

Multimedia Technology for Enhancing Adult Learners' Academic Performance at the Institute of Adult Education in Tanzania

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Abstract

Multimedia technology offers considerable potential to improve teaching and learning in adult education, yet its effective integration depends on appropriate institutional and technological support. This study examined the role of multimedia technology in enhancing adult learners' academic development at the Institute of Adult Education (IAE) in Dar es Salaam and identified strategies for improving its use. A qualitative case study design was employed, involving 20 participants selected through purposive sampling. Data were collected through in-depth interviews and focus group discussions and analyzed thematically. The findings indicate that multimedia technology broadens learners' understanding, strengthens their confidence, facilitates teaching and learning, saves time, and reduces family conflicts. However, its effective implementation is constrained by technical and systemic difficulties, inadequate institutional infrastructure, unreliable internet connectivity, and the high cost of internet data. The findings further identify strategic investment in infrastructure, professional development, and reduced internet-access costs as important conditions for successful multimedia integration. The study concludes that the educational benefits of multimedia technology depend substantially on adequate infrastructure and

equipment, relevant knowledge, and reliable internet access; without these foundations, its integration is unlikely to progress beyond a theoretical aspiration. This study contributes context-specific evidence on multimedia-supported adult education and highlights the need for educational institutions to prioritize technological capacity when transitioning from conventional face-to-face instruction toward more modern learning systems.

Keywords: Academic Development; Adult Education; Digital Learning; Multimedia Technology; Tanzania

INTRODUCTION

Adult education plays a critical role in lifelong learning and socio-economic development, especially in rapidly digitalising societies like Tanzania (UNESCO, 2021). Technological transformation such as the use of multimedia in education, particularly the integration of multimedia technologies, has been widely recognised for its potential to improve instructional quality and learner outcomes (UNESCO, 2023; World Bank, 2020). Multimedia technology refers to the integration of text, audio, video, animation, and interactive digital tools used to enhance teaching and learning processes (Mayer, 2021).

Multimedia encompasses various digital tools such as video, audio, interactive simulations, and online platforms that support diverse learning styles and enhance engagement (Afkar, 2024). In the context of adult education, where learners often balance work, family, and other responsibilities, multimedia tools can provide flexible, self-paced, and contextually rich learning opportunities conducive to adult cognitive processes (UNESCO, 2022; OECD, 2021). Globally, multimedia technology contributes to more engaging and comprehensible instructional experiences, with interactive videos and animations facilitating better understanding compared to traditional methods (Afkar, 2024).

In recent years, technological transformation has significantly reshaped the delivery of adult education across the United States of America (U.S. Department of Education, 2023). The rapid expansion of digital learning, accelerated by the COVID-19 pandemic, led to the widespread adoption of multimedia technologies such as video conferencing platforms, interactive simulations, digital assessments, learning management systems (LMS), and mobile learning applications (National Centre for Education Statistics, 2022). Platforms such as Canvas and Blackboard are now commonly used in adult education programs to

facilitate blended and fully online learning environments (U.S. Department of Education, 2023). The U.S. Department of Education (2023) reports that distance and hybrid learning models have become institutionalized components of adult education programming.

In England, the expansion of digital learning accelerated rapidly during the COVID-19 pandemic, prompting adult education providers to transition from face-to-face instruction to remote and blended learning models (Office for National Statistics, 2022). According to the Department for Education (2023), digital delivery methods have become increasingly embedded in adult skills provision, particularly in English for Speakers of Other Languages (ESOL), Functional Skills, and vocational qualifications (CIPD, 2021).

In Nigeria, mobile technology has played a particularly important role in adult education because of the high penetration of mobile phones compared to computers (National Bureau of Statistics Nigeria, 2022). Mobile-based learning has become an important channel for educational content delivery, especially in urban areas such as Lagos, Abuja, and Port Harcourt. Platforms similar to global learning management systems are being adapted for local use, although limited internet connectivity and high data costs remain significant barriers to effective multimedia learning implementation (World Bank, 2020; UNESCO, 2021).

In Uganda, mobile technology has become a crucial tool in expanding access to adult education due to limited access to computers and institutional learning infrastructure. The growth of mobile learning is strongly supported by digital literacy and ICT education initiatives coordinated by the Ministry of Education and Sports Uganda. Mobile-based learning is widely used in adult literacy programmes, vocational training, and distance education initiatives, particularly in urban centres such as Kampala and surrounding peri-urban areas.

