



Challenges of Multimedia Integration and Training Needs of Construction Technology Education Lecturers in Universities in Northern Nigeria

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ABSTRACT

The examined the challenges of multimedia integration and training needs of construction technology education lecturers in Universities in Northern Nigeria. Two specific objectives were formulated to guide the study, alongside two research questions and two corresponding null hypotheses. The population of the study comprised 71 lecturers, consisting of 44 Building Technology Education lecturers and 27 Woodwork Technology Education lecturers in public universities across Northern Nigeria. Due to the manageable size of the population, a census approach was employed. The instrument for data collection was a structured questionnaire titled: "Challenges of Multimedia Integration Questionnaire (CMIQ)" developed by the researcher. The validity of the instrument was established by experts in Test and Measurement, Vocational Education and Construction Technology Education. A pilot study was conducted using lecturers outside the study area and the reliability of the instrument was determined using appropriate statistical methods, yielding a high reliability coefficient of 0.86, indicating that the instrument was reliable for the study. Data were collected with the assistance of trained research assistants and analysed using Statistical Package for Social Sciences (SPSS). Descriptive statistics of mean and standard deviation were used to answer the research questions, while independent sample t-test was used to test the null hypotheses at 0.05 level of significance. The result of the study revealed that the challenges faced by construction technology education lecturers in integrating multimedia elements into their teaching in universities in Northern Nigeria include limited access to technology, outdated equipment, lack of institutional support and large class sizes among others. Based on the findings, the study recommended among others that Universities should provide adequate multimedia facilities, digital laboratories, internet connectivity and modern instructional technologies to support effective teaching.

ARTICLE INFO

Article History

Received: May, 2026

Received in revised form: May, 2026

Accepted: August, 2026

Published online: September, 2026

KEYWORDS

Multimedia Integration Challenges;
Construction Technology Education;
University Lecturers; Training Needs; Digital
Competencies

INTRODUCTION

The rapid advancement of digital technologies has increasingly transformed teaching and learning in higher education. Multimedia technologies, which combine text, graphics, audio, video, animation, simulations, and interactive applications, provide lecturers with diverse means of presenting information and

engaging learners. These technologies can make learning more interactive, improve the presentation of complex concepts, and provide learners with opportunities to access information through different modes of representation. A systematic review by Abdulrahman *et al.* (2020) established that multimedia tools have been widely applied to support teaching and learning

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and can contribute to improved educational experiences when appropriately designed and implemented.

The effective integration of multimedia into teaching, however, requires more than the availability of digital devices and software. Lecturers need appropriate knowledge, technical skills, pedagogical understanding, and confidence to select, develop, adapt, and use multimedia resources in ways that are consistent with instructional objectives. Basilotta-Gómez-Pablos *et al.* (2022), emphasized that digital competence encompasses the knowledge, skills, and attitudes necessary for university teachers to make effective use of technologies in their professional practice. The authors further identified the growing need to strengthen digital competencies among university teachers in response to changes in higher education and technological development.

The challenges associated with multimedia integration can occur at both the individual and institutional levels. At the individual level, lecturers experience inadequate technical skills, limited confidence, insufficient knowledge of multimedia applications, and difficulties in integrating technology with appropriate pedagogical approaches. At the institutional level, inadequate infrastructure, limited access to digital facilities, unreliable internet connectivity, insufficient technical support, and limited opportunities for professional development may constrain effective technology integration. UNESCO (2023) identifies inadequate training, infrastructure limitations, access challenges, and insufficient support as important barriers to educators' effective incorporation of digital technologies into teaching. These challenges are particularly relevant to construction technology education because the programme is practical, technical, and strongly dependent on demonstration and visualization.

Construction technology education lecturers are expected to teach concepts relating to building construction, construction materials, structural systems, technical drawing, equipment operation, site practices, and emerging construction technologies. Multimedia resources such as instructional videos, animations,

simulations, interactive presentations, three-dimensional models, and digital demonstrations can assist lecturers in presenting these concepts more effectively. However, lecturers may encounter difficulties in producing suitable multimedia materials, operating specialized software, integrating multimedia into practical instruction, and maintaining technology-supported learning environments.

