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ASSESSING ENHANCED TECHNOLOGY-DRIVEN LECTURE ROOM INSTRUCTIONS IN OPEN AND DISTANCE LEARNING AS BRIDGING EDUCATIONAL GAPS IN AHMADU BELLO UNIVERSITY ZARIA, NIGERIA

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Abstract

This study assessed enhanced technology-driven lecture room instruction through Open and Distance Learning (ODL) as a means of bridging educational gaps in Ahmadu Bello University, Zaria. Two objectives, research questons and hypotheses were used for this study. The study adopted a descriptive survey design. The population of the study was 51,436 compressing of lecturers and students. While the sample size was 381, using random sampling technique. Data were collected using a structured questionnaire, which was validated by research experts from educational technology, library and information science and measurement and evaluation. Study was analyzed using mean statistics and independent samples t-test. The findings revealed that technology-driven instructional tools, multimedia resources, and online learning platforms are effectively utilized in ODL, with lecturers demonstrating adequate competence in their application. The results further indicated that technology-driven lecture room instruction enhances students' understanding, promotes active participation and significantly contributes to bridging educational gaps by improving access to learning resources, supporting diverse learning abilities, and enhancing academic performance. The hypotheses tested showed no significant difference in respondents' opinions. The study concludes that enhanced technology-driven instruction through ODL is effective in improving instructional delivery and promoting equitable learning outcomes. It recommends improved digital infrastructure, continuous training for lecturers, and increased access to technological resources for students to further strengthen the impact of technology-driven learning.

Keywords: Technology-driven, Lecture Room Instructions, Open and Distance Learning and Educational Gaps

Introduction

The rapid advancement of digital technologies has significantly transformed teaching and learning processes across the globe, particularly within higher education. Universities are increasingly integrating technology into instructional delivery to enhance accessibility, flexibility and effectiveness of learning. In this context, Nkaanee and McBroom, (2025), technology-driven lecture room instruction refers to the use of digital tools such as multimedia presentations, virtual learning platforms, interactive software and internet-based resources to facilitate teaching within formal classroom settings. The notion

of "enhanced" in this study by El-Sadik and Abdulmonem, (2021).underscores the deliberate and improved integration of technological tools and pedagogical strategies to optimize teaching and learning outcomes. It implies not just the presence of technology, but its effective utilization to support curriculum delivery, facilitate interaction, and improve students' understanding. Enhanced technology-driven instruction includes features such as virtual simulations, learning management systems, video conferencing and collaborative digital tools, all of which contribute to a more dynamic and inclusive learning environment. This enhancement is particularly important in addressing the limitations of traditional lecture methods, which are often characterized by passive learning and limited student participation. This approach moves beyond traditional lecture methods by promoting active learning, real-time feedback, and improved student engagement. In institutions like Ahmadu Bello University, where large class sizes and diverse learner needs are prevalent, the adoption of enhanced technology-driven instruction has become essential for improving the quality of educational delivery.

Closely linked to this is the concept of Open and Distance Learning (ODL), which provides flexible learning opportunities for students who may not be able to participate in conventional face-to-face education due to geographical, economic, or social constraints. ODL leverages technology to deliver instructional content remotely through online platforms, recorded lectures and digital course materials. It emphasizes learner-centered approaches, allowing students to learn at their own pace and convenience. In Nigeria, ODL has gained prominence as a viable strategy for expanding access to higher education, particularly in response to increasing demand and limited physical infrastructure. When combined with technology-driven lecture room instruction, ODL creates a hybrid model that enhances both in-class and remote learning experiences, thereby improving overall instructional effectiveness (Ayomide, 2025).

