Video Learning for Competency-Based Education and Training: A Case of Nyandarua National Polytechnic, Kenya

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Abstract
This paper examines the extent to which digital technologies are used for education and training in Competency-Based Education and Training (CBET) within Technical and Vocational Education and Training (TVET) institutions in Kenya. The study was inspired by related studies elsewhere, which point to the challenges of employing more innovative instructional strategies in TVET institutions despite the emphasis on them. Some studies suggest that the pressure to incorporate new technology in teaching and learning is not always matched by adequate training and support. The introduction of CBET in Kenya has been accompanied by a call to apply active learning strategies to enhance skills acquisition among technical education trainees, which is its core principle. The study aimed to determine the extent to which TVET institutions have employed these strategies, particularly video learning, and the factors influencing their application. The study was conducted among trainers and trainees at Nyandarua National Polytechnic in Kenya in March 2024 and used a descriptive design. The study employed both qualitative and quantitative approaches for data collection and analysis. The study collected data through questionnaires administered online to trainees and self-administered to trainers. The study was guided by constructivism and the cognitive theory of multimedia learning. The study sampled trainers and trainees from nine academic departments at the Nyandarua National Polytechnic. Both trainers and trainees reported using video in learning at 90 percent and 88 percent, respectively. These positive observations came amid myriad challenges both groups cited as impeding the use of video learning in the institution. The study thus concluded that TVET institutions in Kenya have made significant efforts to apply digital technologies as innovative instructional strategies. However, myriad challenges remain that must be addressed to fully realize the benefits of innovative instructional strategies, as clearly documented.

Keywords: Active learning strategies, CBET, digital technologies, TVET institutions, video learning

Introduction

The need to use digital technologies in education and knowledge transfer has become more urgent than ever in Kenya's TVET institutions, with the full rollout of Competency-Based Education and Training (CBET). Competency-based education and training demands that trainers adopt more innovative instructional strategies and techniques, while trainees are expected to play a more participatory role in learning than under previous curricula. This aims to ensure optimal skills acquisition, the chief tenet of CBET.

Digital technologies facilitate education and knowledge transfer by offering more learning opportunities than traditional methods. As Ndirangu (2025) aptly puts it, ‘Digital technologies

provide a myriad of possibilities for the employment of innovative teaching and learning strategies for Competency-Based Education and Training (CBET) curriculum implementation'. Digital technologies also come in various forms and can be applied in many ways, such as e-learning, virtual laboratories, smartboards, videos and animated films, online exams, e-portfolios, and simulations, among others.

Trainers and trainees in TVET institutions in Kenya recognize the immense benefits of using digital technologies in CBET and have made efforts to use some of these technologies in teaching and learning. According to this study, both trainers and trainees at Nyandarua National Polytechnic reported using video in teaching and learning at 90 percent and 88 percent, respectively. This is despite the many challenges they encountered in its use, as discussed in this paper. Many institutions still face challenges in using digital technologies for teaching and learning, as documented elsewhere. These include a lack of technological support, instructors' ability to use technology, limited internet access, a lack of devices such as computers and smartphones, difficulty generating digital instructional materials and creating digital content, and managing conflicting time demands, among others.

Haleem et al. (2022) observe that some teachers are inexperienced with digital technologies, some students lack smartphones and internet access, and in colleges with more practical than theoretical courses, using appropriate and relevant digital technologies is challenging. Alluding to Wandago et al. (2017) and Woolfitt (2015), Ndirangu (2025) maintains that the use of innovative teaching and learning methodologies in TVET institutions in Kenya continues to grapple with enormous challenges, among them the lack of training among trainers in the requisite skills for the use of these digital technologies, lack of supportive infrastructure, and other relevant resources.

Kenya rolled out Competency-Based Education and Training (CBET) in Technical and Vocational Education and Training (TVET) institutions about three years ago. This rollout came with a clarion call to adopt diverse teaching and learning methods to enhance learners' acquisition of skills and knowledge for competency in their respective fields. These methods also include modern digital technologies to improve learning and achieve the highest degree of knowledge transfer. Many TVET institutions in Kenya, including Nyandarua National Polytechnic, have made significant efforts to use digital technologies in CBET. However, many challenges continue to inhibit the use of such technologies among both trainers and trainees. This has hampered CBET implementation in these institutions and diminished the degree of education and knowledge transfer to trainees, negatively affecting their competencies. This situation contradicts the chief principle of CBET: enhancing trainees' practical skills acquisition in readiness for industry.