The increasing digitalization of the construction industry has further increased the need for construction technology education lecturers to develop relevant multimedia competencies. Contemporary construction practice increasingly incorporates digital technologies such as Building Information Modelling (BIM), computer-aided design, three-dimensional visualization, digital project management, virtual simulation, and other technology-supported applications. Consequently, lecturers require appropriate technological and pedagogical competencies to expose students to current construction practices and prepare them for technologically driven workplaces. Where lecturers lack these competencies or encounter institutional barriers, the effective integration of multimedia into construction technology education become limited.

Professional development and training therefore constitute important strategies for addressing challenges associated with multimedia integration. Basantes-Andrade *et al.* (2022) observed that research on digital competence in higher education consistently emphasizes the need to establish competency standards and appropriate training directions for university teachers. Similarly, UNESCO's ICT competency framework for teachers provides a basis for identifying digital competencies and informing pre-service and in-service training, curriculum development, and institutional capacity-building initiatives. Training that is specifically aligned with lecturers' instructional responsibilities can enable them to develop the technical and pedagogical competencies required to use multimedia effectively.

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The need for lecturer training in multimedia integration in Nigeria is important because institutional conditions vary considerably in terms of infrastructure, technical support, access to digital resources, and professional development opportunities. Although universities are increasingly expected to integrate technology into teaching and learning, the effectiveness of such integration depends on the capacity of lecturers and the institutional environment in which they operate. Abdulrahman *et al.* (2020) also noted that the successful application of multimedia technologies is influenced by contextual factors and the conditions surrounding their deployment. For construction technology education lecturers in universities in Northern Nigeria, there is therefore a need to identify the specific challenges that hinder effective multimedia integration and the training required to overcome identified competency deficiencies.

While previous studies have examined multimedia use and digital competence in broader educational contexts, less attention has been given to the specific challenges and training needs of lecturers responsible for construction technology education. Establishing these challenges and training needs is important for developing relevant professional development programmes and institutional support strategies. Against this backdrop, this study examined the challenges faced by construction technology education lecturers in integrating multimedia elements into their teaching and identifies the training needs required to improve their multimedia competencies in universities in Northern Nigeria.

STATEMENT OF THE PROBLEM

The increasing use of multimedia technologies in higher education has created new opportunities for improving instructional delivery, particularly in practical and technology-oriented programmes such as construction technology education. Abdulrahman *et al.*, (2020) revealed that multimedia resources such as instructional videos, animations, simulations, digital presentations, and interactive applications can enhance the understanding of complex

construction concepts and provide students with opportunities for visual and practical learning. However, effective integration of these technologies requires lecturers to possess adequate technical, pedagogical, and digital competencies (Basilotta-Gómez-Pablos *et al.*, 2022).

Despite the potential benefits of multimedia, Construction Technology Education lecturers may face challenges such as inadequate training, limited access to multimedia facilities, poor internet connectivity, insufficient technical support, and limited institutional opportunities for professional development. These challenges restrict lecturers' ability to effectively integrate multimedia into classroom and practical instruction. UNESCO (2023) revealed that continuous professional development and institutional support are necessary for educators to effectively integrate digital technologies into teaching.

The problem is important in Northern Nigeria, where differences in institutional resources and professional development opportunities affect the effective use of multimedia technologies. However, there is limited empirical evidence on the specific challenges faced by construction technology education lecturers and the training they require to improve their multimedia competencies. Without such information, universities may find it difficult to develop training programmes that address lecturers' actual competency needs. Therefore, the problem of this study is the uncertainty regarding the specific challenges hindering multimedia integration and the training needs required to improve the multimedia competencies of Construction Technology Education lecturers in universities in Northern Nigeria. Consequently, this study examined the challenges faced by the lecturers in integrating multimedia elements into teaching and identified the training needs required to improve their multimedia competencies.

Aim and Objectives of the Study

The aim of this study was to examine the challenges of multimedia integration and training needs of construction technology

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education lecturers in Universities in Northern Nigeria. Specifically, the study sought to:

1. Examine the challenges faced by Construction Technology Education lecturers in integrating multimedia elements into their teaching in universities in Northern Nigeria.
2. Determine the training needs required to improve the multimedia competencies of Construction Technology Education lecturers in universities in Northern Nigeria.

Research Questions

The following research questions guided the study:

1. What are the challenges faced by construction technology education lecturers in integrating multimedia elements into their teaching in universities in Northern Nigeria?
2. What are the training needs required to improve the multimedia competencies of construction technology education lecturers in universities in Northern Nigeria?

