Ilaro Journal of Science and Technology (IJST), 2024
Published Online October 2024 (https://sciencetechjournal.federalpolyilaro.edu.ng)
Volume 3, 2024 Edition

Incorporating Multimedia Technology into TVET Curricula: Strategies for Fostering Innovation in Nigeria

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Abstract
This study investigates the incorporation of multimedia technology into the teaching of TVET curricula: strategies for fostering innovation in Nigeria. The population of this study is made up of TVET institutions' students and teachers in Ogun State. The study used a survey research design in which questionnaires were used as research instruments for data collection and the Purposive and simple random Sampling methods were employed. A total number of 150 students and teachers from two Technical Colleges in Ogun State (Government Technical Colleges, Ajegunle and Government Science and Technical College, Idi-Aba, Abeokuta.) administered questionnaires and the data analysis was carried out using SPSS version 25.0 software. The findings of the study revealed that Zoom, mobile apps for learning, YouTube, interactive websites, and smart TVs are multimedia technology tools suitable for teaching TVET. Findings also revealed that incorporating ICT and modern-day technology into the TVET curriculum is part of the strategies needed to foster innovation in the TVET curriculum in Nigeria (X =3.78, SD = 1.72). Furthermore, it was revealed that poor and slow internet connection which slow down the use of technology tools are some of the challenges that serve as obstacles to the integration of multimedia technology in the teaching of the TVET curriculum in Nigeria (X = 3.21, SD = 1.54). The study recommends the need to train more TVET instructors in the field of multimedia technology to be able to effectively handle the gadgets and technologies for teaching TVET.

Keywords: Education**,** Innovation, Multimedia, Technology, Technical Education

Introduction

Multimedia technology has a significant impact on learning satisfaction, it is essential for fostering innovation in vocational education. Learning environments that are dynamic, interactive and can accommodate a range of learning preferences and styles are produced by its integration. Further, multimedia technology also makes it possible for teachers to simulate real-world situations, which opens up practical and hands-on learning opportunities. This element is particularly helpful in vocational education, where applications and practical skills are required.

Similarly, according to Yusuff and Soyemi (2015), technical and vocational education and training (TVET) is a tool for socioeconomic development, long-term livelihood, and empowerment. TVET is defined by the United Nations Educational Scientific and Cultural Organization (UNESCO) as those aspects of the educational process that involve the study of technologies and related sciences in addition to general education, as well as the acquisition of practical skills, mindsets, understanding, and expertise related to occupations in various spheres of the economy and society (UNESCO, 2017).

Furthermore, according to Opatola *et al.* (2016) and Gbedegbe *et al.* (2023), TVET is a planned program of courses and learning experiences that starts with a career options exploration, supports fundamental academic knowledge, and equips workers with the skills needed for industry-defined work to turn Nigeria from its current status as a consumer and importer into a producer and manufacturing nation.

Hence, this study examines strategies for integrating multimedia technology into the teaching of Technical and Vocational Education and Training (TVET) curricula in Nigeria. In a world increasingly driven by digital and technological advances, Nigeria's educational systems, particularly TVET, must adapt to remain relevant and effective. Traditional teaching methods often limit students' engagement and practical skills acquisition, which are critical in the technical and vocational sectors.

The integration of multimedia technology into teaching TVET curricula in Nigeria remains inadequate, hindering

the development of a skilled workforce capable of meeting the demands of the modern economy. However, previous studies show that despite the potential benefits, many TVET institutions struggle to effectively integrate multimedia technology due to various barriers, such as outdated curricula, lack of technical expertise among educators, and insufficient infrastructure. Further, the rationale for this study stems from the need to enhance practical skills, foster innovation, and improve learning outcomes, addressing gaps in traditional teaching methods within Nigeria's rapidly evolving job market. This paper, therefore, investigates the incorporation of multimedia technology into teaching TVET curricula in selected TVET institutions in Ogun State

