

ASSESSING THE CHALLENGES OF INTEGRATING EDUCATIONAL TECHNOLOGY IN SCIENCE EDUCATION PROGRAMMES IN OSUN STATE UNIVERSITIES

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Abstract

This study assessed the challenges of integrating educational technology in science education programmes in Osun State Universities, Nigeria. Descriptive design of survey type was used. The population of the study comprised of all academic staff and undergraduate students in Osun State Universities (Ipetu Ijesa Campus) and the University of Ilesa, Ilesa, Osun State. The sample for the study consisted of twenty (20) lecturers and one hundred and fifty (150) undergraduate students. The sample was selected using simple random sampling techniques, ten (10) lecturers and seventy-five (75) undergraduate students from each institution. Data were gathered using a validated and reliable structured questionnaire based on a four-point Likert scale, with a reliability coefficient of 0.81 confirmed through Cronbach Alpha. Analysis was conducted using frequency counts, percentages, means, standard deviations and t-test. The findings revealed that both lecturers and undergraduate students face significant challenges that hinder the integration of educational technology in science education programs in universities in Osun State. However, the nature of these challenges differs between the two groups, lecturers mainly experience institutional and pedagogical issues, while students were faced with challenges related to access to digital skills. Based on these results, the study recommended, among others that Universities should invest in reliable internet connectivity, modern digital tools, and well-equipped laboratories to support the effective integration of educational technology in science education programs.

Keywords: Educational Technology, Science Education programs, ICT infrastructure, Digital Literacy.

Introduction

The integration of educational technology into teaching and learning has become a central focus in modern education systems across the world. Educational technology, particularly Information and Communication Technology (ICT), plays a crucial role in enhancing instructional delivery, improving students' understanding of scientific concepts, and promoting interactive learning environments. In science education, the use of tools such as simulations, virtual laboratories, multimedia resources, and digital platforms has significantly improved students' engagement and academic performance. This global shift toward

technology-driven education reflects the growing need to equip learners with digital competencies required for the 21st century.

In Nigeria, the relevance of educational technology in higher education has been widely acknowledged. The adoption of ICT in universities is seen as a means of improving the quality of teaching, research, and learning outcomes. Recent studies indicate that educational technology has the potential to transform traditional classroom practices into more student-centered and innovative approaches (Agbesanya et al., 2024). Furthermore, the emergence of advanced technologies such as artificial intelligence and digital learning systems has expanded opportunities for improving science education in Nigerian universities, although these opportunities are yet to be fully maximized (Bali et al., 2024).

Despite these prospects, the integration of educational technology into Nigerian universities remains limited and uneven. Evidence shows that many institutions still struggle with the effective implementation of ICT in teaching and learning processes. Major challenges include inadequate infrastructure, insufficient funding, limited digital literacy among lecturers and students, and weak policy implementation (Awoniyi et al., 2025). These challenges have significantly slowed down the adoption of innovative teaching methods, particularly in science education programme where practical and technology-supported learning is essential. At the state level, universities in Osun State reflect similar challenges experienced across the country. Although some institutions have made efforts to provide ICT facilities, their utilization for instructional purposes, especially in science education, remains sub-optimal. A study on universities in Osun State revealed that both lecturers and students have access to certain e-learning technologies, but their level of usage for teaching and learning activities is relatively low (Abanikanda & Fadele, 2024). This suggests that the mere availability of technology does not necessarily translate into effective integration in classroom practice.

Additionally, infrastructural and administrative challenges persist in tertiary institutions within the state. Research indicates that despite the presence of ICT facilities, issues such as inefficient systems, poor management of academic records, and inadequate technological support continue to affect teaching and learning processes (Oyewale, 2022). These limitations hinder the effective application of educational technology in science education programmes, where experimentation, visualization, and practical engagement are critical.

Another significant issue is the human factor in technology integration. Many lecturers lack the required technical skills and pedagogical knowledge to effectively utilize educational technology. In some cases, there is resistance to change from traditional teaching methods to technology-driven approaches. This is further compounded by inadequate training opportunities and lack of continuous professional development programmes for educators. Studies have shown that without proper training and support, the adoption of ICT in education remains ineffective (Agbesanya et al., 2024).

Moreover, the gap between policy formulation and implementation continues to affect the successful integration of educational technology in Nigerian universities. Although policies promoting ICT in education exist, their execution is often inconsistent, particularly in public universities that cater to a large population of students (Awoniyi et al., 2025). This has resulted in a continued reliance on conventional teaching methods, limiting students'

exposure to modern technological tools necessary for scientific innovation and global competitiveness.