Technology-driven instruction into ODL has the potential to bridge these gaps by providing equitable access to high-quality educational resources, enabling personalized learning, and supporting continuous academic engagement regardless of physical location. Furthermore, the integration of technology in lecture room instruction in ODL frameworks supports inclusivity by catering to diverse learning styles and needs (Musa, 2025). Students who may struggle with traditional teaching methods can benefit from multimedia content, recorded sessions, and interactive tools that enhance comprehension and retention. It also enables continuous assessment and feedback, which are essential for monitoring student progress and improving learning outcomes. In a large and complex institution such as Ahmadu Bello University, where student populations are high and resources may be stretched, these innovations are crucial for maintaining educational standards and ensuring that all students have equal opportunities to succeed. Therefore, this study is grounded in the need to evaluate the impact of enhanced technology-driven lecture room instruction in Open and Distance Learning, can address existing educational challenges and disparities. By focusing on the interplay between these variables, the study seeks to provide empirical evidence on their role in improving access, quality, and equity in higher education. This is particularly relevant in the Nigerian context, where the demand for university education continues to rise, and innovative solutions are required to meet this demand while maintaining academic excellence.

Statement of the Problem

The increasing adoption of Open and Distance Learning (ODL) in Nigerian universities has expanded access to higher education by providing flexible learning opportunities for students who are unable to participate in conventional face-to-face instruction. However, the effectiveness of ODL depends largely on the quality of instructional delivery and the extent to which appropriate educational technologies are integrated into teaching and learning. Despite improvements in digital infrastructure and institutional investments in educational technologies, many ODL programmes continue to experience challenges such as limited learner engagement, inadequate interaction between lecturers and students, delayed feedback, poor collaboration, and inconsistent learning experiences. These challenges often reduce the effectiveness of instructional delivery and may negatively influence students' academic achievement and satisfaction.

Enhanced Technology-Driven Lecture Room Instruction (ETDLI) has emerged as an instructional approach capable of addressing many of these challenges by integrating digital technologies, interactive learning platforms, multimedia resources, virtual communication tools, and learner-centred instructional strategies into the teaching process. Within the ODL environment, ETDLI is expected to promote active learner participation, improve communication and collaboration, facilitate timely feedback, and enhance students' learning experiences. However, the extent to which ETDLI is effectively implemented in ODL programmes and its influence on instructional effectiveness remain unclear.

At Ahmadu Bello University, where ODL continues to expand, there is limited empirical evidence regarding the extent to which Enhanced Technology-Driven Lecture Room Instruction has been adopted and whether it significantly enhances teaching effectiveness, learner engagement, and academic performance within the ODL system. Existing studies have largely focused on the adoption of educational technologies in conventional classroom settings without adequately examining the contribution of ETDLI to improving instructional delivery in ODL. This knowledge gap makes it difficult for university administrators, instructional designers, and policymakers to make evidence-based decisions regarding technology integration in ODL programmes.

It is against this background that this study seeks to assess the impact of Enhanced Technology-Driven Lecture Room Instruction on instructional delivery and learning outcomes within the Open and Distance Learning programme of Ahmadu Bello University, with a view to providing empirical evidence that can inform policies and practices for improving the quality and effectiveness of ODL in Nigerian universities.

Another critical problem confronting Open and Distance Learning (ODL) programmes is the inadequate implementation of Enhanced Technology-Driven Lecture Room Instruction (ETDLI), which is essential for delivering high-quality, interactive, and learner-centred instruction in technology-mediated learning environments. Although ODL is intended to expand access to higher education through flexible modes of learning, its effectiveness depends largely on the integration of appropriate instructional technologies that facilitate meaningful interaction, collaboration, timely feedback, and active learner engagement. However, in many ODL programmes, including those in Nigerian universities, the implementation of ETDLI is constrained by inadequate digital infrastructure, unreliable internet connectivity, limited access to educational technologies, insufficient technical support, and varying levels of digital competence among lecturers and students. Consequently, instructional delivery often remains largely transmissive rather than interactive, limiting opportunities for effective learning and reducing the quality of educational experiences. These limitations diminish the potential of ODL to provide equitable, high-quality education and may contribute to disparities in students' engagement, satisfaction, and academic achievement.