The study aimed to assess the current status of digital technology use, particularly video-based learning, for CBET implementation in TVET institutions in Kenya, with specific reference to Nyandarua National Polytechnic. Specific objectives were to: establish the extent of use of digital technologies, especially video, for teaching and learning in CBET at Nyandarua National Polytechnic; assess the perceptions of trainers and trainees at Nyandarua National Polytechnic regarding the use of digital technologies, especially video, for CBET curriculum teaching and learning; and identify the challenges impeding the use of digital technologies, especially video, among trainers and trainees at Nyandarua National Polytechnic for CBET curriculum implementation.

Literature Review

This section reviews the literature on Competency-Based Education and Training, Digital Technologies, and Video Learning.

Competency-Based Education and Training

Competency-Based Education and Training (CBET) may be defined in various ways. First, it can be defined as training based on a participant's ability to demonstrate mastery of skills under certain conditions and meet specific standards before moving to the next phase of learning or life. The key defining terms in CBET training are skills, knowledge, and attitudes central to a career that must be demonstrable. CBET benefits learners by equipping them with skills, knowledge, and attitudes relevant to a particular industry, thereby increasing their employability. Jwan (2022) says that the CBET curriculum emphasizes action learning. It focuses on what the trainee can do rather than what the trainee knows. Acquisition of demonstrable, actionable skills is thus a significant aspect of CBET.

CBET can also be defined as a learning system that emphasizes skills acquisition, enabling learners to fit into the industry they are prepared for. Learners must be able to demonstrate these skills in their area of specialization. According to Ndirangu (2025), the key defining terms in CBET are skills, knowledge, and attitudes that are central to a career and must be demonstrable. It benefits learners by equipping them with skills, knowledge, and attitudes relevant to a particular industry, thereby increasing their employability (Ndirangu, 2025). This learning system has been necessitated by claims of a mismatch between TVET graduates and industry. Feedback from industry players on students in industrial attachment and mentorship programmes partly supports this claim. Therefore, to ensure TVET learners are adequately equipped with the requisite skills, the Ministry of Education in Kenya rolled out this curriculum about three years ago. Although it is a new concept in Kenya, Jwan (2022) notes that many other countries worldwide have applied it.

CBET subscribes to the principle of learner-centred learning, in which learners take an active role in constructing their knowledge and acquiring skills and attitudes. The trainer serves only as a guide. In other words, active learning, which engages learners in their learning as opposed to the traditional mode in which trainers transfer knowledge to learners, is at the centre of CBET. Hartikainen et al. (2019) summarize as follows: 'Active learning is one of the principles of CBET. It has become the current trend that is taking space from the traditional instructional methods.' Close collaboration between trainers and learners is another key principle of CBET, in which trainers and learners build a consultative relationship with frequent and immediate feedback on the learner's progress. CBET learning is personalized, so each learner can move at their own pace and acquire the required competency.

This realization has therefore called for a change in approach and the use of newer teaching and learning methods in TVET institutions. Digital technologies in training are one of these newer methods for implementing CBET.

Digital Technologies

Digital technologies involve using computers and other digital and electronic devices to create and share instructional materials. The internet primarily facilitates sharing. These include laptops, tablets, mobile phones, virtual labs, cameras, projectors, smart boards, and screens. The benefits of digital technologies in learning cannot be overstated, as they allow flexibility, promote learning outcomes, increase interaction between trainer and learner, provide strong motivation for learning, and capture learners' attention. Omutange et al. (2025) underscore the importance of modern digital technology platforms in teaching and learning in TVET institutions in Kenya. They recommend adopting and integrating them across all subjects to improve learning outcomes. This

means using digital technologies in CBET will help achieve its objectives of enhancing practical skills acquisition among learners in TVET institutions.

In addition, modern industry, the culmination of learners' training in TVET institutions, has increasingly become digitalized, and learners must acquire digital skills beforehand to perform their jobs competently after graduation. Unfortunately, many TVET institutions have not kept pace with industry by providing digital technologies to facilitate learning. Some trainers have also been reluctant to adopt these technologies in teaching. Haleem et al. (2022) state that 'Traditional instructors are hesitant to include contemporary technology and gadgets in school, viewing them as a distraction rather than an intelligent learning aid'. Some trainers in TVET institutions also lack the skills to employ these technologies effectively for teaching and learning, having trained in contexts devoid of these technologies, as Omutange et al. (2025) aptly assert, 'Besides, there are tutors who underwent training in the traditional teaching methods devoid of any modern digital technology platforms and therefore have less competence in the uptake and use of these technologies'. Elsewhere, Wandago et al. (2017) note further challenges in using more innovative instructional strategies in TVET institutions.

