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Trainers' Perceptions of Audio-Visual Method Utilisation in Science-based Entrepreneurship Education at Federal Polytechnic Nekede

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Abstract: **The study investigated trainers' perception of audio-visual utilisation in science-based entrepreneurship education at Federal Polytechnic Nekede, Owerri, Imo state, Nigeria. The objectives of the study include among others to identify science-based entrepreneurship vocational training available at the Federal Polytechnic Nekede, Owerri, ascertain trainers' extent of familiarity with usage of audio-visual methods in science-based entrepreneurship education. The study is anchored on technological determinism. The in-depth interview method was adopted to collect qualitative data from science entrepreneurship teachers and sample size was based on saturation principle leading to responses from six science entrepreneurship facilitators in the relevant area who were purposively selected. Instrument for data collection was the interview guide containing five questions which was subjected to face validation by an expert researcher. The qualitative data collected were analysed using explanation building techniques. Result revealed that trainees engage in science related entrepreneurship studies including; deodorant production, snail keeping, bread making, computer networking, web and application design, agri-based enterprises, and frame and lens fabrication among others, that trainers are familiar with some audio-visual methods. Respondents were of the view that both traditional and audio-visual methods should be synergised in science-based entrepreneurship training among other findings. Based on the findings of this study, it was recommended that science entrepreneurship teachers should be versatile in their teaching methods, that relevant devices required for audio-visual content and presentations should be made available at various institutions' entrepreneurship centres.**

Keywords: **audio-visual utilization, Federal Polytechnic Nekede, science entrepreneurship teachers, building techniques, various institutions' entrepreneurship centres.**

1. INTRODUCTION

The recognition of the place of entrepreneurship in sustainable development is instrumental to its introduction into the Nigerian educational system. However, the effectiveness of traditional teaching methods in achieving the objectives of science-based entrepreneurship education remains questionable (Fed. Min. of Education, 2018). Referring to (Fraser et al. 2014; Freeman et al. 2014; Haak et al. 2011; Meltzer and Thornton 2012), Bøe, et al. (2024) asserted that science, technology, engineering and mathematics (STEM) students learn better through active learning activities than the traditional lecture environments and that active learning approaches can foster students' connection to their discipline and enhance their capacity for advanced critical thinking.

In recent years, educational outcomes in Nigeria particularly within Imo state have been constrained by a persistent decline in student engagement and academic performance. This trend underscores an urgent need to shift from traditional teaching methodologies toward more immersive, interactive pedagogies. Adopting such advanced pedagogical frameworks is critical not only for strengthening trainees' science-based entrepreneurial capacities and demystifying complex scientific processes, but also for accelerating the vital digitalization of science-based entrepreneurship education. Documentary film as a multimedia and multilingual oriented media genre can positively affect the process, motivation, and student learning outcome. Referring to (Adi et al., 2021; Mulyana, 2017; Saufi & Rizka, 2021) in Sukamto (2023:235) "Film learning media makes students more enthusiastic and eager to participate in learning which leads to the conclusion that students' learning motivation can be increased with the help of a documentary film learning environment". Meanwhile, documentary as a film format of presentation has become more sophisticated as a result of technological advancements including the internet and social media platforms such as the facebook, YouTube, Instagram, Tiktok among others (Maskun et al, 2021; Calvillo et al.2023).

Science-based entrepreneurship vocational training in areas including but not limited to production of deodorants, bread making, snaring, bee keeping, livestock keeping, frames and lenses fabrication, pharmaceutical production, networking, data analytics can be packaged using audio-visual methods like the documentary, animations, slides, virtual reality and other formats to facilitate achievement of learning goals. More so, Information Communication Technology (ICT) virtual environment are relevant and can serve as platforms for audio-visual presentation and reception outlets (Chen et al., 2022). The teachers in various institutional entrepreneurship centres in the tertiary institutions can use these approaches to demonstrate visual presentations of processes, patterns, techniques and designs of various training contents for the students in the course of entrepreneurship studies. The content are usually easy to share on internet-enabled platforms including the social media platforms at any point thereby creating avenue for teacher-learner centred pedagogy. The approach can represent active learning activities recommended for impacting knowledge and skills in sciences and other fields (Bøe, et al.2024).

