerian classrooms. However, questions remain regarding the extent to which ICT is meaningfully integrated into pedagogical practices, and more importantly, how such integration (or the lack thereof) affects student learning activities, academic engagement, and instructional outcomes. While some institutions report sporadic adoption of ICT tools for assignments, communication, and administrative purposes, the depth, quality, and pedagogical coherence of such integration are rarely empirically assessed. This study thus addresses a critical knowledge gap by appraising the incorporation of ICT in Colleges of Education across North-West Nigeria and examining its influence on learning activities. By employing a data driven and context-sensitive approach, the research seeks to uncover patterns of ICT use, evaluate its pedagogical impact, and contribute to the discourse on how teacher education institutions can better align with global digital education trends. Ultimately, the findings will offer evidence-based recommendations for policy makers, institutional leaders, and stakeholders committed to fostering equitable and effective digital learning ecosystems in Nigeria and similar contexts.

Statement of the Problem

Information and communication technology (ICT) has dynamically transformed educational systems around the world, positioning digital technologies as essential catalysts for enhancing academic results, learner engagement, and pedagogical effectiveness. ICT integration has evolved from a supporting function to a fundamental part of educational delivery in

developed regions. However, in many developing contexts such as Nigeria particularly in the North-West region the extent, effectiveness, and sustainability of ICT incorporation into teaching and learning remain inadequately explored, inconsistently implemented, and often institutionally undervalued.

Colleges of education are supposed to be at the forefront of pedagogical innovation since they play a crucial role in preparing future educators. Yet, emerging evidence suggests a persistent lag in ICT adoption within these institutions due to infrastructural limitations, inadequate professional development, policy inconsistency, and digital literacy gaps among educators and students. This raises a crucial concern: To what extent has ICT been functionally incorporated in Colleges of Education in North-West Nigeria, and what influence does its integration or lack thereof have on learning activities and student academic engagement? Furthermore, although e-learning and digital inclusion are promoted by national and regional educational policies, there are few empirical studies that evaluate the actual implementation techniques and their effects on learning outcomes in this institutional and geographic context. There is still a chance of policy-practice divergence and unfair digital change in teacher education in the absence of solid data and scholarly evaluation. Thus, this study aims to critically assess how ICT is integrated into education colleges in North-West Nigeria, assess how it helps or hinders learning activities, and offer empirical insights that could guide the development of policies, strategic interventions, and sustainable educational innovation.

Objectives of the Research

The study outlines two objectives:

1. To examine the degree to which ict is in cooperated into educational experiences in colleges of education in North-West Nigeria
2. To determine the influence of ICT usage on students' academic engagement and participation in learning activities

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Research Questions

The following research questions was developed to guide the research:

1. To what extent is ICT integrated into academic engagement process in colleges of education across North-West Nigeria?
2. What is the impact of ICT usage on students' academic engagement and learning outcomes on these institutions?

Hypotheses

The following hypotheses was formulated to serve as framework for the study:

1. There is no notable correlations between the extent of ICT incooperation and the level of students academic engagement in learning activities
2. The use of ICT tools in teaching does not strongly influence student's achievement levels in colleges of education in North-West Nigeria.

METHODOLOGY

A questionnaire-based design was adopted in this study. The design is adopted for this study primarily because it is a sample population to be used to represent the entire population. The population of the study comprised all Academic staff in all the 9 Public Colleges of Education in North-west zone of Nigeria as at June, 2024. There are 3107 academic staff in these colleges. This is based on the official data obtained from the College Registry Department: Personnel Units FCEs/COEs North-west zone, Nigeria (2024). The sample size for this study was 346 academic staff. The sample size is determined based on research advisors (2008) table for sample size selection. The table provides the minimum expected return instruments at 95% confidence level, 50% level of variability and ± 5 margin of error. It indicated that for a population of 3170 at 95% confidence level and margin error of 5%, 346 are adequate.

However, for sampling purposes, proportionate simple random sampling technique was used. This is based on the fact that, the institutions selected for the study vary in terms of