Video Learning

Video learning has long been used as a teaching and learning method at all levels, from early childhood to higher education, as Evangelou (2023) and Noetel (2021) show. It has a long history as an educational tool. Some scholars, such as Yousef et al. (2013), have attempted to provide a chronology of the evolution of video learning since its experimental stages during the Second World War. As it has evolved across various media formats, video has become a common and preferred teaching and learning tool, with the internet and digital technologies enabling greater flexibility and accessibility.

Video learning ranks highly for teaching and learning in TVET institutions, alongside other digital technologies such as smartboards, Google Classroom, online textbooks, gamification, cloud technology, and wikis. For instance, students and trainers in TVET institutions rated YouTube and Smart Video highly for frequency of access (Omutange et al., 2025). This may stem from the numerous documented benefits of video learning as a teaching and learning tool.

A study by Riyanto and Yunani (2020) found that using video as a digital technology can increase students' abilities. Tani et al. (2022) support this, noting that multimedia presentations markedly improve student learning outcomes and offer valuable course delivery options, including online learning. Adler et al. (2025) reaffirm the evolving nature of learning modalities and the integration of digital tools, particularly video. They note changing learner preferences in the digital age. Students increasingly turn to digital platforms for their educational needs, with pre-recorded videos and real-time video instruction growing in popularity. This shift is partly due to the easy accessibility of online platforms like YouTube. Noetel et al. (2021) echo these sentiments, stating that 'Adding video to existing teaching led to strong learning benefits'.

Nevertheless, video learning must be implemented effectively to benefit learners. For instance, studies indicate that passive video learning is less effective, and trainers must be present to help learners interpret and understand the learning materials. Videos should also be relevant to the learning content to be effective. Some online-sourced videos do not precisely match the curriculum content and may be unbeneficial. This calls for customizing these videos or having trainers create original videos to make them beneficial. In addition, some videos distract learners by directing their attention to other objects and graphics rather than the learning material (Adler et al., 2025). Very long videos have also proved counterproductive compared with short, attention-

sustaining videos. Overall, despite these shortcomings, most studies still find that video learning significantly improves learning outcomes. Therefore, adopting video learning in TVET institutions for CBET would greatly contribute to achieving its objectives of enhanced skills acquisition.

Theoretical Framework

This study was guided by two theories: Constructivism (Woolfitt, 2015) and the Cognitive Theory of Multimedia Learning (Carmichael et al., 2023).

According to Jean Piaget's constructivist theory, learning involves learners actively constructing relevant knowledge; the more active the involvement, the greater the learning potential. Constructivist learning moves from experience to knowledge, not the other way around. Four principles guide it: (i) learners construct their meaning; (ii) new learning builds on prior knowledge; (iii) learning is enhanced by social interaction; and (iv) learning develops through 'authentic' tasks (Cooperstein & Kocevar-Weidinger, 2004). These are all principles of CBET. Therefore, drawing a parallel between CBET implementation and the use of digital technologies that, as asserted earlier, promote learners' own learning, enhance interaction between trainers and learners, and engage learners in tasks that improve their skills is appropriate. The more learners engage with digital technologies in learning tasks, the more they develop and refine their skills.

On the other hand, Richard Mayer's Cognitive Theory of Multimedia Learning highlights the importance of combining visual and auditory messages to enhance learners' understanding of information presented in teaching and learning (Ndirangu, 2025). This theory is relevant to the study because most digital technologies combine visual and auditory stimuli, providing multiple ways to perceive and interpret information and promoting understanding.

Methodology

The study was conducted at Nyandarua National Polytechnic. It employed both quantitative and qualitative approaches for data collection and analysis and used a descriptive design. The study used purposive and stratified random sampling to ensure inclusivity across departments and trainee levels. The study selected three trainers from each of the nine departments, for a total sample of 27. All responded on time, yielding a 100 percent response rate. The study targeted 108 trainees, and 84 responded on time, yielding a 78 percent response rate. Data were collected through questionnaires administered online to trainees and self-administered to trainers. Quantitative data were analysed using SPSS and presented as frequencies and percentages in tables, graphs, and charts, while qualitative data were analysed by grouping them into similar thematic areas.