The primary aim of this study is to investigate the incorporation of multimedia technology into TVET curricula: strategies for fostering innovation in Nigeria. The secondary objectives are to identify various multimedia technology tools that can be integrated into the TVET curriculum in Nigeria, to explore strategies for fostering innovation in teaching the TVET curriculum in Nigeria and to identify the challenges that serve as obstacles to the integration of multimedia technology in the TVET curriculum in Nigeria. The important research questions raised by this study include what are the various multimedia technology tools that can be integrated into the TVET curriculum in Nigeria? What are the strategies needed to foster innovation in teaching the TVET curriculum in Nigeria? And what are the challenges that serve as obstacles to the integration of multimedia technology in the TVET curriculum in Nigeria?

Literature Review

The integration of technology in vocational education correlates with instruction with industry norms. According to Moore and Gilmartin (2010), it enables students to become acquainted with the tools and equipment utilized in their respective disciplines; to guarantee they are employable upon graduation. Technology improves the learning approach by offering interactive simulations, virtual labs, and online resources. Online platforms and digital resources give users access to specialized expertise and knowledge across the world. This broadens the scope of learning beyond geographic boundaries, allowing students to access the most recent material and achievements in their professions (Chen Yang, Chen, & Chen, 2019). As technology advances, vocational education evolves to accommodate new skills required by future employment markets. Many problems and challenges remain in the incorporation of multimedia technologies in most vocational institutions. Such obstacles are expressed in a variety of ways. For starters, multimedia's potential as an extremely modern teaching approach is neglected, limiting its full effectiveness. Innovations in vocational education and student satisfaction rely primarily on knowledge-based criteria, although this component has not been thoroughly evaluated. This weakness limits kids' ability to improve and grow their overall literacy. Furthermore, the use of multimedia technology in vocational schools can dramatically increase educational creativity and reform. Multimedia technology is currently being used in vocational education to increase pupils' satisfaction and innovation (Linder, 2017). The multimedia-based teaching method integrates the benefits of both online and conventional instructional methods. The implementation of this teaching method will greatly improve higher education (Liu & Fan, 2019). According to Zhu and Hu (2021), multimedia technology is being developed and popularized in vocational education. Furthermore, there is a rising emphasis on simulating the efficacy of e-learning mechanisms, taking into account factors such as the use of online assessments, student views of learning, and the deployment of diverse instructional strategies (Zhu, Wang, & Du, 2020). Multimedia technology enables an evolving and engaging learning experience. Integrating movies, simulations, virtual reality, and other multimedia aspects stimulates students, making the learning process more entertaining and successful.

A study on Technology Integration in Technical and Vocational Education and Training (TVET): The Role of Art Teachers was conducted by Gbadegbe *et al* (2023) carried out a study on Technology Integration in Technical and Vocational Education and Training (TVET): The Role of Art Teachers. Applying the Technological Pedagogical and Content Knowledge (TPACK) model, this study investigates the interrelationships between the knowledge needed for art teachers to effectively integrate technology into TVET instruction. The study considered that quality TVET practices could be accomplished if TVET teachers had a thorough understanding of their subject matter, pedagogical methods, and how to use technology resources. The study employed a quantitative data method and a Structural Equation Modelling (SEM) analytic technique to determine the path coefficients of direct or indirect influence between exogenous and endogenous factors. The data was analyzed using SPSS and Smarts PLS after being collected online. The study found a strong correlation between art teachers' knowledge and how much technology can be introduced into TVET.

The study also demonstrated that mastery of technology tools, technologically driven methods of instruction, and a teacher's technical knowledge and abilities are essential mechanisms for fostering efficient skill development at the TVET level. This indicates that educators, training institutions, policymakers, and stakeholders in the TVET ecosystem should focus on such mechanisms to improve TVET teaching and learning delivery

Wu (2024) carried out a study on the application of Multimedia Technology to Innovative Vocational Education on learning satisfaction in China. The paper investigates the impact of multimedia technology in enhancing learning satisfaction within innovative vocational education. It delves into the utilization of

multimedia tools and their correlation with learner satisfaction, exploring how these technologies augment engagement and comprehension in vocational training. The primary data from 515 students of vocational colleges of China has been collected and regression analysis is applied for empirical analysis. The study found that multimedia technology had a positive link with innovative vocational education and learning outcomes. The outcomes provide policymakers with vital insights into the important role multimedia plays in promoting enhanced learning experiences and general happiness among vocational learners.