The technological devices including, computers, televisions, language laboratories support the use of audio-visual methods and their the combination with other methods in the teaching learning process in order to improve students' competence (Barona-Oñate, et al. 2019). Explaining this approach Sarkar (2022) stated that audio-visual aids are instructional material that appeal to the senses of hearing and visual. They are the instructional method of teaching and learning that use audio and visual model of learning. They are devices that are used in the classroom to make learning engaging and easy. These can also help teachers to communicate messages or information in places where conventional teaching methods may not succeed. Despite the potential of the audio-Visual aids, their utilisation particularly in entrepreneurship education remains uncertain. Moreover, empirical studies on both the conceptual and geographical scope of this study is limited, therefore this study will address the gap by assessing trainers' view regarding the use of audio-visual methods for teaching and learning science-related entrepreneurship courses in the Nigeria's context with a focus on federal Polytechnic Nekede, Owerri, Imo state. The findings of this study will contribute significantly to the advancement of United Nations Sustainable Development Goal 4 (SDG 4), that targets the delivery of equitable and quality education which also aligns with the Nigerian National Policy on Science and Technology Education. Moreover, by validating innovative, digitally-driven instructional methods, this research provides empirical pathways to enrich learning outcomes, cultivate critical entrepreneurial skills, and foster lifelong learning opportunities within the contemporary educational ecosystem.

Statement of the Problem

The issue of unemployability of most Nigerian graduates is a grave concern. Job seekers instead of job creators with many lacking the requisite industry skills and competencies. This is despite the acclaimed entrepreneurship studies at the tertiary institutions particularly in the Polytechnics. However, this problem may be attributed to students' apathy to learning probably arising from poor teaching methods especially in science related programs (Fed Min. of Education, 2018).

To save this situation from further deterioration, there is the need to develop an innovative, engaging and technology oriented audio-visual model in forms such as documentary, animation films, slides, virtual reality etc particularly for science-based entrepreneurship education. Meanwhile, trainers' dispositions towards adoption of audio-visual methods for teaching and learning science-based entrepreneurship remains uncertain. Therefore, this study intends to examine trainers' perception of audio-visual methods for science-based entrepreneurship education at Federal Polytechnic Nekede Owerri, Imo State, Nigeria.

Objectives of the Study

The aim of the study is to assess trainers perception of the utilisation of audio-visual methods in science-based entrepreneurship education at Federal Polytechnic Nekede, Owerri, Imo State. The specific objectives include to;

1. identify science-based entrepreneurship vocational training programmes available at Federal Polytechnic Nekede Owerri, Imo state.

2. ascertain trainers' extent of familiarity with audio-visual methods in science-based entrepreneurship education at Federal Polytechnic Nekede.

3. assess trainers' preference for the use of audio-visual methods at Federal Polytechnic Nekede Owerri, Imo State.

4. determine trainers' perceived challenges of using audio-visual methods for science-based entrepreneurship education at federal Polytechnic Nekede Owerri, Imo State.

2. REVIEW OF LITERATURE

Literature that dwells on utilisation of audio-visual methods for science-based entrepreneurship education is limited. Hence this study will add to the existing body of empirical studies.

Science Learning, Entrepreneurship Education and Audio-visual Methods

Learning generally including science is meant to build and improve the capacity of students to tackle problems, respond to problems, and provide solutions to problems that arise both in learning and in the real world (Jumini, 2016; Mildenhall et al., 2019; Soetomo, 2017) referred to in Jumini, et al.(2022). However, science, especially physics, is still making poor achievements, physics is considered a difficult subject and is not of interest to most students (Bray and Williams, 2020). Companies as business/industrial worlds need creative ideas generated by lecturers and student. Learning science by analyzing problems that occur in society can train students' abilities to be sensitive, and critical in analyzing problems, and also train systems thinking skills (Jumini et al.2022).

Even though student-centered instruction leads to positive student outcomes, teacher-centred instruction methods have remained in use in many institutions. Several barriers prevent instructors from further adopting evidence-based student-centered practices and holistic approaches. Introducing audio visual Practices including slides, videos, simulations or demonstrations related to the material aimed at incalcuting student-centered instructional practices is paramount (Biswas,et al, 2022) particularly in the study of entrepreneurship. Besides, bringing the real world into the classroom serves as an experiential alternative that is possible through audio-visual methods. The teacher-centred pattern can be modified by process of co-creation of the problem through student-teacher based(Blankesteijn 2024).

Empirical studies

The possibility of training that covers the whole processes in basic natural sciences, the market innovation strategies evolving from research and the interprising strategies were examined in Blankesteijn *et al.*,(2020) as a means for university-industry technology transfer. The study found that major themes like cultivating entrepreneurial mindset and balancing theory and practicals were not adequately covered.