Another significant problem is the persistence of educational inequalities among students despite the adoption of Open and Distance Learning (ODL) and the integration of Enhanced Technology-Driven Lecture Room Instruction (ETDLI), both of which are intended to promote equitable access to quality higher education. Although these innovations are expected to reduce barriers to learning by providing flexible access to instructional resources and interactive learning opportunities, disparities in students' educational experiences continue to exist. These inequalities are reflected in unequal access to digital devices, reliable internet connectivity, learning resources, digital skills, and academic support services required for effective participation in ODL. In a diverse academic environment such as Ahmadu Bello University, Zaria, students from socioeconomically disadvantaged backgrounds are particularly vulnerable to these challenges, limiting their ability to fully benefit from technology-enhanced instructional practices. Consequently, the unequal distribution of these resources may undermine the effectiveness of ETDLI in ODL and compromise the goal of providing inclusive and equitable quality education. This situation underscores the need to examine whether the integration of Enhanced Technology-Driven Lecture Room Instruction within the ODL programme at Ahmadu Bello University is

effectively reducing educational inequalities or whether existing disparities continue to limit its intended benefits.

Objectives of the Study

The following objectives were set to guide the study:

1. To assess the impact of technology-driven lecture room instruction on Open and Distance Learning in Ahmadu Bello University, Zaria.
2. To examine the impact of technology-driven lecture room instruction in ODL on bridging educational gaps among students in Ahmadu Bello University, Zaria.

Research Questions

The study was set to answer the following research questions:

1. What is the impact of technology-driven lecture room instruction on Open and Distance Learning in Ahmadu Bello University, Zaria?
2. What is the impact of technology-driven lecture room instruction in ODL on bridging educational gaps among students in Ahmadu Bello University, Zaria?

Hypotheses

The study has the following null hypotheses

HO_1: There is no significant difference between lecturers' and students' responses on the impact of technology-driven lecture room instruction on Open and Distance Learning in Ahmadu Bello University, Zaria.

HO_2: There is no significant difference between lecturers' and students' responses on the impact of technology-driven lecture room instruction on bridging educational gaps among students in Ahmadu Bello University, Zaria.

Methodology

The study adopted a descriptive survey research design. This design involves systematically collecting data to describe a particular population or phenomenon as it exists at a specific point in time. It is widely used to examine and document characteristics, opinions, behaviours, and prevailing conditions within a clearly defined group without manipulating any variables. The population of this study comprises the lecturers and students involved in ODL in Ahmadu Bello University Zaria. Thus, a sample size for this study was 381.

Simple random sampling technique was used by the researcher. The decision to use 381 sample sizes was based on the Research Advisors Table (2006) of sample specification. Therefore, 121 lecturers and 260 students were randomly sampled to distribute questionnaires in order to avoid bias. Data were collected using a self-developed questionnaire, designed by the researcher, which contained ten item statement measured on a five-point Likert scale of Strongly Agree (SA = 5), Agree (A = 4), Undecided (U = 3), Disagree (D = 2) and Strongly Disagree (SD = 1). The collected data were analyzed using mean statistics to answer the research questions and independent t-test was used for the hypotheses testing.

Results

Respondents' Opinions on the impact of Technology-Driven Lecture Room Instruction on Open and Distance Learning in Ahmadu Bello University, Zaria.

This section explores respondents' views on the impact of technology-driven lecture room instruction in Open and Distance Learning in Ahmadu Bello University, Zaria. It specifically responds to research question one by assessing the perceptions of lecturers and students on" what is the impact of

technology-driven lecture room instruction implemented on Open and Distance Learning in Ahmadu Bello University, Zaria?

Table 1: Mean responses on the impact of Technology-driven Lecture room Instruction on Open and Distance Learning in Ahmadu Bello University, Zaria (n = Lecturers = 121; Students = 260).