Materials and Methods

In this study, a survey research design was used and the population consists of students and teachers in TVET institutions in Ogun State. In Ogun State, there are eight technical colleges with an estimated population of 1000 for students and teachers (Federal Ministry of Education, (2023). A purposive sampling technique was used to determine the sample size which is 150 and only two schools, Government Technical College, Ajegunle and Government Science and Technical College, Idi-Aba, Abeokuta. Due to time and financial constraints, simple random sampling was used to select the actual 150 students and teachers (120 students and 30 teachers; 60 students and 15 teachers from each school, respectively). A structured questionnaire was used to collect data which was analyzed using SPSS version 25.0. The research questions were answered and analyzed using frequency tables and simple percentages.

Presentation and Interpretation of Results

Research Question One

What are the various multimedia technology tools suitable for the integration of the TVET curriculum in Nigeria?

Table 1: Multimedia technology tools suitable for TVET

Multimedia Technology Tools	Frequency	Percent
Mobile Apps	31	20.7
Interactive Websites	11	7.3
Smart TV	9	6.0
YouTube	26	17.3
Zoom	73	48.7
Total	**150**	**100.0**

Authors' Computations from Field Survey (2024)

Table 1 shows that 73 (48.7%) of the respondents claimed that Zoom is suitable for TVET, 31 (20.7%) claimed that mobile apps for learning are suitable, 26 (17.3%) claimed that YouTube is suitable, 11 (7.3%) claimed that interactive websites are suitable while 9 (6.0%) claimed that smart TV is suitable for TVET. This implies that the majority of the respondents claimed that Zoom is suitable for TVET. This implies that Zoom, mobile apps for learning, YouTube, interactive websites, and smart TVs are multimedia technology tools suitable for TVET.

Research Question Two

What are the strategies needed to foster innovation in TVET curriculum in Nigeria?

Table 2: Strategies needed to foster innovation in TVET curriculum in Nigeria

Statements	SA	A	D	SD	Mean	Stand Dev
Integration of practical hands-on lab experience and apprenticeship	73 (48.7 %)	69 (46.0 %)	8 (5.3 %)	-	3.43	1.61
Incorporate ICT and modern-day technology into the TVET curriculum	65 (43.3 %)	78 (52.0 %)	7(4.7 %)	-	3.78	1.72
Integrate innovation, skill acquisition, and entrepreneurship education into the TVET curriculum	57 (38.0 %)	84 (56.0 %)	6 (4.0 %)	3(2.0 %)	3.54	1.83

Authors' Computations from Field Survey (2024)

Table 2 shows that 73 (48.7%) of the respondents strongly agree, 69 (46.0%) agree while 8 (5.3%) disagree that integration of practical hands-on lab experience and apprenticeship are part of the strategies needed to foster innovation in TVET curriculum in Nigeria, 65 (43.3%) of the respondents strongly agree, 78 (52.0%) agree while 7(4.7%) disagree that incorporating ICT and modern day technology into TVET curriculum are part of the strategies needed to foster innovation in TVET curriculum in Nigeria. Furthermore, 57 (38.0%) strongly agree, 84 (56.0%) agree, 6 (4.0%) disagree and 3(2.0%) strongly disagree that integrating innovation, skill acquisition, and entrepreneurship education into the TVET curriculum is part of the strategies needed to foster innovation in TVET curriculum in Nigeria.

Research Question Three

What are the challenges that serve as obstacles to the integration of multimedia technology in the TVET curriculum in Nigeria?