In Kenya, multimedia technology integration in adult education has advanced relatively faster due to improved digital infrastructure and supportive government digital transformation policies (Ministry of Education Kenya, 2022). The Kenyan education technology ecosystem has been strengthened through national ICT in education strategies that promote digital literacy, lifelong learning, and competency-based education across formal and non-formal learning systems. In addition, initiatives supported by Kenya National Bureau of Statistics (2021) show increasing internet and smartphone penetration, which has facilitated access to digital learning resources among adult learners, particularly in urban

centres such as Nairobi, Mombasa, and Kisumu. Furthermore, private sector digital innovation, supported by telecommunications and mobile financial ecosystems such as Safaricom, has indirectly promoted mobile-based learning opportunities for adult education participants through affordable mobile internet services, mobile money-enabled education payments, and increased access to digital learning platforms (Kenya National Bureau of Statistics, 2021).

In Tanzania, the integration of multimedia technology in adult education has been steadily increasing as part of the country's broader digital transformation and education modernization efforts (Ministry of Education, Science and Technology Tanzania, 2022). The government, through the Ministry of Education, Science and Technology Tanzania, has promoted the use of Information and Communication Technology (ICT) in education to support lifelong learning, adult literacy programmes, and vocational skills training (Ministry of Education, Science and Technology Tanzania, 2022). The expansion of digital learning has been influenced by national development strategies aimed at improving digital inclusion and educational access across both urban and rural communities. The growth of mobile technology has played a particularly important role in supporting adult education in Tanzania. According to the Tanzania Communications Regulatory Authority (2022), mobile phone has significantly increased compared to computer ownership, making mobile-based learning one of the most practical approaches for delivering educational content to adult learners. Multimedia learning tools such as mobile learning applications, educational videos, audio learning materials, and online learning platforms are increasingly used in adult education programmes, especially in cities such as Dar es Salaam, Arusha, and Mwanza (Tanzania Communications Regulatory Authority, 2022).

Although the use of multimedia in adult education has become a cornerstone of modern learning approaches, its implementation is still faced with several challenges. These challenges can be grouped into different categories. One major category is individual-level challenges, which include low levels of digital literacy among adult learners, limited economic capacity that affects the ability to afford internet data bundles, and difficulties in accessing digital learning resources. In addition, infrastructure-related challenges such as unreliable electricity supply and poor internet connectivity, particularly in rural areas where such services are limited, further hinder effective multimedia learning adoption. Another category of challenges is institutional challenges, which include a shortage of ICT equipment required for effective multimedia learning delivery and a lack of adequately trained professionals with

expertise in multimedia technology integration in education. Despite these challenges, the use of multimedia in adult education remains significant and therefore requires greater attention and prioritization.

Supporting this perspective, the study by OECD (2025), digital technologies can support learning outcomes when combined with appropriate pedagogical strategies, although technology alone does not automatically guarantee improved academic achievement. Similarly, Rott (2024) found that the use of digital multimedia tools in adult education enhances learner participation, motivation, and learning experience because multimedia supports cognitive processing through visual and auditory learning channels. In addition, multimedia technology supports learner-centered and flexible learning approaches that are particularly important in adult education. Adult learners often balance education with work and family responsibilities; therefore, flexible digital learning systems allow them to study at their own pace (UNESCO, 2021; OECD, 2025).

Timotheou et al. (2022) shows that ICT integration in education improves student engagement and enhances teaching practices when technology is effectively aligned with instructional design. Likewise, Haruna (2024) found that improving digital literacy among adult learners increases their confidence and ability to participate in multimedia-based learning activities, which subsequently contributes to improved academic outcomes.

Moreover, Mayer (2021) found that one of the major impacts of multimedia technology is improved knowledge retention and comprehension. According to the cognitive theory of multimedia learning, learners understand concepts better when information is presented through multiple sensory channels rather than through text alone. Multimedia learning allows learners to process information using both visual and auditory channels, reducing cognitive overload and improving understanding of complex academic concepts.

Studies from the Organisation for Economic Co-operation and Development (OECD, 2025) found that Multimedia technology also enhances learner motivation and engagement in adult education. Digital learning tools such as videos, simulations, and interactive quizzes create more dynamic learning experiences compared to traditional lecture-based teaching methods. indicate that well-designed digital learning environments increase learner participation and academic performance when supported by appropriate pedagogical strategies. However, technology alone does not guarantee improved academic outcomes; instructional design and teacher competence play critical roles in determining effectiveness.