Considering the importance of educational technology in enhancing science education and the persistent challenges affecting its integration, there is a need to examine these issues within specific contexts such as universities in Osun State. Understanding these challenges will provide valuable insights into how educational technology can be effectively integrated to improve teaching and learning outcomes in science education programs.

Akaeze and Akaeze (2024) conducted a study on the challenges of integrating educational technology in Nigerian higher education, focusing on infrastructural and institutional barriers in Benue State, Nigeria. Using a descriptive survey design, data were collected from lecturers across selected federal universities. The findings revealed that poor internet connectivity, erratic power supply, and inadequate ICT facilities significantly hinder lecturers' ability to integrate technology into science education programs. Additionally, lack of institutional support, insufficient funding, and absence of clear implementation policies were identified as major constraints. The study concluded that despite the recognized importance of educational technology, infrastructural deficits and weak administrative support systems continue to limit its effective adoption in science education in Nigerian universities.

Oyekunle, et al., (2024) carried out their study in Lagos State, Nigeria, focusing on students' challenges in digital integration within vocational and technical education programs. Adopting a descriptive research design, the researchers collected data from students in tertiary institutions offering science and technical courses. The findings indicated that students encountered challenges such as high cost of internet data, inadequate access to digital learning resources, and low levels of digital literacy. Students also experienced difficulties using online platforms for collaborative learning and performing practical science tasks due to limited technological exposure. Socio-economic constraints were also identified as factors affecting students' participation in technology-enhanced learning. The study concluded that although digital integration offers numerous benefits, students' challenges must be addressed to improve its effectiveness in science education.

Odaudu and Oyeniyi (2025) conducted a study at Taraba State University in Taraba State, Nigeria, examining the use of technology for online learning among both lecturers and students. Using a descriptive survey design, the study revealed that lecturers faced challenges related to curriculum rigidity, lack of institutional policies, and difficulty in adapting teaching methods to digital platforms. In contrast, students encountered challenges such as poor engagement, distractions from digital tools, limited access to structured learning environments, and insufficient support systems. The study also found that lecturers were concerned with aligning technology to learning objectives, while students were more concerned with usability and accessibility. The researchers concluded that differences in roles (instruction vs. learning) explain the variation in challenges faced by lecturers and students in integrating educational technology in science education programs.

Statement of the Problem

The integration of educational technology into science education has been widely recognized as essential for improving teaching effectiveness, enhancing students' understanding of

scientific concepts, and preparing learners for a technology-driven world. Despite this recognition, the effective use of educational technology in Nigerian universities remains limited, particularly in science education programmes where practical and interactive learning is crucial.

In universities in Osun State, efforts have been made to introduce Information and Communication Technology (ICT) facilities and digital learning tools. However, evidence suggests that these technologies are either inadequate or underutilized in the teaching and learning process. Many science classrooms still rely heavily on traditional teaching methods, which do not adequately support the development of critical thinking, problem-solving skills, and practical competencies required in science education.

Furthermore, several challenges appear to hinder the effective integration of educational technology in these institutions. These include inadequate infrastructural facilities, poor internet connectivity, irregular power supply, insufficient funding, and limited access to modern technological tools. In addition, many lecturers lack the necessary technical skills and training required to effectively incorporate technology into their instructional practices. Resistance to change and lack of institutional support further complicate the situation.

The persistence of these challenges raises concerns about the quality of science education being delivered and the preparedness of graduates to compete in a globally driven, technology-oriented environment. If these issues are not addressed, the gap between the potential benefits of educational technology and its actual implementation will continue to widen. This study is delimited to examining the challenges affecting the integration of educational technology in science education programs in universities located in Osun State, Nigeria. It focuses specifically on the perspectives of lecturers and undergraduate students enrolled in science education programs, such as Biology, Chemistry, Physics, and Integrated Science designed to prepare students to become science educators or professionals in related fields excluding other faculties or non-science courses.

Therefore, the problem of this study is to assessing challenges of integrating educational technology in science education programmes in Osun State Universities, with a view to identifying possible solutions for improving its effective utilization.

Purpose of the study

The purpose of this study is to assess challenges of integrating educational technology in science education programmes in Osun State Universities, Nigeria. Specifically, the study examined

- i. the challenges lecturers encounter in integrating educational technology into science education programmes in universities in Osun State.
- ii. the challenges students face in accessing and using educational technology in their science courses in universities in Osun State.
- iii. the difference between the challenges faced by lecturers and those faced by students in integrating educational technology in science education programmes in universities in Osun State.