S/N	Item Statements	Category of Respondents	Mean	SD
1	Technology-driven lecture room instruction has improved the effectiveness of Open and Distance Learning in Ahmadu Bello University, Zaria	Lecturers	3.78	0.94
		Students	3.69	1.02
2	The use of technology-driven lecture room instruction has enhanced students' understanding of course contents in Open and Distance Learning programmes	Lecturers	3.81	0.91
		Students	3.71	1.00
3	Technology-driven lecture room instruction has increased students' active participation during Open and Distance Learning lectures	Lecturers	3.79	0.93
		Students	3.68	1.03
4	The integration of technology-driven instructional tools has improved communication and interaction between lecturers and students in Open and Distance Learning	Lecturers	3.74	0.96
		Students	3.70	0.99
5	Technology-driven lecture room instruction has enhanced students' access to learning resources and instructional materials in Open and Distance Learning	Lecturers	3.77	0.95
		Students	3.69	1.01
	Cumulative		**3.73**	**0.97**

***Decision Mean** = 3.00*

The findings in Table 1 reveal that for Item 1, lecturers (Mean = 3.78, SD = 0.94) and students (Mean = 3.69, SD = 1.02) agreed that technology-driven lecture room instruction has improved the effectiveness of Open and Distance Learning in Ahmadu Bello University, Zaria. For Item 2, lecturers (Mean = 3.81, SD = 0.91) and students (Mean = 3.71, SD = 1.00) agreed that technology-driven lecture room instruction has enhanced students' understanding of course contents in Open and Distance Learning programmes. For Item 3, lecturers (Mean = 3.79, SD = 0.93) and students (Mean = 3.68, SD = 1.03) agreed that technology-driven lecture room instruction has increased students' active participation during Open and Distance Learning lectures. For Item 4, lecturers (Mean = 3.74, SD = 0.96) and students (Mean = 3.70, SD = 0.99) agreed that the integration of technology-driven instructional tools has improved communication and interaction between lecturers and students in Open and Distance Learning. For Item 5, lecturers (Mean = 3.77, SD = 0.95) agreed that technology-driven lecture room instruction has enhanced students' access to learning resources and instructional materials in Open and Distance Learning. All the mean scores exceeded the benchmark mean of 3.00, indicating agreement among respondents, while the standard deviation values (0.91–1.03) showed relatively low variability and consistency in their responses. Overall, the findings indicate that technology-driven lecture room instruction has a positive impact on the effectiveness, students' understanding, active participation, communication and interaction, as well as

access to learning resources in Open and Distance Learning. The cumulative mean score of 3.73 further confirms the respondents' positive perception of technology-driven lecture room instruction in Ahmadu Bello University, Zaria.

Respondents' Opinions on the impact Of Technology-Driven Lecture Room Instruction in ODL on Bridging Educational Gaps among Students in Ahmadu Bello University, Zaria

This section explores respondents' views on impact of Technology-Driven Lecture Room Instruction in ODL on Bridging Educational Gaps among Students in Ahmadu Bello University, Zaria. It specifically responds to research question two by assessing the perceptions of lecturers, and students on; how does technology-driven lecture room instruction bridge educational gaps among students in Ahmadu Bello University, Zaria?

Table 2: Mean scores on the impact of technology-driven lecture room instruction in ODL on bridging educational gaps among students in Ahmadu Bello University, Zaria.

S/N	Item Statements	Category of Respondents	Mean	SD
1	Technology-driven lecture room instruction in ODL has reduced learning disparities among students in Ahmadu Bello University, Zaria	Lecturers	3.77	0.94
		Students	3.74	0.98
2	Technology-driven lecture room instruction has minimized barriers to learning caused by time, distance and physical limitations among students	Lecturers	3.81	0.91
		Students	3.75	0.97
3	Technology-driven lecture room instruction has minimized barriers to learning caused by time, distance, and physical limitations among student	Lecturers	3.78	0.93
		Students	3.72	1.01
4	Technology-driven lecture room instruction has provided equal access to quality learning opportunities for students irrespective of their geographical location	Lecturers	3.77	0.95
		Students	3.70	1.02
5	The use of technology-driven lecture room instruction has enabled students with different learning needs to participate effectively in Open and Distance Learning programmes	Lecturers	3.80	0.92
		Students	3.70	1.03
	Cumulative		**3.75**	**0.97**