Moreover, Chen, et al (2022) did a survey study on effectiveness of virtual team learning in entrepreneurship competence in the Chinese higher education sector. Four hypotheses were raised to analyze two sorts of relationships: between input, respondents' demographics or characteristics, and mediators such as virtual teamwork, virtual taskwork, information and communication technology; the other between mediators and output in relation to effectiveness of entrepreneurship education. An online survey was carried out to collect respondents' perceptions of virtual team learning in entrepreneurship education from teamwork, taskwork, and information and communication technology aspects, considering respondents' characteristics. By explaining factors of the team process, the findings show that virtual teamwork, taskwork, and information and communication technology positively affect the entrepreneurial outcome of virtual team learning. Moreover, individual characteristics, including gender, educational qualification, field, entrepreneurial family background, and prior entrepreneurial experience have different effects on three elements of virtual teams.

Relatedly, Adebayo,(2021) did a study on students' perceptions of intrepreneurship education in selected Federal Polytechnics in Nigeria. The researchers purposively selected three Federal Polytechnics in Nigeria. A structured

questionnaire that employed 4-likert scale was the instrument used for data collection. A total number of 475 copies of questionnaire were administered to students who were randomly selected for the study. Frequency, percentages and mean aided by Statistical Package for the Social Sciences (SPSS) were used for the analysis. The study revealed that significant number of students positively perceived entrepreneurship education in polytechnics. It was however recommended that the stakeholders should give more support towards the realization of the objectives of the programme.

In another study, Ubogu, (2023) conducted a study on entrepreneurship education in tertiary institutions in Nigeria for national development. The aim of the research was to X-ray the use of digital technologies for entrepreneurship teaching in tertiary institutions in Imo State. Two research questions and two null hypotheses guided the study. Descriptive survey design was used for the study. The population of the study comprised ninety (90) lecturers from two universities in Imo State.; Alvan Ikoku Federal College of Education and the Federal University of Technology, Owerri, Imo State. The entire population was studied as the population was manageable. A self-made Digital Technology Questionnaire (DTQ) validated by three experts was the main instrument for data collection. A pilot test was used to establish the reliability of the instrument and data collected were analyzed ouusing Cronbach Alpha to obtain reliability coefficient value of 0.77. Mean and standard deviation were used to answer the research questions, while t-test was used to test the null hypotheses formulated at 0.05 level of significance. Findings of the study revealed that digital technologies were not adequately utilized for teaching entrepreneurship instructional delivery in universities in Imo State. Based on this findings, it was recommended among others that administrators of universities in Imo state should intensify efforts to procure adequate digital technological tools to enhance effective teaching of entrepreneurship for effective delivery and that university management needs to collaborate with the government to train business education lecturers for effective utilisation of digital technology tools in teaching and learning of entrepreneurship-oriented courses.

Furthermore, Boe, et al.(2024) conducted a study to determine how student motivation interacts with learning activities with special attention to active learning and the Scandinavian context where participation in learning activities is not imposed but voluntary. Twenty-one undergraduate physics students at a large, research-intensive university in Norway participated in nine focus group interviews at the beginning and end of the spring term of 2020. The study was anchored on self-determination theory. Thematic analysis gave rise to three themes: students' autonomous motivation came from mastery experiences and perceived learning, such as the joy of solving a problem. Second, active learning activities enabled students' autonomous motivation when these activities supported competence, for example through optimal challenge or with evident learning gains. In contrast, students experienced low or controlled motivation when excessive challenge and lack of mastery threatened their sense of competence among others. The emphasis on mastery and competence for these students was discussed considering how physics is associated with difficulty and extraordinary cleverness.

Meanwhile, Islam (2023) conducted a study that aimed to analyze differences in student learning outcomes in the Islamic Cultural History course between groups of students studying explanation documentation and those studying traditional learning. The research approach used is quantitative research. The population of this study amounted to 45 students. It consisted of 40 experimental students, and the control class has 42 students. The test result data was analysed using quantitative analysis. Results indicated that using a documentary learning environment substantially impacts student learning outcomes in Islamic Cultural History courses. This implies that using film learning media makes students more enthusiastic and motivated to participate in learning. Thus, students' learning motivation can be increased through documentary films.