Research Questions

1. What challenges do lecturers encounter in integrating educational technology into science education programmes in universities in Osun State?
2. What challenges do students face in accessing and using educational technology in their science courses in universities in Osun State?

Hypothesis

1. There is no significant difference between the challenges faced by lecturers and those faced by students in integrating educational technology in science education programmes in universities in Osun State.

Methodology

The design adopted for this study was descriptive design of survey type. The choice of this design was that it focuses on eliciting information from respondents' opinions, beliefs, and behavior. The population of the study comprises all academic staff and undergraduate students in Osun State Universities (Ipetu Ijesa Campus) and the University of Ilesa, Ilesa, Osun State. The sample for the study consisted of 20 lecturers and 150 undergraduate students. The sample was selected using simple random sampling techniques. Two higher institutions were selected for the study, Osun State University (Ipetu Ijesa Campus) and the University of Ilesa, Ilesa, Osun State using simple random sampling technique. 10 lecturers and 75 students were then selected from each university, Department of Science, Technology and Mathematics Education using purposive random sampling technique. The instruments for data collection for this study were Questionnaire on Lecturers' Perceptions of Challenges Affecting the Integration of Educational Technology in Science Education Programs in Universities in Osun State, Nigeria (QLPCAIETSEP) and Questionnaire on Students' Perceptions of Challenges Affecting the Integration of Educational Technology in Science Education Programmes in Universities in Osun State, Nigeria (QSPCAIETSEP). The QLP-CAIETSEP and QSP-CAIETSEP items were constructed to answer all the research questions raised. The QLP-CAIETSEP comprised two sections: Section A and Section B. Section A consisted of bio-data of the respondents which include the name of school, gender, and department, while section B contained 14 structured question items on Lecturers' Perceptions of Challenges Affecting the Integration of Educational Technology in Science Education Programs and QSP-CAIETSEP comprised two sections: Section A and Section B. Section A consisted of bio-data of the respondents which include the name of school, gender, department, Course of Study, and level while section B contained 14 structured question items on Students' Perceptions of Challenges Affecting the Integration of Educational Technology in Science Education Programs in universities with a rating scale of Strongly Agree (SA) – 4, Agree (A) - 3, Disagree (D) – 2, Strongly Disagree (SD) -1. Course of Study, and level

The items of the instruments were subjected to face and content validity by two lecturers from the Department of Science, Technology and Mathematics Education (STME) and one lecturer from Test and Measurement Department of the University of Ilesa. All comments and corrections were incorporated into the final form of the instrument. Cronbach Alpha was used to determine the reliability of the instrument which was established at 0.81. On the basis of the high index, the instrument was considered reliable and suitable for conducting the research.

The administration of the instrument was done in two weeks with the help of two research assistants for the administration and retrieval of the instrument. Ten (10) questionnaires and Seventy-five (75) questionnaires were administered in each higher institution for the lecturers and students respectively. Hence, a total number of twenty (20) and one hundred and fifty (150) questionnaires were administered across the sampled schools. The data generated for this study were analyzed using descriptive and inferential statistics. The questions raised were answered using frequency count, percentage, means and standard deviation. The hypotheses formulated was tested using t-test. The hypothesis was tested at 0.05 level of significance.

Results

Research Question 1: What challenges do lecturers encounter in integrating educational technology into science education programmes in universities in Osun State?

Table 1: Descriptive Analysis of the Perceived Challenges Affecting the Integration of Educational Technology in Science Education Programmes among Lecturers

S/N	PERCEIVED CHALLENGES AFFECTING THE INTEGRATION OF EDUCATIONAL TECHNOLOGY IN SCIENCE EDUCATION PROGRAMMES AMONG LECTURERS	SA (%)	A (%)	D (%)	SD (%)	MEAN	STANDARD DEVIATION	REMARK
1	I find it difficult to access reliable internet for teaching with educational technology.	9 (6.0)	9 (6.0)	2 (1.3)	0.00	3.35	0.67	Agree
2	I feel that lack of time to prepare technology-based lessons is a major challenge	5 (3.3)	11 (7.3)	2 (1.3)	2 (1.3)	2.95	0.89	Agree
3	The cost of acquiring necessary devices/software is a major challenge.	10 (6.7)	18 (5.3)	2 (1.3)	0.00	3.40	0.68	Agree
4	Technical problems often disrupt my use of educational technology in class.	12 (8.0)	0.00	2 (1.3)	0.00	3.20	0.62	Agree
5	Limited availability of digital resources hinders my teaching.	7 (4.7)	9 (6.0)	2 (1.3)	2 (1.3)	3.05	0.94	Agree
6	Using educational technology increases my workload significantly.	1 (0.7)	1 (0.7)	14 (9.3)	4 (2.7)	1.95	0.69	Disagree
7	I struggle to balance traditional teaching methods with technology-based approaches.	9 (6.0)	9 (6.0)	2 (1.3)	0.00	3.35	0.67	Agree
8	Infrastructural challenges (power supply, equipment) limit my use of educational technology.	4 (2.7)	14 (9.3)	2 (1.3)	0.00	3.10	0.55	Agree
9	I lack sufficient time to prepare lessons that incorporate educational technology.	1 (0.7)	1 (0.7)	5 (3.3)	0.00	1.50	0.83	Disagree