academic staff population and as such, proportionate simple random sampling technique is most preferred in this regard to select the sample from individual institutions in order to take care of the population size difference. The number of participants from each sub-group is determined by their number relative to the entire population. The Data collection instrument for this study was a self- developed structured questionnaire. The Questionnaire was titled Assessment of Information and Communication Technology in Teaching and Learning Activities for Colleges of Education Questionnaire" (AICTTLAQ). The Questionnaire is prepared based on 5-Likert Scale. The respondents are expected to react to each item on a five point scale ranging from. SA – Strongly Agree (5), A –Agree (4), U – Undecided (3), SD –Strongly disagree (2) and D – Disagree (1). The Questionnaire is divided into five (5) parts. The first part section contains the respondent's personnel information, while section B-E contains statements aimed at answering the Questions raised by the study. The instrument was vetted by the experts from English and Literary studies and Science Education Departments, Ahmadu Bello University, Zaria. The initial draft copies of the Questionnaire, Objectives of the study, Research Questions and Hypotheses were given to the experts from the Departments mentioned above. The Experts were requested to critically examine the items in relation to contents, relevance, appropriateness of statement, the clarity of words, and length of statements in relation to the Objectives of the study. They were requested to make other necessary comment(s) toward ensuring that the instrument is adequate and relevant to the study. However, useful inputs such as reframing of the items, deleting of irrelevant items and simplifying some ambiguous items made that are incorporated to arrive at the final certified copy of the instrument. The Questionnaire was subjected to trial testing using 35 respondents from Federal College of Education, Kontagora, which is outside the area of the study, but share the same characteristics with the study population. The decision to use 35 respondents is based on the assertion of Connelly (2008), Treece and Treece (2018) and Salihu

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(2021) who suggested 10% of the sample size projected for the larger percent study as adequate for pilot testing. Therefore, the 10% Of 346 is 34.6 which is round up to 35. Reliability of the instrument is aimed at determining the consistency and dependability of the draft instrument before embarking on the main body. The reliability coefficient indices of the instrument was established utilising Cronbach's Alpha method for estimating reliability. The instrument was administered once. The study adopted the 0.64 as the minimum threshold for accepting the reliability strength of the instrument as set by Danjuma and Muhammad (2011). The researchers requested for introduction letter from the Department of Educational Foundations and Curriculum, Federal University of Education, Zaria. This enable the researchers to obtain the data required for the research such as the population of lecturers in the study area. The researchers and five trained assistants (who were given extensive training on how to administer, retrieve and return the completed questionnaires to the researchers) and administer the Questionnaires to the respondents in the institutions under study by physically visiting to the institutions, the questionnaires was numbered serially from 1 to 346. The respondents were given

60 minutes to fill the questionnaires and returned same to the researchers. This is aimed at given the respondents ample time to critically study the Questionnaire and respond to it appropriately. Descriptive and inferential statistics were used to analyze the data obtained in this study. To accurately interpret the data, response options were coded numerically in the scale with proportionate values of 5 to 1 ranked from highest to lowest. The study is to use percentage and frequency counts to present the demographic information of the respondents which include institutional affiliations, gender, status/category, highest qualification and experience. The research question was analyzed using frequency counts: percentage, arithmetic means and standard deviation to obtain overall average scores. T-test was used to test the null hypothesis at 0.05 alpha level of significance.

RESULTS

Research Question One: To what extent is ICT integrated into academic engagement process in colleges of education across North-West Nigeria

This question was answered by the descriptive statistics presented in Table 1 and 2 below

Table 1: Descriptive Statistics Showing perception of respondents on the extent to which ICT integrated into academic engagement process in colleges of education across North-West Nigeria

Item Statement	Response					Total	Mean
	SA	A	UD	D	SD		
My college ensures access to quality ICT facilities for instructional activities.	132	143	16	24	21	336	4.01
ICT tools are commonly employed in lecture presentation.	156	111	12	16	41	336	3.97
Students are utilizing digital tools for their academic pursuits.	172	108	18	20	18	336	4.18
Lecturers training on technology-enhanced teaching.	150	121	20	20	25	336	4.04
Learning resources are accessible via digital channels (e.g., LMS, WhatsApp).	132	109	28	31	36	336	3.80
Reliable infrastructure enables ICT utilization.	142	113	19	27	35	336	3.89
Average Mean Respondents							3.98

Table 1 shows respondents' view on the extent to which ICT integrated into academic engagement process in colleges of education across North-West Nigeria. The result revealed that most of the respondents agreed that their college ensures access to quality ICT facilities for instructional activities with a mean response rate of 4.01. ICT tools are commonly employed in lecture presentation with a mean response rate of 3.97. Students are utilizing digital tools for their academic pursuits with a mean response rate of 4.18. Lecturers training on technology-enhanced teaching with a mean response rate of 4.04. Learning resources are accessible via digital

channels (e.g., LMS, WhatsApp) with a mean response rate of 3.80. Reliable infrastructure enables ICT utilization with a mean response rate of 3.89.

The study shows that most of the respondents were of the view that ICT were integrated into academic engagement process in Colleges of Education across North-West Nigeria with average mean respondent of 3.98.

Research Question Two: What is the impact of ICT usage on students' academic engagement and learning outcomes on these institutions?