Furthermore, the World Bank (2021) reported that multimedia technology promotes flexible and self-paced learning, which is essential for adult learners who often combine education with employment and family responsibilities. Flexible online learning platforms allow learners to access educational materials anytime and anywhere, supporting lifelong learning goals (OECD, 2025). This flexibility has been particularly important following the COVID-19 pandemic, which accelerated the adoption of digital education globally.

Despite its advantages, multimedia technology also presents several challenges that may affect academic development. These challenges include limited digital literacy, high internet costs, and inadequate technological infrastructure, especially in developing countries. The effectiveness of multimedia learning therefore depends on infrastructure availability, teacher training, and institutional support systems (UNESCO, 2021).

In addressing these challenges, OECD (2025) recommended that one of the most important ways to improve multimedia technology is strengthening digital literacy skills among adult learners and educators. Digital literacy training enables learners to effectively navigate learning management systems, access online educational resources, and engage with digital academic content. Studies show that digital competence is a key determinant of successful technology-based learning outcomes in adult education. Similarly, educators require continuous professional development to improve their ability to design and deliver multimedia-based instruction effectively (UNESCO, 2021). Additionally, World Bank (2021) emphasizes that digital infrastructure development is essential for bridging the digital divide, especially in developing countries where technological inequalities remain high. Thus, the government both for developed and developing countries, should improve ICT infrastructure. Reliable internet connectivity, affordable data services, stable electricity supply, and access to digital devices such as smartphones, tablets, and computers are necessary for effective multimedia learning.

Mayer (2021) in his research, the findings found that conducive environment for learners-centre such as increasing ICT learning equipment should be well improved. The adoption of learner-centered and flexible instructional approaches also improves multimedia technology effectiveness. Adult learners benefit from learning environments that consider their work, family responsibilities, and prior learning experiences. Multimedia learning content should therefore be designed using real-life examples, practical tasks, and interactive learning activities to increase motivation and academic engagement. In addition, OECD,

(2025) added that teacher training and capacity building are equally important. Educators must be trained in digital pedagogy, multimedia instructional design, and online teaching methodologies. Teachers who are competent in using digital tools can create engaging learning materials that support academic achievement among adult learners.

UNESCO, (2021) added that, reducing the cost of technology access can significantly improve multimedia adoption. Governments and educational institutions can support adult learners by subsidizing internet services, providing open educational resources, and promoting offline learning materials that do not require constant internet connectivity. This should align with education policies and institutional support systems is necessary for sustainable multimedia integration. Governments should develop and implement digital education policies that promote lifelong learning, digital inclusion, and technology-based education programs

It is therefore the purpose of this paper to examine the Role of Multimedia Technology in Enhancing Learners' Academic Development in Adult Education focusing on two key objectives: to explore the impact of multimedia technology on adult learners' academic Development in Adult Education; and determine the ways to Improve Multimedia technology in Enhancing Learners' Academic Development in Adult Education.

METHODOLOGY

This qualitative case study was conducted at the Institute of Adult Education in the Dar es Salaam Campus. The Institute of Adult Education (IAE) Dar es Salaam Campus was purposively selected due to its extensive provision of adult education programs, including adult education and distance learning programs delivered through conventional and online modalities. The institution offers certificate, diploma, and degree programmes in various fields, which are implemented through online platforms that utilize multimedia technologies to facilitate teaching and learning.

The study involved twenty (20) participants, a number determined through the principle of data saturation, which is widely recognized in qualitative research as the point at which additional data no longer provide new insights (Guest, Bunce, & Johnson, 2006; Morse, 2000). This sample size was considered adequate to explore in depth the experiences and perceptions of adult learners and educators regarding multimedia technology in teaching and learning, while maintaining feasibility for detailed analysis.

Participants were purposively selected because they were directly involved in multimedia applications within adult education settings. The purposive sampling approach aimed to identify individuals with rich, relevant, and diverse experiences who could provide meaningful insights into the phenomenon under study (Patton, 2015). The sample included ten bachelor's degree students, five lecturers, and five non-graduate learners, ensuring representation across different perspectives and roles in adult education.