10	Frequent software or platform failures discourage me from using educational technology.	7 (4.7)	9 (6.0)	4 (6.0)	0.00	3.35	0.67	Agree
11	The absence of technical support staff makes it difficult to use educational technology effectively.	10 (6.7)	8 (5.3)	2 (1.3)	0.00	3.15	0.75	Agree
12	I believe the university does not provide enough incentives for lecturers to adopt educational technology.	8 (5.3)	12 (8.0)	0.00	0.00	3.40	0.68	Agree
13	I find it challenging to integrate educational technology into practical science lessons.	5 (3.3)	11 (7.3)	2 (1.3)	2 (1.3)	3.40	0.50	Agree
14	I believe inadequate collaboration among lecturers hinders effective integration of educational technology.	7 (4.7)	11 (7.3)	2 (1.3)	0.00	2.95	0.89	Agree

Cut -Off Mean; 2.50

Table 1 identified the Perceived Challenges Affecting the Integration of Educational Technology in Science Education Programmes among Lecturers. Using a cut-off mean of 2.50 for the rating scale. Majority of the respondent agreed on the challenges affecting the Integration of Educational Technology in Science Education Programmes among Lecturers. It indicates that the university lecturers face a lot of challenges that is affecting the Integration of Educational Technology in Science Education Programmes

Research Question 2: What challenges do students face in accessing and using educational technology in their science courses in universities in Osun State?

Table 2: Descriptive Analysis of the Perceived Challenges Affecting the Integration of Educational Technology in Science Education Programmes among students

S/N	PERCEIVED CHALLENGES AFFECTING THE INTEGRATION OF EDUCATIONAL TECHNOLOGY IN SCIENCE EDUCATION PROGRAMMES AMONG STUDENTS	SA (%)	A (%)	D (%)	SD (%)	MEAN	STANDARD DEVIATION	REMARK
1	I find it difficult to access reliable internet for online learning.	27 (18.0)	64 (42.7)	59 (39.3)	0.00	2.79	0.73	Agree
2	I do not have regular access to a personal computer or device for learning.	88 (58.7)	30 (20.0)	32 (21.3)	0.00	3.37	0.82	Agree
3	The cost of internet subscription is a major challenge for me.	32 (21.3)	118 (78.7)	0.00	0.00	3.21	0.41	Agree
4	I often experience technical problems when using educational technology.	32 (21.3)	59 (39.3)	59 (39.3)	0.00	2.82	0.76	Agree

5	Limited availability of e-learning resources hinders my studies.	0.00	94 (62.7)	56 (37.3)	0.00	2.63	0.49	Agree
6	Poor electricity supply affects my ability to use educational technology.	41 (27.3)	41 (27.3)	51 (34.0)	17 (11.3)	2.71	0.99	Agree
7	I struggle to balance traditional learning methods with technology-based learning.	6 (4.0)	12 (8.0)	128 (85.3)	4 (2.7)	2.13	0.50	Disagree
8	I find it difficult to get help when I face challenges using educational technology.	0.00	0.00	22 (14.7)	128 (85.3)	1.15	0.35	Disagree
9	I believe infrastructural challenges in my university limit my use of educational technology.	32 (21.3)	91 (60.7)	10 (6.7)	17 (11.3)	2.92	0.86	Agree
10	I find it difficult to access educational technology outside the university environment.	63 (42.0)	31 (20.7)	56 (37.3)	0.00	3.05	0.89	Agree
11	I believe lecturers do not consistently use educational technology in teaching.	4 (2.7)	18 (12.0)	96 (64.0)	32 (21.3)	1.96	0.66	Disagree
12	I believe inadequate training on digital tools limits my ability to use educational technology.	67 (44.7)	59 (39.3)	18 (12.0)	6 (4.0)	3.25	0.82	Agree
13	I find it challenging to use educational technology for practical science courses.	60 (40.0)	78 (52.0)	12 (8.0)	0.00	3.32	0.62	Agree
14	I feel that frequent system or platform failures discourage me from using educational technology.	56 (37.3)	76 (50.7)	12 (8.0)	6 (4.0)	3.21	0.76	Agree

Cut -Off Mean; 2.50

Table 2 identified the perceived challenges affecting the Integration of Educational Technology in Science Education Programmes among students. Using a cut-off mean of 2.50 for the rating scale. Majority of the respondent agreed on the challenges affecting the Integration of Educational Technology in Science Education Programmes among students. It indicates that the undergraduates' students face a lot of challenges that is affecting the Integration of Educational Technology in Science Education Programs.