Table 2: Descriptive Statistics showing perception of respondents on the impact of ICT usage on students' academic engagement and learning outcomes on these institutions

Item Statement	Response					Total	Mean
	SA	A	UD	D	SD		
ICT fosters interactive learning experiences.	201	98	5	7	25	336	4.32
Students' academic performance has improved with the use of ICT tools.	170	121	11	9	25	336	4.20
ICT makes class presentations more interesting and interactive.	169	111	16	15	25	336	4.14
Online access to materials helps students understand course content better.	181	98	9	19	29	336	4.14
ICT encourages collaborative learning among students.	141	107	18	25	45	336	3.82
I am motivated to participate in learning due to the use of ICT.	150	109	20	14	43	336	3.92
Average Mean Respondents							3.74

Table 2 revealed that ICT fosters interactive learning experiences with a mean response rate of 4.32. Students' academic performance has improved with the use of ICT tools with a mean response rate of 4.20. ICT makes class presentations more interesting and interactive with a mean response rate of 4.14. Online access to materials helps students understand course content better with a mean response rate of 4.14. ICT encourages collaborative learning among students with a mean response rate of 3.82. Students are

motivated to participate in learning due to the use of ICT with a mean response rate of 3.92. The study shows that most of the respondents were of the view that ICT has a beneficial effect on students' learning participation and learning outcomes on these institutions.

Test of Hypotheses

Null Hypothesis One: H_{01} : There is no clear connections between the extent of ICT in cooperation and the level of students' academic engagement in learning activities

Table 3: Analysis of compelling links between the extent of ICT in cooperation and the level of students' academic engagement in learning activities.

Variables	N	X	S.D	Mean diff.	df	T	P value	Remark
Agree	265	4.09	0.320					
				2.77	322	4.889	0.0001	Significant
Disagree	52	1.32	0.320					

Total = 4.889 > $t_{\text{tab}} (0.05, 5) = 2.571$

The overall mean response of the statement was tested against the expected mean of 3.0 which is the mean response of our Likert rating scale.

Table 3 shows that the agreed respondents have a mean rate of 4.09 having a variability of 0.320 while disagreed respondents have a mean rate of 1.32 with a exhibiting variability of 0.320. The exhibiting difference between the variables is 2.77. Since the outcome of the t- test 4.889 the is greater than the table value (2.571); the result of the study rejects the null hypotheses which say that there is no marked

correlations between the extent of ICT in cooperation and the grade level of students' academic engagement in learning activities. Therefore, this study accepts that there is a pronounced association between the extent of ICT in cooperation and the academic standing of students' academic engagement in learning activities

Null Hypothesis Two Ho₂: The use of ICT tools in teaching does not show positive influence on students' performance in Colleges of Education in North-West Nigeria.

Table 4: Analysis of influence of the use of ICT tools in teaching on students 'performance in Colleges of Education in North-West Nigeria.

Variables	N	X	S.D	Mean diff.	df	T	P value	Remark
Agree	265	3.74	0.461					
				2.09	321	3.678	0.0001	Significant
Disagree	52	1.65	0.461					

Total = 3.678 > $t_{\text{tab}} (0.05, 5) = 2.571$

Table 4 shows that the agreed respondents have a mean rate of 3.74 with a variability of 0.461 while disagreed respondents have a mean rate of 1.65 with a displaying dispersion of 0.461. The mean variation between the variables is 2.09. Because the determined value of the t- test 3.678 is greater than the table value (2.571); the result of the study rejects the null hypotheses which say that the use of ICT tools in teaching does not notably influence students 'learning outcomes in Colleges of Education in North-West Nigeria. Therefore, this study accepts that the use of ICT tools in teaching significantly influence students' learning outcome in Colleges of Education in North-West Nigeria.

SUMMARY OF FINDINGS

The study accepts that there is a strong association between the extent of ICT in cooperation and the academic standing of student learning activities with a mean variation of 2.77 and t-value 4.889 and p value 0.00001. The study accepts that the use of ICT tools in teaching showed a compelling links in influencing students' educational attainment in Colleges of Education in North-West Nigeria showing a mean disparity of 2.09 and t-value 3.678 and p value 0.00001.

DISCUSSION OF FINDINGS

The study accepts that there is a significant relationship between the extent of ICT incorporation and the level of students' academic engagement in learning activities with a mean

difference of 2.77 and t-value 4.889 and p value 0.00001. This is in line with Hussain et al. (2017) who found that ICT positively affects students' academic achievement and retention and ICT was found more compelling, effective and valuable in teaching of chemistry when contrasted with conventional techniques of teaching. However, the findings is inconsistent with that of Venkatesh et al. (2014) who found out that there exist no actual effects of ICT in education since all researches are based on socioeconomic background of students and embedded characteristics of the school. Similarly, Babaheidari and Svensson (2014) and Lin et al. (2014) have shown no clear impact of ICT on learning outcomes and no evidence of any strong impact of the application of ICT in education.