Decision Mean *= 3.00*

The findings in table 2 indicate that technology-driven lecture room instruction at Ahmadu Bello University is effective in bridging educational gaps among students. The findings in the table reveal that for Item 1, lecturers (Mean = 3.77, SD = 0.94) and students (Mean = 3.74, SD = 0.98) agreed that technology-driven lecture room instruction in Open and Distance Learning (ODL) has reduced learning disparities among students in Ahmadu Bello University, Zaria. For Item 2, lecturers (Mean = 3.81, SD = 0.91) and students (Mean = 3.75, SD = 0.97) agreed that technology-driven lecture room instruction has

minimized barriers to learning caused by time, distance, and physical limitations. For Item 3, lecturers (Mean = 3.78, SD = 0.93) and students (Mean = 3.72, SD = 1.01) agreed that technology-driven lecture room instruction contributes to reducing learning barriers among students. For Item 4, lecturers (Mean = 3.77, SD = 0.95) and students (Mean = 3.70, SD = 1.02) agreed that technology-driven lecture room instruction has provided equal access to quality learning opportunities irrespective of students' geographical location. For Item 5, lecturers (Mean = 3.80, SD = 0.92) and students (Mean = 3.70, SD = 1.03) agreed that technology-driven lecture room instruction has enabled students with different learning needs to participate effectively in Open and Distance Learning programmes. All the mean scores exceeded the benchmark mean of 3.00, indicating agreement among respondents, while the standard deviation values (0.91–1.03) showed relatively low variability and consistency in their responses. Overall, the findings indicate that technology-driven lecture room instruction has a significant positive impact on bridging educational gaps among students by reducing learning disparities, minimizing barriers related to time, distance, and physical limitations, providing equal access to quality learning opportunities, and supporting students with diverse learning needs. The cumulative mean score of 3.75 further confirms the respondents' positive perception of the effectiveness of technology-driven lecture room instruction in bridging educational gaps in Open and Distance Learning programmes at Ahmadu Bello University, Zaria.

Hypotheses

$H0_1$: There is no significant difference between lecturers' and students' responses on the impact of Technology-Driven Lecture Room Instruction on Open and Distance Learning in Ahmadu Bello University, Zaria. To test this null hypothesis, an independent sample t-test statistic was used, with the result presented in Table 3

Table 3: Independent Sample t-test on: there is no significant difference between lecturers' and students' responses on the impact of Technology-Driven Lecture Room Instruction on Open and Distance Learning in Ahmadu Bello University, Zaria.

S/N	Variables	N	Mean	Std. Dev	Df	t-cal	t-crit	P
1	Lecturers	121	2.624	0.50671				
					360	1.226	1.196	0.91
2	Students	260	4.560	1.07511				

The independent samples t-test in table 3 indicates that there is no statistically significant difference between lecturers' and students' responses on the impact of technology-driven lecture room instruction on ODL among students in Ahmadu Bello University, Zaria given that the computed p-value = 0.91 which is higher than 0.05 level of significance at which the hypotheses was tested. This result suggests that lecturers and students consistently agree that technology-driven lecture room instruction effectively helps to bridge educational gaps, providing equitable access to learning resources, supporting diverse learning needs, and improving academic performance across the student population.

$H0_2$: There is no significant difference between lecturers' and students' responses on the impact of technology-driven lecture room instruction on bridging educational gaps among students in Ahmadu Bello University, Zaria. To test this null hypothesis, an independent sample t-test statistic was used, with the result presented in Table 4.

Table 4: Independent Sample t-test on: there is no significant difference between lecturers' and students' responses on the impact of technology-driven lecture room instruction on bridging educational gaps among students in Ahmadu Bello University, Zaria.