Table 3: The challenges that serve as obstacles to the integration of multimedia technology in the TVET curriculum in Nigeria

Statements	SA	A	D	SD	Mean	Stand Dev
Poor and slow internet connection which slows	72 (48.0%)	64 (42.7%)	9 (6.0%)	5 (3.3 %)	3.21	1.54

down the use of technology tools						
Lack of adequate infrastructure and facilities for teaching and learning	49 (32.7%)	86 (57.3%)	11 (7.3%)	4 (2.7%)	3.17	1.44
Shortage of trained TVET instructors in the field of multimedia technology	66 (44.0%)	75 (50.0%)	6 (4.0%)	3 (2.0%)	3.14	1.68

Authors' Computations from Field Survey (2024)

Table 3 shows that 72 (48.0%) of the respondents strongly agree, 64 (42.7%) agree, 9 (6.0%) disagree while 5 (3.3%) strongly disagree that poor and slow internet connection which slow down the use of technology tools are some of the challenges that serve as obstacles to the integration of multimedia technology in TVET curriculum in Nigeria, 49 (32.7%) of the respondents strongly agree, 86 (57.3%) agree, 11 (7.3%) disagree while 4 (2.7%) strongly disagree that lack of adequate infrastructure and facilities for teaching and learning are some of the challenges that serve as obstacles to the integration of multimedia technology in TVET curriculum in Nigeria. Furthermore, 66 (44.0%) of the respondents strongly agree, 75 (50.0%) agree, 6 (4.0%) disagree 3 (2.0%) strongly disagree that the shortage of trained TVET instructors in the field of multimedia technology is some of the challenges that serve as obstacles to the integration of multimedia technology in TVET curriculum in Nigeria.

Discussion of Results

The findings of this study revealed that Zoom, mobile apps for learning, YouTube, interactive websites, and smart TVs are multimedia technology tools suitable for TVET. In addition, findings revealed that the majority of the respondents agree that integration of practical hands-on lab experience and apprenticeship, incorporating ICT and modern-day technology into the TVET curriculum as well as integrating innovation, skill acquisition, and entrepreneurship education into the TVET curriculum are part of the strategies needed to foster innovation in TVET curriculum in Nigeria. Furthermore, the findings of this study revealed that poor and slow internet connection which slow down the use of technology tools, lack of adequate infrastructure and facilities for teaching and learning as well the shortage of trained TVET instructors in the field of multimedia technology are some of the challenges that serve as obstacles to the integration of multimedia technology in TVET curriculum in Nigeria. These findings support the study of Wu (2024) who reported that multimedia technology had a positive link with innovative vocational education and learning outcomes.

Conclusion and Recommendations

This study shows that the integration of practical hands-on lab experience and apprenticeship, incorporating ICT and modern-day technology into the TVET curriculum as well as integrating innovation, skill acquisition, and entrepreneurship education into the TVET curriculum are part of the strategies needed to foster innovation in the TVET curriculum in Nigeria. The result also revealed that Zoom, mobile apps for learning, YouTube, interactive websites, and smart TVs are multimedia technology tools suitable for teaching TVET. In conclusion, integrating multimedia technology into Nigeria's TVET curriculum presents significant opportunities for enhancing learning and fostering innovation. Tools like Zoom, mobile apps, YouTube, and smart TVs can modernize instruction, making it more interactive and aligned with industry demands. However, to fully realize these benefits, challenges such as poor internet connectivity, inadequate facilities, and a lack of trained instructors must be addressed. By investing in infrastructure, training educators, and incorporating hands-on learning and entrepreneurship education, Nigeria can transform TVET teaching, equipping students with the skills and adaptability needed in a rapidly evolving job market and fostering national development. The study recommends that there is need to implement comprehensive multimedia technology training programs for TVET instructors to enhance their proficiency in using and teaching with multimedia tools in line with the curricula. Increase financial investment in multimedia resources for TVET, ensuring adequate funds for purchasing, maintaining, and updating multimedia equipment are also recommended.

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