Data were collected through in-depth interviews and focus group discussions. Analysis followed Stewart's five-stage thematic analysis framework: familiarization, coding, theme identification, interpretation, and reporting. Themes were generated in direct alignment with the study objectives, and findings were supported by direct quotations to authentically represent participants' viewpoints and lived experiences (Stewart, 2020).

The Findings and Discussion were presented in two parts. The first part addressed the impact of multimedia technology on adult learners' academic development, and the second part explored strategies to enhance the use of multimedia technology for academic development. This structure enabled a clear connection between participants' experiences, thematic findings, and practical recommendations for improving adult education outcomes.

RESULTS AND DISCUSSION

The findings are organized into two main sections. The first section presents the empirical results of the study, focusing on: the impact of multimedia technology on adult learners' academic development in adult education, and identifying strategies for improving the use of multimedia technology to enhance learners' academic development in adult education. The second section provides a comprehensive discussion of the findings, where the results are interpreted, analysed, and related to existing literature and the broader context of adult education.

The impact of multimedia technology on adult learners' academic Development in Adult Education

The findings of this study found that the use of multimedia technology in delivering adult education plays a highly significant role in both teaching and learning processes hence it involves the following;

It helps to broaden learners' understanding and strengthen their confidence

The findings of this study revealed that the use of multimedia technology significantly contributes to broadening learners' understanding and strengthening their confidence in adult education. Participants consistently reported that multimedia-supported learning environments enable them to explore content more deeply, conduct independent searches for additional information, and participate actively in academic discussions without fear.

During the interview, one of the students has something to say that *"online learning platforms allow me to express myself more freely, particularly because I can control features such as video and audio during live sessions. This flexibility reduces anxiety and fosters a sense of psychological comfort, which in turn enhances my willingness to ask and answer questions"*.

Moreover, in the interview with lectures, one of them emphasized this point, stating:

The use of multimedia stimulates confidence and broadens understanding. In the 15 years I have been teaching, I have observed that many students lack confidence when they are in a large group setting where they can see each other. However, when they meet online, for example through Google Meeting, many switch off their cameras when expressing themselves, answering, or asking questions. This situation builds their self-confidence and reduces fear; therefore, they also increase their understanding through the discussions they engage in.

Similarly, during a focus group discussion, one student explained that

Learning through multimedia makes the learners in the Institute of Adult Education feel comfortable. Also, the use of technology such as multimedia in this level, enhance knowledge. For example, this method helps me understand better than when I am in a physical classroom. When we use multimedia, I have the confidence to ask questions, search for more information, listen more clarification from the colleges that used to expand my knowledge.

The collected data indicate that multimedia technology broadens learners' understanding, strengthens their confidence, and encourages active participation, thereby contributing significantly to adult learners' academic development. These findings directly address the study objective by showing how multimedia-supported learning environments improve both cognitive engagement and self-efficacy, which are essential components of effective adult education. This study is buoyed with the study by Rott (2024) who found that

the use of digital multimedia tools in adult education enhances learner participation, motivation, and learning experience because multimedia supports cognitive processing through visual and auditory learning channels. Similarly, Timotheou et al. (2022) shows that ICT integration in education improves student engagement and enhances teaching practices when technology is effectively aligned with instructional design. Likewise, Haruna (2024) found that improving digital literacy among adult learners increases their confidence and ability to participate in multimedia-based learning activities, which subsequently contributes to improved academic outcomes.

Makes the process of teaching and learning easier

The use of multimedia makes the process of teaching and learning easier. The findings revealed that learners' use of multimedia devices, such as mobile phones or video conferencing, facilitates learning because there is no requirement to be physically present at a specific location; instead, one can access lessons from wherever they are.

During the interviews with learners, one of them was quoted as saying

the use of multimedia such as video conferencing, Google Meeting, and video calls helps us students a lot in making learning easier because when we use this method, we are not required to attend classes physically, especially for those of us with family and work responsibilities. You can study while being anywhere without going to the learning centre.

Furthermore, from the lecturers' perspective, one lecturer stated:

Teaching through technological systems, such as the use of multimedia, simplifies instruction because it is not necessary to meet with students physically in the classroom. What is required is internet access and a quiet place. You can teach and give assignments to students across the entire Dar es Salaam region at once without meeting them face to face, and each student can understand the lesson.