Hypotheses

The following null hypotheses were tested at 0.05 level of significance:

Ho₁: There is no significant difference between the mean responses of building technology education lecturers and woodwork technology education lecturers regarding the challenges faced in integrating multimedia elements into teaching in universities in Northern Nigeria.

Ho₂: There is no significant difference between the mean responses of building technology education lecturers and woodwork technology education lecturers regarding the training needs required to improve the multimedia competencies of construction technology education lecturers in universities in Northern Nigeria.

METHODOLOGY

The study adopted a descriptive survey research design. According to Creswell and

Creswell (2023), descriptive survey research design involves the systematic collection of data from a population through questionnaires to describe existing conditions, opinions, practices, or characteristics within a given context. The design was considered appropriate because it enabled the researcher to obtain information directly from building technology education and woodwork technology education lecturers regarding the challenges of integrating multimedia into teaching and their training needs in universities in Northern Nigeria.

The target population of the study was 71 lecturers consisting of 44 Building Technology Education lecturers and 27 Woodwork Technology Education lecturers across selected public universities in Northern Nigeria. Due to the manageable size of the population, a census sampling technique was adopted, whereby all 71 lecturers were included in the study. The instrument for data collection was a structured questionnaire titled "Challenges of Multimedia Integration Questionnaire (CMIQ)", developed by the researcher based on the objectives of the study and relevant literature. The instrument was subjected to face and content validation by three experts in Construction Technology Education, Vocational Education and Test and Measurement. Their observations and corrections were incorporated into the final version of the instrument.

The questionnaire consisted of sections covering the demographic characteristics of the respondents, challenges associated with multimedia integration, and training needs for improving multimedia competencies. Responses to the items were structured using appropriate five-point rating scales. The instrument was pilot-tested using lecturers from institutions outside the study area. The pilot study was conducted to determine the clarity, suitability, and internal consistency of the questionnaire items. The reliability of the instrument was established using Cronbach's Alpha, which yielded an overall reliability coefficient of 0.86, indicating a high level of internal consistency. According to Pallant (2020), a Cronbach's Alpha coefficient of 0.70 or above is generally considered acceptable for

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research purposes. The instrument was therefore considered reliable and suitable for data collection in the main study. The researcher personally coordinated the data collection exercise with the assistance of eleven trained research assistants.

The completed questionnaires were retrieved directly from respondents, while online responses were monitored and downloaded for analysis. Data collected were analyzed using the Statistical Package for the Social Sciences (SPSS), Version 26. Mean and standard deviation were used to answer the two research questions, while the independent-samples t-test was used to test the two null hypotheses at the 0.05 level of significance. The null hypotheses were retained where the p-value was greater than or equal to

0.05 and rejected where the p-value was less than 0.05. The research questions were answered based on the mean scores of the respondents. The interpretation of the mean scores was based on the real limits of the five-point rating scale used in the questionnaire.

RESULTS AND INTERPRETATION

Research Question One

What are the challenges faced by construction technology education lecturers in integrating multimedia elements into their teaching in universities in Northern Nigeria?

The result of research question one is presented in Table 1.

Table 1: Means and Standard Deviations of Respondents on the Challenges Construction Technology Education Lecturers Face in Integrating Multimedia Elements into their Teaching in Universities in Northern Nigeria

S/No	Item Statement	$\bar{X}_B$	SD _B	$\bar{X}_W$	SD _W	$\bar{X}_A$	SD _A	REMARK
1.	There is Limited Access to Technology in my University	4.23	0.99	3.88	1.11	4.06	1.05	Agreed
2.	There are Inadequate Training Opportunities for lectures on Multimedia Integration	3.89	0.99	3.77	0.95	3.83	0.97	Agreed
3.	My university has Outdated Equipment , making Multimedia use difficult	3.84	.987	3.74	0.76	3.79	0.87	Agreed
4.	Some Lectures Resist Change , limiting the adoption of multimedia tools	3.70	1.05	3.63	0.84	3.67	0.95	Agreed
5.	There is a Lack of Institutional Support for integrating Multimedia into teaching	3.77	1.20	3.85	0.95	3.81	1.08	Agreed
6.	Large Class Sizes make it Challenging to effectively Implement Multimedia- based Instruction	3.80	1.03	4.04	0.81	3.92	0.92	Agreed
7.	Frequent Technical Issues Disrupt the use of Multimedia tools during Lectures	3.86	0.93	3.96	0.76	3.91	0.85	Agreed
8.	Financial Constraints Hinder the Maintenance of Multimedia tools.	3.86	0.85	3.70	1.20	3.78	1.03	Agreed
9.	Rigid Curriculum Structure Restricts the Effective Integration of Multimedia tools in to Teaching	4.02	1.09	3.67	1.24	3.84	1.17	Agreed
Grand Means		3.89	1.01	3.80	0.96	3.85	0.99	Agreed