In the same vein, Sanchez-Calvillo et al.(2023) carried out a research to analyze the durability of local materials and vernacular constructions of the state of Michoacan. The main approach involved the architectural survey and inspection of these buildings, photographic and drone surveys, characterization in the laboratory and oral interviews with local users. During the field work, interviews with the local population, the creation of multimedia content and the use of audiovisual method was crucial in the documentation of this local knowledge and culture, being great methods for scientific communication and dissemination. The main product was the documentary Xirangua, which means ‘roots’ in the Purépecha language, the main indigenous ethnicity in the state. The documentary explores the traditional architecture and construction of Michoacan, indicating the reality within the loss of this vernacular heritage and the imperative of its conservation through the perspective of the local population, users and artisans. The use of these audiovisual techniques have demonstrated to be suitable for the promotion and preservation of cultural heritage and for education. It also raised awareness about the current issues particularly on cultural heritage preservation using documentary film, scientific communication among others.

Theoretical Framework

This study is anchored on the theory of Technological determinism introduced by Thorstein Veblen in 1857. The major idea advanced in the theory is that technology drives change and determines societal transformation. Thus the theory's relevance to this study is that audio visual methods are technology oriented involving use of digital equipment and accessories such as computers systems, smart phones among others. Secondly, the rationale for proposing audio visual methods is to improve the current state of entrepreneurship education in the tertiary institutions in order to transform the socioeconomic condition of Nigeria.

Method

The study adopted the in-depth interview method to collect qualitative data from teachers/facilitators in the science disciplines in Federal Polytechnic Nekede, Owerri, Imo state. Sample size was based on saturation principle. Eleven science entrepreneurship teachers from the Schools of Industrial and Applied Sciences, Agriculture and Agricultural technology, Information Communication Technology and school of Health technology were purposively selected and interviewed. Instrument for data collection was the interview guide containing five questions which was subjected to face validation by an expert researcher. The researchers interviewed the respondents face-to-face to collect qualitative data on the variables of the study. The data collected were analysed using explanation-building techniques.

3. RESULT AND DISCUSSION

This discussion is based on the objectives of the study.

Available Science-Based Entrepreneurship Vocational Training programmes in Federal Polytechnic Nekede, Owerri

The findings of the study revealed that Federal Polytechnic Nekede offers a broad range of science-based entrepreneurship vocational training programmes through its Entrepreneurship Development Centre (EDC). These include soap making, deodorant production, snail keeping, bread making, computer networking, web and application design, snacks production, agri-based enterprises, and frame and lens fabrication. These areas of training reflect a synthesis of chemical sciences, biological sciences, agricultural technology, and information and communication technology (ICT), thereby equipping students with practical competencies rooted in scientific principles and technological applications. Together, these programmes demonstrate the Polytechnic's integration of scientific knowledge into entrepreneurship development, aligning training activities with labour-market demands for technologically informed and scientifically literate entrepreneurs.

The findings align with Ubogu (2023), who affirmed that entrepreneurship education is well established across Nigerian polytechnics, providing learners with practical skills required for self-reliance. The diversity of science-based training options available at Federal Polytechnic Nekede supports this claim and highlights a strong institutional commitment to applied skill development. Similarly, the findings resonate with Adebayo (2021), who argued that positive trainer perception fosters greater learner engagement in entrepreneurship programmes. In this context, trainers' awareness of relevant and diverse science-based vocational options may contribute to their favourable attitudes toward integrating audio-visual methods into instruction. The implication is that the breadth of the Polytechnic's science-based training offerings provides a foundation for understanding trainers' preference for audiovisual methods. Many vocational tasks involve sequential, stepwise actions that are difficult to explain verbally but can easily be demonstrated through visual media. The hands-on nature of activities such as soap making, computer networking, and frame fabrication underscores the relevance of audiovisual tools for enhancing clarity.

The findings can also be interpreted through the theory of technological determinism, which posits that technological tools shape human actions, learning behaviours, and organizational practices. The availability of diverse, science-based entrepreneurship programmes at Federal Polytechnic Nekede likely influences trainers' inclination to employ audio-visual methods, as these technologies enable more effective communication of scientific processes. In other words, the nature of the vocational training itself particularly its scientific and technical orientation may necessitate the adoption of audiovisual resources. As technological determinism suggests, the structure and demands of technology within a learning environment directly shape pedagogical choices. The need to teach complex scientific procedures thus encourages the use of visual demonstrations, digital simulations, and multimedia instructional materials.