These findings demonstrate that multimedia technology enhances accessibility, convenience, and efficiency in adult education. By making learning easier to access and teaching easier to deliver, multimedia supports the broader objective of improving academic development among adult learners, as it allows learners to engage with content consistently and flexibly, increasing their opportunities for learning and participation. These findings affiliated with finding by UNESCO (2021; OECD, 2025) who found that multimedia technology supports learner-centered and flexible learning approaches that are particularly

important in adult education. Adult learners often balance education with work and family responsibilities; therefore, flexible digital learning systems allow them to study at their own pace.

Time Saving and Reduction of Family Conflicts

The findings of this study revealed that the use of technology, particularly multimedia, in adult education contributes significantly to saving time and reducing family-related conflicts. The data indicate that multimedia-supported learning minimizes the need for physical attendance at the institution, thereby reducing travel time between home and the learning centre. The study found that many adult learners, especially public servants, enrol in evening classes that typically run from late afternoon until around 10:00 p.m. As a result, learners often return home late at night. The finding found pants reported that this situation has, in many cases, contributed to marital misunderstandings and conflicts, particularly where issues of trust arise due to late arrival at home.

During the interviews, one student explained that:

Honestly, the use of multimedia has saved our marriages because there were conflicts between couples due to mistrust. All this was caused by coming home late since classes end at 10:00 p.m. For example, I personally live in Bunju. When I finish class at 10:00 p.m., and start the journey using public transport, as you know with the traffic congestion in Dar es Salaam, I end up arriving home at midnight. That is where our conflicts are.

Similarly, during a focus group discussion, another student stated:

The use of technology such as multimedia in learning has been a savior. First, it saves time. I no longer have to come to the institution and wait for a class, sometimes only to find that the lecturer is late or has postponed the session after we have already spent time traveling. Sometimes traffic causes you to arrive late to class or late at home. Nowadays things are different because you can study from anywhere and at the right time. If a session is postponed, you receive the information immediately and continue with other activities.

In addition, one lecturer emphasized the benefits of multimedia technology that:

Even for us, as facilitators, we are very proud of using this multimedia technology in teaching activities. Nowadays you can organize a conference from anywhere without losing time traveling to the learning centre. This has also restored trust, peace, and love in our

families because sometimes when you return home very late, it becomes difficult for family members to believe that you were at work.

The above findings indicate that multimedia technology not only enhances academic accessibility but also promotes better time management and contributes to improved family stability among adult learners and educators.

The current study related with the findings of World Bank (2021) who reported that multimedia technology promotes flexible and self-paced learning, which is essential for adult learners who often combine education with employment and family responsibilities. Flexible online learning platforms allow learners to access educational materials anytime and anywhere, supporting lifelong learning goals

Despite the recognized importance of multimedia in teaching and learning, this study found several challenges affecting its effective implementation, including;

Technical and Systemic Challenges in Multimedia Use

The findings indicate that both students and lecturers experience technical and systemic difficulties in the use of multimedia technologies during online learning. One student explained during an interview:

Many users, especially our teachers, face either system-related or technical challenges when using technology, particularly multimedia. Sometimes we fail to understand each other during online classes because of noise from home or the roadside, especially when someone forgets to mute the microphone. Even the host sometimes fails to mute participants automatically, and the lesson becomes unclear.

Similarly, one of the lecturers, was quoted as saying:

Most of the users, especially we lecturers, do not have sufficient skills to use multimedia effectively. Sometimes a lecturer has to seek assistance in connecting or setting up the instructional system so that participants do not experience difficulties. This may attribute by the lack of skills in monitoring technological system

Similarly, during the Focus Group Discussion (FGD), one student expressed the following concern: *“We experience technical errors when studying through video conferencing. This is largely influenced by the limited expertise of our facilitators, who are not fully competent in managing the system.”*

This quotation demonstrates that ineffective management of digital platforms and inadequate digital skills among facilitators. Such limitations may negatively affect the effectiveness of instruction and learners. Moreover, the presence of background noise and limited technical control during sessions disrupts concentration and reduces the overall quality of instruction.

Inadequate Institutional Infrastructure

Another major theme emerging from the findings of this paper is the lack of supportive infrastructure within the institution. Participants consistently reported shortages of essential facilities required for effective multimedia integration.

During an interview, one lecturer stated:

The available computer services here are not sufficient compared to the number of lecturers, the teaching timetable, and the overall demand for digital service delivery, especially when using multimedia. Institutional computers are few, so we are forced to use our personal laptops or even our phones to conduct classes.