N_B , $\bar{X}_B$, SD_B = number, mean and standard deviation of Building Technology Lecturers, N_W , $\bar{X}_W$, SD_W = number, mean and standard deviation of Woodwork Technology Lecturers X_A , SD_A = Average mean and standard deviation.

Table 1 shows the mean and standard deviation of the respondents on the challenges

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faced by construction technology education lecturers in integrating multimedia elements into their teaching in universities in Northern Nigeria. The Table 1 showed the mean of building technology education lecturers ranges from 3.70 to 4.23, the standard deviation also ranges from 0.85 to 1.20 and the mean of woodwork technology education lecturers also ranges from 3.63 to 4.04 while the standard deviation ranges from 0.76 to 1.24 respectively. The grand mean of building technology education lecturers is 3.89 and 3.80 for woodwork technology education lecturers, the average mean of the respondents is ranged from 3.67 to 4.06 and average standard

deviation also ranges from 0.85 to 1.17. The grand mean of the respondents is 3.85 which indicates that construction technology education lecturers in Universities in Northern Nigeria faces challenges in integrating multimedia elements into their teaching.

Research Question Two

What are the training needs required to improve the multimedia competencies of construction technology education lecturers in universities in Northern Nigeria?

The result of research question two is presented in Table 2.

Table 2: Means and Standard Deviations of Responses on the Training Needs Required to Improve Multimedia Competencies of Construction Technology Education Lecturers in Universities in Northern Nigeria

S/No	Item Statement	$\bar{X}_B$	SD_B	$\bar{X}_W$	SD_W	$\bar{X}_A$	SD_A	REMARK
1.	Data Analytics and Learning Analytics Training.	4.57	0.82	4.19	0.88	4.38	0.85	Agreed
2.	Mobile Learning Design Training.	4.34	0.75	4.00	0.88	4.17	0.82	Agreed
3.	Training on creating accessible multimedia content.	4.32	0.67	3.70	0.91	4.01	0.79	Agreed
4.	Training on using storytelling techniques in multimedia content.	3.93	0.76	3.56	1.19	3.75	0.98	Agreed
5.	Online Collaboration and Communication Training.	3.98	0.93	3.93	1.04	3.96	0.99	Agreed
6.	Training on tools like Adobe Creative Cloud, Canva.	4.00	0.94	4.00	0.94	4.00	0.94	Agreed
7.	Training on digital assessment and feedback tools like Turnitin or Quizlet.	3.98	1.05	3.89	0.89	3.94	0.97	Agreed
8.	Training on LMS platforms like Moodle, Blackboard, or Canvas.	3.91	1.14	4.07	1.07	3.99	1.11	Agreed
9.	Training on AI, AR, blockchain, and other emerging technologies.	4.09	0.86	4.11	0.85	4.10	0.86	Agreed
10.	Training on curating and managing digital content for education.	4.25	0.89	4.19	0.92	4.22	0.91	Agreed
	Grand Means	4.14	0.88	3.96	0.96	4.05	0.92	Agreed

N_B , $\bar{X}_B$, SD_B = number, mean and standard deviation of Building Technology Lecturers, N_W , $\bar{X}_W$, SD_W = number, mean and standard deviation of Woodwork Technology Lecturers $\bar{X}_A$, SD_A = Average mean and standard deviation.