Trainers' Familiarity with Audio-Visual Methods

The findings of the study revealed that trainers demonstrated varying levels of familiarity with audio-visual methods used in science-based entrepreneurship education. Many of the trainers indicated that they were knowledgeable about basic audio-visual tools such as slides and PowerPoint presentations for teaching and learning. They reported confidence in using these tools to create instructional content that supports students' understanding of entrepreneurship concepts. Beyond simple slide presentations, some trainers stated that they could develop vocational training materials using documentary techniques, animations, and graphics particularly when teaching complex processes that require visual demonstration.

The findings also showed that several trainers gained practical experience with audio-visual methods during the COVID-19 pandemic. They prepared audio-visual materials and shared them with students as supplementary learning resources after physical class meetings. This demonstrates adaptive use of technology to sustain teaching and learning during periods of restricted physical interaction. However, despite this experience, some trainers acknowledged limited knowledge regarding the packaging of entrepreneurship content using advanced multimedia tools such as documentaries, graphics-rich slides, and animations. This suggests that while trainers have foundational familiarity with audio-visual methods, many have not yet achieved full competence in creating comprehensive multimedia instructional packages.

The findings align with Islam (2023), who found that learners exposed to documentary-based instructional content performed better academically. By confirming that trainers use similar documentary techniques, the present findings reinforce the instructional value and effectiveness of audio-visual materials in enhancing learning outcomes. The findings also relate to Ubogu (2023), who observed inadequate use of audio-visual methods in entrepreneurship teaching within Nigerian tertiary institutions. The trainers' partial familiarity with multimedia techniques in this study supports Ubogu's argument that usage is present but not yet optimal.

Furthermore, the findings resonate with Sanchez-Calvillo et al. (2023), who produced a documentary as part of their research and highlighted that audio-visual techniques are well-suited for the promotion and preservation of cultural heritage and for educational purposes, including entrepreneurship. The trainers' reliance on documentaries, animations, and graphics for demonstrating scientific and entrepreneurship concepts provides further evidence that audio-visual methods serve as powerful tools for communication, engagement, and knowledge dissemination. The theory of technological determinism provides additional insight into these findings. According to this perspective, technology influences the nature of teaching practices as well as educators' capacity to adopt new instructional approaches. Trainers' familiarity with audio-visual methods appears to be shaped by their access to digital tools, exposure to multimedia platforms, and the broader technological environment of the institution. The increased use of audio-visual materials during the COVID-19 pandemic also suggests that external technological pressures can accelerate the adoption of new teaching strategies. However, differences in trainers' expertise in packaging audio-visual content indicate that technological access alone does not guarantee uniform proficiency; rather, the availability of supportive infrastructure, training opportunities, and institutional encouragement also plays a determinant role.

Trainers' Preference for Audio-Visual Methods in Science-Based Entrepreneurship Training

The findings of the study revealed that trainers generally expressed a positive preference for the use of audio-visual methods in science-based entrepreneurship training. Trainers viewed audio-visual tools as a welcome innovation capable of enhancing skills mastery, particularly in vocational and science-based contexts where visual demonstration is essential. They reported that audio-visual content helps learners recall important aspects of the training, suggesting that such methods support improved retention and application of technical knowledge.

However, the findings also showed that trainers do not support the exclusive use of audio-visual methods as a standalone instructional approach. Respondents emphasized that relying completely on audio-visual tools may hinder effective teacher-learner interaction, which remains vital for clarifying concepts, providing feedback, and facilitating hands-on practice. Thus, the trainers preferred a blended instructional approach, where traditional face-to-face teaching methods complement the use of audio-visual materials. This combined approach was perceived as particularly important for science-based entrepreneurship training, which requires both conceptual understanding and practical demonstration. The findings support Sanchez-Calvillo et al. (2023), who documented interviews using multimedia and audiovisual techniques and highlighted their effectiveness for scientific communication and dissemination. The trainers' views in this study reinforce the idea that audiovisual materials provide rich, contextualized learning experiences that strengthen comprehension.

The findings also corroborate the principles of active learning discussed by Boe et al. (2024). According to their work, instructional strategies that engage learners through interactive or visually enhanced methods are more likely to produce improved learning outcomes. This aligns with trainers' reported preference for using audiovisual tools to demonstrate complex entrepreneurial processes. The study further agrees with Chen et al. (2022), who found that virtual teamwork, taskwork, and the integration of information and communication technology positively influence entrepreneurial learning outcomes. Their findings suggest that audiovisual tools can meaningfully shape instructional design decisions in entrepreneurship education. Trainers in this study shared similar views, noting that audiovisual methods can improve engagement and help learners visualize scientific and entrepreneurial concepts more effectively.