This response indicates a structural limitation within the institution. The shortage of computers and digital facilities places additional burdens on lecturers and may compromise the consistency and quality of online instruction.

Similarly, another lecturer highlighted the shortage of instructional equipment:

Multimedia use is affected by a lack of important equipment such as projectors. Sometimes you prepare a lesson intending to use a projector, but because there are very few available, you end up teaching manually and explaining without writing or displaying anything.

This finding implies that inadequate teaching equipment limits the effective application of multimedia strategies, thereby reducing opportunities for interactive and visually supported learning.

Internet Connectivity Challenges

Unstable internet connectivity emerged as another significant barrier. Students reported frequent interruptions during online sessions, particularly during audio and video conferencing.

During a focus group discussion, one of students stated :

Sometimes the internet disconnects during the lesson, especially when we are using audio, video conferencing, or Google Meeting. This often happens to teachers where communication cuts off in the middle of the session due to either unstable or overloaded internet networks.

This quotation illustrates how unstable or overloaded internet networks disrupt instructional continuity. Such interruptions affect both content delivery and student engagement, ultimately weakening the learning experience.

High Cost of Internet bundle

The cost of internet data identified as a major obstacle affecting students' participation in online learning. The findings reveal that financial constraints prevent many students from attending virtual classes consistently.

During the interview, one of the students explained that:

Personally, I failed to attend about five classes because I could not afford to buy internet data. I missed important content, and unfortunately the lecturer gave a test during one of those sessions. I ended up scoring zero.

Another student added during an interview that:

Many of us struggle to afford internet costs. Personally, I have low-paying jobs. When you compare our income with the high cost of living in Dar es Salaam, we divide the little money we get among many responsibilities and remain with a little. When it comes to buying data bundles for online learning, it becomes very difficult, because online classes consume data very fast.

This response indicates that socio-economic factors significantly influence access to multimedia-based learning. The high cost of data bundles creates inequality in participation and limits consistent engagement in digital learning environments.

The findings associate with the report by UNESCO (2021) who reported that, despite its advantages, multimedia technology also presents several challenges that may affect academic development. These challenges include limited digital literacy, high internet costs, and inadequate technological infrastructure, especially in developing countries.

Ways to Improve Multimedia technology in Enhancing Learners' Academic Development in Adult Education

The findings of this study reveal that the effective integration of multimedia technology into teaching and learning processes particularly within the context of adult education requires deliberate and systemic intervention at both policy and institutional levels.

The researcher established that sustainable improvement in multimedia utilization cannot be achieved in isolation; rather, it demands coordinated efforts from the government, educational institutions, and donors. Specifically, strategic investment in infrastructure, continuous professional development for lecturers, structured orientation for learners, and the reduction of internet access costs emerged as critical determinants of successful multimedia integration as follows;

Strengthening Technological Infrastructure

The study findings found that infrastructure creates the foundational pillar upon which meaningful technology integration is built. Without adequate physical and digital infrastructure, the pedagogical/andragogical potential of multimedia remains largely theoretical. Participants consistently emphasized that the availability of sufficient computers, projectors, and reliable high-speed internet connectivity significantly influences the effectiveness of multimedia-based instruction.

From an institutional perspective, adult education providers must prioritize capital investment in digital infrastructure to ensure equitable access to technological resources. This includes not only the procurement of hardware facilities but also the establishment of stable and uninterrupted internet services capable of supporting synchronous and asynchronous learning modalities.

During an in-depth interview, one lecturer remarked that: *“There is every reason for the institution to increase the number of computers in order to enhance teaching effectiveness, particularly when multimedia-based instruction is required.”*

The findings of current paper allied with the study by Mayer (2021) who found that conducive environment for learners-centre such as increasing ICT learning equipment should be well improved. The adoption of learner-centred and flexible instructional approaches also improves multimedia technology effectiveness. Adult learners benefit from

learning environments that consider their work, family responsibilities, and prior learning experiences.

Continuous Professional Development for Lecturers

Beyond infrastructural considerations, the findings demonstrate that human capacity development is equally indispensable. The study established that institutions, in collaboration with educational stakeholders and development partners, must institutionalize regular and structured professional development programs focusing on the pedagogical application of multimedia technologies.

Importantly, the data reveal a generational and experiential gap among lecturers. Many were trained during periods when digital technologies were either absent or minimally integrated into instructional practice. Consequently, adapting to the contemporary digital landscape requires not only technical training but also cognitive and pedagogical reorientation.