Table 2 shows the mean and standard deviation of the respondents on the training needs

required to improve multimedia competencies in construction technology education lecturers in Universities in Northern Nigeria. The Table 2

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showed the mean of building technology education lecturers ranges from 3.91 to 4.57, the standard deviation also ranges from 0.67 to 1.14 and the mean of Woodwork Technology Education Lecturers also ranges from 3.56 to 4.19 while the standard deviation ranges from 0.85 to 1.19 respectively. The grand mean of Building Technology education lecturers is 4.14 and 3.96 for woodwork technology education lecturers, the average mean of the respondents is ranged from 3.75 to 4.38 and the average standard deviation also ranges from .79 to 1.11. The grand mean of the respondents is 4.05 which indicates that there are training needs required to improve multimedia

competencies in construction technology education lecturers in Universities in Northern Nigeria.

Null Hypothesis One

There is no significant difference between the mean responses of building technology education lecturers and woodwork technology education lecturers regarding the challenges faced in integrating multimedia elements into teaching in universities in Northern Nigeria.

The result of testing null hypothesis one is presented in Table 3.

Table 3: Independent T-Test Analysis of the Mean Responses of Building and Woodwork Technology Education Lecturers on the Challenges Faced By Construction Technology Education Lecturers in Integrating Multimedia Elements into Their Teaching

Respondents	N	$\bar{x}$	S.D	Df	t-value	p-value	Decision
Building Technology Education Lecturers	44	3.8864	.61678	69	.565	.574	Accepted
Woodwork Technology Education Lecturers	27	3.8005	.50407				

The result of the independent t-test is presented in Table 3 showed that there is no significant difference between the mean response of building and woodwork technology education lecturers on the challenges faced by construction technology education lecturers in integrating multimedia elements into their teaching in in universities in Northern Nigeria within the degree of freedom (df) of 69, t-value of .565, p- value = .574. Since the p value is greater than the confidence level ($P > 0.05$) therefore, the null hypothesis one (H_{01}) was also accepted which implied that there is no significant difference between the mean response of building and woodwork technology education lecturers on the

challenges faced by construction technology education lecturers in integrating multimedia elements into their teaching in universities in Northern Nigeria.

Null Hypothesis Two

There is no significant difference between the mean responses of building technology education lecturers and woodwork technology education lecturers regarding the training needs required to improve the multimedia competencies of construction technology education lecturers in universities in Northern Nigeria.

The result of testing null hypothesis two is presented in Table 4.

Table 4: Independent T-Test Analysis of the Mean Responses of Building and Woodwork Technology Education Lecturers on the Training Needs Required to Improve Multimedia Competencies of Construction Technology Education Lecturers

Respondents	N	$\bar{x}$	S. D	df	t-value	p-value	Decision
Building Technology Education Lecturers	44	4.1364	.48517	69	1.371	.175	Accepted
Woodwork Technology Education Lecturers	27	4.0500	.50407				

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Respondents	N	$\bar{x}$	S. D	df	t-value	p-value	Decision
Woodwork Technology Education Lecturers	27	3.9566	.53573				

The result of the independent t-test is presented in Table 4 showed that there is no significant difference between the mean response of Building and Woodwork Technology Education Lecturers on the training needs required to improve multimedia competencies of Construction Technology Education Lecturers in Northern Nigerian Universities within the degree of freedom (df) of 69, t-value of 1.371, p -value = .175. Since the p value is greater than the confidence level ($P > 0.05$) therefore, the null hypothesis two (H_{02}) was likewise accepted which implied that there is no significant difference between the mean response of Building and Woodwork Technology Education Lecturers on the training needs required to improve multimedia competencies of Construction Technology Education Lecturers in universities in Northern Nigeria.

FINDINGS OF THE STUDY

Based on the analyses of data the following findings were made:

1. The challenges faced by construction technology education lecturers in integrating multimedia elements into their teaching in universities in Northern Nigeria include limited access to technology, outdated equipment, lack of institutional support and large class sizes among others. The null hypothesis one was therefore accepted, indicating that there was no statistically significant difference between the mean responses of building technology education lecturers and woodwork technology education lecturers regarding the challenges faced in integrating multimedia elements into teaching in universities in Northern Nigeria.
2. The training needs required to improve the multimedia competencies of Construction Technology Education lecturers in universities in Northern Nigeria include data analytics and

learning analytics, mobile learning design, creation of accessible multimedia content, use of Learning Management Systems (LMS) such as Moodle, Blackboard, and Canvas, and the application of emerging technologies such as Artificial Intelligence (AI), Augmented Reality (AR), blockchain, and other related technologies. Null hypothesis two was also accepted, indicating that there was no statistically significant difference between the mean responses of Building Technology Education lecturers and Woodwork Technology Education lecturers regarding the training needs required to improve their multimedia competencies in universities in Northern Nigeria.