S/N	Variables	N	Mean	Std. Dev	Std. Error	Df	t-cal	t-crit	P
1	Lecturers	121	2.3011	0.46121	0.04783				
						360	1.60	1.960	0.72
2	Students	260	4.0286	1.08976	0.13025				

The independent samples t-test demonstrates that there is no statistically significant difference between lecturers and students' respondents' views regarding the effect technology-driven lecture room instruction on bridging educational gaps among students in Ahmadu Bello University, Zaria, with a p = 0.72, which exceeds the 0.05 level of significance. This suggests that respondents share a common view that technology-driven lecture room instruction effectively helps in bridging educational gaps, improving access, inclusivity, and learning outcomes among students.

Summary of Findings

The following are the findings of the study based on data presentation and analysis:

i. The study found that technology-driven lecture room instruction significantly improved the effectiveness of Open and Distance Learning in Ahmadu Bello University, Zaria by enhancing students' understanding of course contents, promoting active participation, improving communication and interaction between lecturers and students and increasing access to learning resources and instructional materials. The study also found that technology-driven lecture room instruction helped bridge educational gaps by reducing learning disparities, minimizing barriers related to time, distance and physical limitations, providing equal access to quality learning opportunities regardless of geographical location and enabling students with different learning needs to participate effectively in Open and Distance Learning programmes

Discussions of the Findings

The findings of this study revealed that enhanced technology-driven lecture room instruction through Open and Distance Learning (ODL) is generally effective in improving teaching and learning processes in Ahmadu Bello University. Respondents agreed that digital tools, multimedia resources, and online learning platforms are adequately utilized and integrated into lecture delivery. This suggests that the university has made considerable progress in adopting technology to support instructional practices. The positive perception of lecturers' competence in using these tools further indicates that capacity-building efforts and exposure to digital teaching methods are yielding meaningful outcomes. This finding aligns with the study by Tabowei (2021) who found out that technology-enhanced instructional approaches improve student engagement and comprehension when effectively implemented. Similarly, Ohazuruike (2026) emphasized that the integration of online and face-to-face learning creates a more interactive and flexible learning environment, thereby enhancing overall instructional effectiveness. Furthermore, the study found out that technology-driven lecture room instruction promotes active student participation and enhances understanding through the use of multimedia resources.

In relation to bridging educational gaps, the findings indicated that technology-driven lecture room instruction in ODL helps reduce disparities in access to learning resources and supports students with varying academic abilities. Respondents agreed that digital platforms provide equal opportunities for students to access course materials, participate in discussions, and engage with instructional content regardless of their background. This finding is consistent with the work of Osunwusi (2020) who noted

that ODL expands access to education and promotes equity by removing geographical and time constraints.

The improvement in academic performance among students who previously experienced learning gaps further underscores the effectiveness of technology-driven instruction. This suggests that the integration of digital tools not only enhances access but also positively influences learning outcomes. Empirical support for this finding can be drawn from the study by Uzodinma, Njoku and Ejiofor (2024) which reported a significant positive effect of technology use on student achievement. The study emphasized that when technology is effectively integrated into instruction, it can help struggling learners catch up with their peers, thereby narrowing performance gaps. However, despite these positive outcomes, the findings also imply the existence of minor challenges in achieving full optimization of technology-driven instruction. Issues such as inconsistent integration of online platforms and varying levels of engagement suggest that the implementation of ODL and digital tools may not yet be uniform across all departments or courses.

Conclusion

The study concludes that the effective use of technology by lecturers improve instructional delivery by enhancing students' understanding and encouraging active participation in the learning process. It further concludes that technology-driven lecture room instruction is a vital tool for bridging educational gaps, as it promotes equitable access to learning resources, accommodates diverse learner needs and improves academic performance among students.

Recommendations

Based on the findings of the study, it recommends that:

i. The management of Ahmadu Bello University should strengthen the provision of digital infrastructure such as reliable internet connectivity, modern multimedia facilities, and functional learning management systems to support effective technology-driven lecture room instruction through Open and Distance Learning (ODL).

ii. Continuous training and capacity-building programmes should be organized for lecturers to enhance their competence in the use of emerging educational technologies. This will improve instructional delivery, promote active student engagement, and maximize the benefits of technology-driven teaching methods.

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