Similarly, the results align with Biswas et al. (2022), who argued that incorporating slides, videos, simulations, and graphic demonstrations is essential for delivering effective instruction. Trainers' preference for using audiovisual techniques as a supplement to traditional teaching underscores the importance of integrating multimedia tools into science-based entrepreneurship curricula. The findings support Blankesteijn (2024), who suggested that co-creation of instructional materials such as audiovisual content between teachers and students can enhance learning outcomes. The trainers' emphasis on adapting audiovisual materials to students' needs reinforces this perspective. Moreover, the study aligns with Barona-Oñate et al. (2019), who argued that combining audiovisual materials with other instructional methods improves students' skills and overall learning effectiveness. The trainers' response in this study support this blended-approach recommendation.

Importantly, the theory of technological determinism provides a useful lens for interpreting trainers' preferences. According to this theory, technological tools shape human behavior, communication patterns, and instructional practices. Trainers' preference for audiovisual methods may thus be influenced by the availability of digital devices, institutional infrastructure, and access to technological tools required for producing and consuming multimedia content.

Challenges

Finding indicated that development and use of audio-visual teaching content present several technological and socio-economic challenges that affect both facilitators and learners. For instance, it was reported that producing high-quality audio-visual materials often requires sophisticated digital devices with large storage capacities, which many trainers do not possess. In addition, many trainers lack the necessary technical skills to design, edit, and package audio-visual content effectively for instructional purposes. Limited financial resources also hinder the ability of facilitators to purchase sufficient data for uploading or sharing large video files.

Finding revealed that challenges also exists among the students who do not own smartphones capable of accessing or streaming audio-visual materials, while many struggle with the cost of mobile data. As a result, even when facilitators successfully create educational videos, many students are unable to access them, thereby undermining the intended learning outcomes. The findings of this study contradict Islam (2023), who did not adequately consider enabling factors such as device availability and financial capacity when evaluating the effectiveness of audio-visual materials. The results, however, support Ubogu's recommendation that educational institutions must intensify efforts to provide adequate digital tools to enhance effective teaching, particularly in entrepreneurship education. These findings also challenge Sajidan et al. (2021), whose work aimed to enhance science-based entrepreneurship skills but did not fully address the accessibility barriers faced by learners and facilitators.

Based on the theory of technological determinism and in relation to the findings of this study technological devices influence social practices, including teaching and learning processes. In this context, access to audio-visual learning materials is determined by the availability and affordability of these devices. However, differences in learners' economic backgrounds create unequal access, meaning that technology does not benefit all learners equally. Thus, while technology drives changes in instructional delivery, socio-economic disparities continue to shape who can participate effectively in such technologically driven learning environments.

4. CONCLUSION AND RECOMMENDATIONS

This study examined trainers' perceptions of audio-visual method utilisation in science-based entrepreneurship education at Federal Polytechnic Nekede, Owerri. The findings revealed that the institution offers a wide range of science-based vocational programmes that reflect the integration of chemical sciences, biological sciences, agricultural science, ICT, and eyecare-reated competences thereby providing students with practical, science-driven entrepreneurial skills. It established

that trainers possess varying levels of familiarity with audiovisual methods. While many are competent in using slides, documentary techniques among others, some experience challenges in packaging comprehensive multimedia content. However, they emphasized that audiovisual methods should not operate as standalone teaching strategies, instead, they should complement traditional methods to strengthen teacher-learner interaction and hands-on learning. The findings also highlighted several challenges affecting audiovisual integration, including limited access to sophisticated digital devices, inadequate technical skills and other barriers that reduce the potential benefits of audiovisual technologies in entrepreneurship education.

Based on the findings of this study, recommendations were made as follows;

1. Federal Polytechnic Nekede management should strengthen technological infrastructure, invest in modern digital tools and improved internet connectivity to support effective audiovisual content creation and delivery.

2. Institutions should ensure continuous capacity-building for trainers through regular workshop organized to train instructors in multimedia development, including video editing, animation, documentary production, and graphic design. This will close skill gaps and improve trainers' competence in audiovisual utilisation.

3. Teachers should adopt a blended instructional approach to complement traditional teaching methods rather than replace them to enhance understanding of complex scientific and vocational processes.

4. Government should support institutions to develop AV content libraries for high-quality resources and training.

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