DISCUSSION OF FINDINGS

The study also revealed the challenges faced by construction technology education lecturers in integrating multimedia elements into their teaching in universities in Northern Nigeria include limited access to technology, outdated equipment, lack of institutional support and large class sizes among others. This finding indicates that effective multimedia integration depends not only on the willingness and competence of individual lecturers but also on the availability of functional facilities, continuous professional development, institutional support and adequate financial resources. The finding is in line with Adamu and Salihu (2022), who identified inadequate ICT facilities, poor infrastructure and insufficient training as major barriers to effective technology integration in Nigerian tertiary institutions.

The finding also agrees with Bello and Sulaimon (2023), who reported that inadequate technological resources, limited training opportunities and insufficient institutional support constrain lecturers' effective use of digital

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technologies for instructional purposes. The findings further imply that universities need to provide modern multimedia facilities, organize continuous competency-based training, ensure regular maintenance and replacement of obsolete equipment, and strengthen institutional support to enable construction technology education lecturers to effectively integrate multimedia into teaching and learning. The findings indicate that construction technology education lecturers recognize the importance of multimedia and are generally willing to use it, but they require further development of their competencies and greater institutional support.

The challenges identified in the study show that improving multimedia integration requires more than training individual lecturers. It also requires the provision of appropriate facilities, regular professional development, technical support, adequate funding and institutional policies that encourage the effective use of multimedia in teaching and learning. Therefore, the study demonstrates that sustainable improvement in multimedia integration in Construction Technology Education depends on the combined efforts of lecturers and university management.

The findings revealed that data analytics and learning analytics, mobile learning design, creation of accessible multimedia content, use of Learning Management Systems (LMS) such as Moodle, Blackboard and Canvas, and the application of emerging technologies such as Artificial Intelligence (AI), Augmented Reality (AR), blockchain and other related technologies constitute important training needs for improving the multimedia competencies of Construction Technology Education lecturers in universities in Northern Nigeria. This finding suggests that lecturers require continuous professional development to acquire contemporary digital skills that can enhance instructional delivery, learner engagement and the effective management of technology-supported learning environments.

The finding is consistent with Basilotta-Gómez-Pablos *et al.* (2022), who emphasized the need for continuous development of digital competencies among higher education teachers

to enable them to effectively integrate emerging technologies into teaching and learning. Similarly, Basantes-Andrade *et al.* (2022) reported that university teachers require continuous training in digital technologies, digital content creation, online learning environments and emerging technological applications to strengthen their professional practice. The finding also agrees with UNESCO (2023), which emphasized continuous professional development in digital competencies, including the use of digital tools, technology-supported pedagogy and emerging technologies. Furthermore, the finding implies that training programmes for construction technology education lecturers should move beyond basic computer literacy and focus on advanced, practical and pedagogically relevant multimedia competencies.

CONCLUSION

Based on the findings of the study, it was concluded that construction technology education lecturers in universities in Northern Nigeria face several challenges that limit the effective integration of multimedia elements into teaching. These challenges include limited access to appropriate technology, outdated equipment, inadequate institutional support, large class sizes, and insufficient training opportunities. This indicates that effective multimedia integration requires not only individual lecturer competence but also adequate institutional facilities, technical support and conducive teaching conditions. The study further concluded that construction technology education lecturers require continuous and targeted training to improve their multimedia competencies. Key areas of training need include data and learning analytics, mobile learning design, accessible multimedia content development, Learning Management Systems, and emerging technologies such as Artificial Intelligence, Augmented Reality and blockchain.

The absence of significant differences between the responses of building technology education and woodwork technology education lecturers indicates that the identified challenges and training needs are generally common to both groups. Therefore, universities should provide

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regular, competency-based professional development programmes and strengthen institutional support to enable construction technology education lecturers to effectively integrate contemporary multimedia technologies into teaching and learning.

RECOMMENDATIONS

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

1. Universities should provide adequate multimedia facilities, digital laboratories, internet connectivity and modern instructional technologies to support effective teaching.
2. TETFund, NUC and University Administrators should collaborate in providing sustainable professional development opportunities aimed at improving multimedia competencies of construction technology education lecturers.

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