Hypothesis Testing

Hypothesis 1: There is no significant difference between the challenges faced by lecturers and those faced by students in integrating educational technology in science education programmes in universities in Osun State.

Challenges faced by lecturers and those faced by students in integrating educational technology in science education programmes was analyzed using t-test for statistical significance at the 0.05 level of significance to test the hypothesis. Table 3 shows the final result.

Table 3: t-test analysis for challenges faced by lecturers and those faced by students in integrating educational technology in science education programs

VARIATIONS	N	MEAN	SD	DF	T _{CAL}	P (SIG)	REM.
CHALLENGES FACED BY LECTURERS	20	42.00	2.77	168	4.381	0.000*	Significant
CHALLENGES FACED BY STUDENTS	150	38.51	3.41				

*P<0.05

Table 3 shows that the t-cal value of 4.381 is significant because the P value (0.000) < 0.05 at 0.05 level of significance. This implies that null hypothesis is rejected. Hence, there is significant difference between the challenges faced by lecturers and those faced by students in integrating educational technology in science education programs in universities in Osun State.

Discussion of the findings

The findings showed that the university lecturers faced a lot of challenges that was affecting the Integration of Educational Technology in Science Education Programmes. This is in agreement with that of Akaeze and Akaeze (2024) who conducted a study on the challenges of integrating educational technology in Nigerian higher education, focusing on infrastructural and institutional barriers in Benue State, Nigeria. The findings revealed that poor internet connectivity, erratic power supply, and inadequate ICT facilities significantly hinder lecturers' ability to integrate technology into science education programs. Additionally, lack of institutional support, insufficient funding, and absence of clear implementation policies were identified as major constraints.

The findings also showed that the undergraduates' students faced a lot of challenges that was affecting the Integration of Educational Technology in Science Education Programs. This is consistent with the submission of Oyekunle, et al., (2024) who carried out their study in Lagos State, Nigeria, focusing on students' challenges in digital integration within vocational and technical education programs. The findings indicated that students encountered challenges such as high cost of internet data, inadequate access to digital learning resources, and low levels of digital literacy. Students also experienced difficulties using online platforms for collaborative learning and performing practical science tasks due to limited technological exposure. Socio-economic constraints were also identified as factors affecting students' participation in technology-enhanced learning.

The findings further showed that there was significant difference between the challenges faced by lecturers and those faced by students in integrating educational technology in science education programs in universities in Osun State. This is consistent with the submission of Odaudu and Oyeniyi (2025) who conducted a study at Taraba State University in Taraba State, Nigeria, examining the use of technology for online learning among both lecturers and students. The study revealed that lecturers faced challenges related to curriculum rigidity, lack of institutional policies, and difficulty adapting teaching methods to digital platforms. In contrast, students encountered challenges such as poor engagement, distractions from digital tools, limited access to structured learning environments, and insufficient support systems.

The study also found that lecturers were concerned with aligning technology to learning objectives, while students were more concerned with usability and accessibility. The researchers concluded that differences in roles (instruction vs. learning) explain the variation in challenges faced by lecturers and students in integrating educational technology in science education programs.

Conclusion

Based on the findings of this study, it could be concluded that, both lecturers and undergraduate students face significant challenges that hinder the integration of educational technology in science education programmes in universities in Osun State. However, the nature of these challenges differs between the two groups, lecturers mainly experience institutional and pedagogical issues, while students face challenges related to access and digital skills.

Recommendations

Based on the findings of the study, the following recommendations were made:

1. Universities should invest in reliable internet connectivity, modern digital tools, and well-equipped laboratories to support the effective integration of educational technology in science education programmes.
2. Regular training programmes, workshops, and seminars should be organized to enhance lecturers' competence and confidence in using educational technologies for teaching.
3. Institutions should introduce orientation programs and courses that develop students' skills in using educational technologies for learning and research.
4. Efforts should be made by universities to ensure that both lecturers and students have access to necessary digital devices and affordable internet services, possibly through subsidies or partnerships with technology providers.

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