ICT tools in teaching significantly influence students' academic achievement in Colleges of Education in North-West Nigeria with a mean difference of 2.09 and t-value 3.678 and p value 0.00001. This is in line with Basri et al. (2018) and Courtney et al. (2022) who revealed that ICT can expand educational access, strengthen its relevance and raise educational quality.

CONCLUSION

The findings accentuate the profound role of ICT in improving and strengthening academic engagement and performance among students in tertiary institutions particularly in colleges of education in the North-West, Nigeria. The study reveals a statistically strong bonds between the extent of ICT incorporation and students' academic engagement in learning activities with a noticeable average discrepancy of 2.77 and highly strong value of 4.889. Additionally, the findings affirm that the utilization of ICT devices in teaching has a significant and considerable positive influence on students' academic performance. This findings offer that ICT is not merely complementary teaching aid but rather a pivotal driver of supportive learning environment. Thus, a planned and substantiated implementation of ICT- based teaching methods can serve as impetus for academic excellence and educational reforms.

RECOMMENDATIONS

1. Governments at all levels should invest massively on ICT infrastructure which include among others, internet access, computer laboratories and multimedia teaching aids. This is to create an enabling environment for a comprehensive technology- enhanced learning classrooms
2. ICT policy should be regularly updated and implemented to guide the standardization, monitoring and utilization of ict teaching and learning with clear boundaries, timelines and quality assurance.
3. ICT- based instructional strategy should be in cooperated into the general teacher education curriculum. This will enable pre-service teachers graduate with necessary skills to use technology in different classroom contexts.
4. Lecturers should be trained regularly on new innovations in the utilization of ICT in our colleges and universities.

REFERENCES

- Almufarre, A., & Arshad, M. (2023). Promising Emerging Technologies for Teaching and Learning: Recent Developments and Future Challenges. *Sustainability*, 15(8), 6917.
<https://doi.org/10.3390/su15086917>
- Anastasopoulou, E., Tsagri, N. A., Avramidi, N. E., Lourida, N. K., Mitroyanni, N. E., Tsogka, N. D., & Katsikis, N. I. (2024). The impact of ICT on education. *Technium Social Sciences Journal*, 58, 48–55.
<https://doi.org/10.47577/tssj.v58i1.11144>
- Babaheidari, S. M., & Svensson, L. (2014). Managing the Digitalization of Schools: an exploratory study of school principals' and IT managers' perceptions about ICT adoption and usefulness. *E-Learn: World Conference on E-Learning in Corporate, Government, Healthcare, and Higher Education*, 2014(1), 106–113.

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- Basri, W. Sh., Alandejani, J. A., & Almadani, F. M. (2018). ICT Adoption Impact on Students' Academic Performance: Evidence from Saudi Universities. *Education Research International*, 2018, 1–9.
<https://doi.org/10.1155/2018/1240197>
- Courtney, M., Karakus, M., Ersozlu, Z., & Nurumov, K. (2022). The influence of ICT use and related attitudes on students' math and science performance: multilevel analyses of the last decade's PISA surveys. *Large-Scale Assessments in Education*, 10(1). <https://doi.org/10.1186/s40536-022-00128-6>
- Gupta, D. (2015). Teacher Education Curriculum in context of Information & Communication Technology. *Issues and Ideas in Education*, 3(2), 85–101.
<https://doi.org/10.15415/ije.2015.32007>
- Hussain, I., Suleman, Q., Naseer-ud-Din, M., & Shafique, F. (2017). Effects of Information and Communication Technology (ICT) on Students' Academic Achievement and Retention in Chemistry at Secondary Level. *Journal of Education and Educational Development*, 4(1), 73.
<https://doi.org/10.22555/joeed.v4i1.1058>
- Lin, C.-Y., Huang, C.-K., & Chen, C.-H. (2014). Barriers to the adoption of ICT in teaching Chinese as a foreign language in US universities. *ReCALL*, 26(1), 100–116.
<https://doi.org/10.1017/s0958344013000268>
- Murenzi, R., Paoli, M., Galazzi, S., & Treacy, S. (2021). Looking into Africa's Future: The Fourth Industrial Revolution and the Role of ICT Education. *Alliance for African Partnership Perspectives*, 1(1), 107–114.
<https://doi.org/10.1353/aap.2021.0013>
- Venkatesh, V., Croteau, A.-M., & Rabah, J. (2014, January 1). *Perceptions of Effectiveness of Instructional Uses of Technology in Higher Education in an Era of Web 2.0*. IEEE Xplore.
<https://doi.org/10.1109/HICSS.2014.22>