During the interview, one of the lecturers articulated this concern as follows:

We, as lecturers, need regular training and sufficient seminars on the use of this technology. Many of us were educated at a time when these tools did not exist. Given the rapid technological revolution, we must become intellectually creative to keep pace with change and to meet students' needs within this science and technology-driven context.

This testimony highlights the necessity of fostering intellectual adaptability, digital literacy, and pedagogical innovation among academic staff. Continuous professional development should therefore move beyond technical competence to encompass digital training, instructional design, and critical engagement with emerging technologies such as Artificial Intelligence. Similarly, to OECD, (2025) who added that teacher training and capacity building are equally important. Educators must be trained in digital pedagogy, multimedia instructional design, and online teaching methodologies. Teachers who are competent in using digital tools can create engaging learning materials that support academic achievement among adult learners.

Orientation and Capacity Building for Students

The study further illustrated that effective multimedia utilization is not solely dependent on lecturers' competence but also on students' digital preparedness. Several

participants emphasized the need for systematic orientation programs designed to equip learners with the skills required to navigate multimedia learning environments efficiently.

During focus group discussion, one student observed that;

Students we need to be well oriented on the proper use of technology, especially multimedia in learning. This will help us reduce the challenges encountered when using multimedia for academic purposes. The institution should establish formal orientation programs at the beginning of studies and whenever new technological changes emerge, because the world is moving very fast technologically for example, the emergence of tools such as ChatGPT and other AI technologies cherishing the world.

This perspective reflects the dynamic nature of technological advancement and the necessity of adaptive institutional mechanisms. Orientation programs should therefore be continuous rather than episodic, responding to rapid innovations in digital and artificial intelligence technologies.

Similarly, a participant in a focus group discussion emphasized the strategic importance of awareness and capacity building by saying that

The sustainability and effectiveness of knowledge transfer through modern systems such as multimedia depend on investing in awareness and capacity building for the key teachers and students. Seminars, workshops, and training programs will help us to adapt the environment and facilitate academic processes through multimedia technology.

The current study associated with the findings by OECD (2025) recommended that one of the most important ways to improve multimedia technology is strengthening digital literacy skills among adult learners and educators. Digital literacy training enables learners to effectively navigate learning management systems, access online educational resources, and engage with digital academic content.

Reducing the Cost of Internet Access

furthermore, the findings reveal that the high cost of internet bundles constitutes a significant barrier to equitable participation in multimedia-based learning. The financial burden disproportionately affects students, particularly during online sessions, thereby undermining inclusive access to digital education. The findings found that development of sponsored or institutionally supported internet schemes to ensure affordability for both

learners and facilitators will help to equalize the use of multimedia in online learning activities.

During the interview with students, one of the students said:

The most appropriate way to ensure equity and reduce the burden of costs is to lower internet charges for students and lecturers so that they can reliably access bundles for teaching and learning. Since the government recognizes registered students in each institution, there should be special internet offers linked to National ID numbers. For example, students could receive subsidized data packages. The same arrangement should apply to facilitators so that everyone can afford the costs.

This information emphasize affordability as a core dimension of digital equity. Policy-level interventions such as educational data subsidies, zero-rated academic platforms may significantly enhance access and participation in multimedia-supported adult education.

These findings associated with the study by UNESCO, (2021) added that, reducing the cost of technology access can significantly improve multimedia adoption. Governments and educational institutions can support adult learners by subsidizing internet services, providing open educational resources, and promoting offline learning materials that do not require constant internet connectivity. This should align with education policies and institutional support systems is necessary for sustainable multimedia integration. Governments should develop and implement digital education policies that promote lifelong learning, digital inclusion, and technology-based education programs

CONCLUSION

It is concluded that multimedia technology has become a catalyst for academic achievement among students, particularly those in adult education institutions, although its implementation is confronted with various challenges. It has, however, been established that the success of multimedia largely depends on the availability of adequate infrastructure, sufficient equipment, appropriate knowledge, and reliable internet access. Without these foundational pillars, multimedia integration will remain a theoretical concept rather than a practical reality.

It is therefore recommended that the use of multimedia be given priority, with emphasis placed on strengthening appropriate infrastructure, increasing the availability of

institutional equipment, and reducing operational costs. This will facilitate the transition from a manual, face-to-face instructional approach to a modern system across all educational institutions.

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