Findings and Discussion

The findings are discussed in relation to the three study objectives, which were to establish the extent of use of digital technologies, especially video, for teaching and learning in CBET at Nyandarua National Polytechnic; to assess the perceptions of trainers and trainees at Nyandarua National Polytechnic regarding the use of digital technologies, especially video, for CBET curriculum teaching and learning; and to identify the challenges impeding the use of digital technologies, especially video, among trainers and trainees at Nyandarua National Polytechnic for CBET curriculum implementation.

The Extent of Use of Video for Teaching and Learning in CBET in Nyandarua National Polytechnic

In response to whether trainees used video as a digital learning tool, 88 percent responded affirmatively. The trainers supported this claim, as they responded positively to the same question. Figure 1 confirms that assertion.

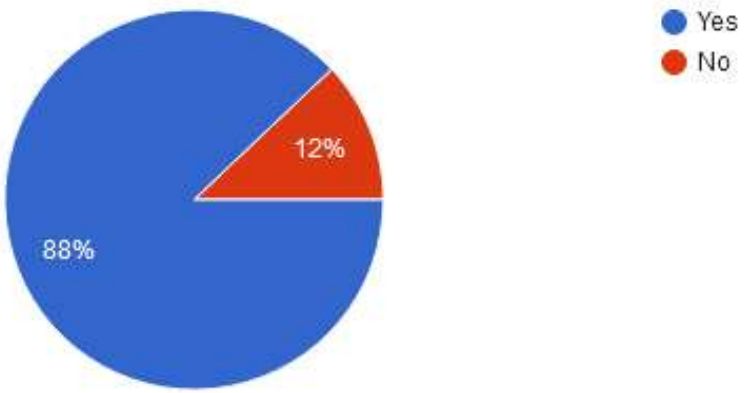


Fig. 1: Trainees' Use of Video in Learning
Source: Ndirangu, 2025

In response to the question about which subjects trainees have used video learning for, 98 percent of trainees affirmed that they have used video to learn several subjects, while a paltry 2 percent responded in the negative, as shown in Table 1. The data confirms that video, as a digital technology, is used in learning across almost all departments at Nyandarua National Polytechnic. Further investigation is needed into the two departments where this digital technology appears not to have been used. These are the Applied Sciences and Agriculture and Environmental Studies departments.

Table 1: Subjects in Which Video Learning Has Been Employed

S/No.	Department	Subjects/Learning areas
1.	Agriculture and Environmental Studies	None
2.	Applied Sciences	None
3.	Building and Civil Engineering	Technical Drawing, Design and Sketching, Structural Analysis, Material Science, Construction Materials, Survey, Building Temporary Works
4.	Business and Entrepreneurship	Entrepreneurship
5.	Computing and Informatics	Digital Literacy, Software Installation, Computer Software, Networking
6.	Electrical and Electronics	Electronic Principles, Electrical Fabrication Solar Installation, Mathematics
7.	Hospitality, Fashion, Design and Cosmetology	Pattern Drafting, Accessorizing, Fabric Formation, Sewing Machine Operations
8.	Liberal Studies	Communication Skills, English, Non-verbal Techniques, Marriage and Family Therapy, Psychological Testing and Assessment, Telephone Conversation, Etiquette, Case Management, Mobilizing Community-Based Groups, Managing Community Projects, Managing Community-Based Groups, and Child Welfare.
9.	Mechanical and Automotive Engineering	Vehicle Engines, Vehicle Braking System, Vehicle Engine Transmission System, Tool-room, Automobile Principles
10.	Others	All units

Regarding the course of study, respondents were distributed across all courses offered by the polytechnic, as reflected in the following responses from 86 respondents: Electrical Engineering Level 6, Automotive Engineering Level 6, Civil Engineering Level 6, Information and Communication Technology Level 6, Fashion and Design Level 5, Mechanical Engineering Level 6, Electrical Engineering Level 5, Building and Construction Level 6, Fashion and Design Level 6, General Agriculture Level 5, Building Technology Level 5, Electrical Engineering (Telecommunications) Level 6, Automotive Technician Level 5, Electrical Technology Level 5, Automotive Engineering Level 5, Counselling Psychology Level 6, Agricultural Engineering Level 6, Catering and Accommodation Level 6, Food and Beverage Level 5, Electrical and Electronic Engineering (Power option) Level 6, Electrical and Electronics Engineering Level 6, ICT Technician Level 5, General Agriculture Level 6, Social Work and Community Development Level 5. Figure 2 shows their distribution across levels, with Level 6 making up the majority.

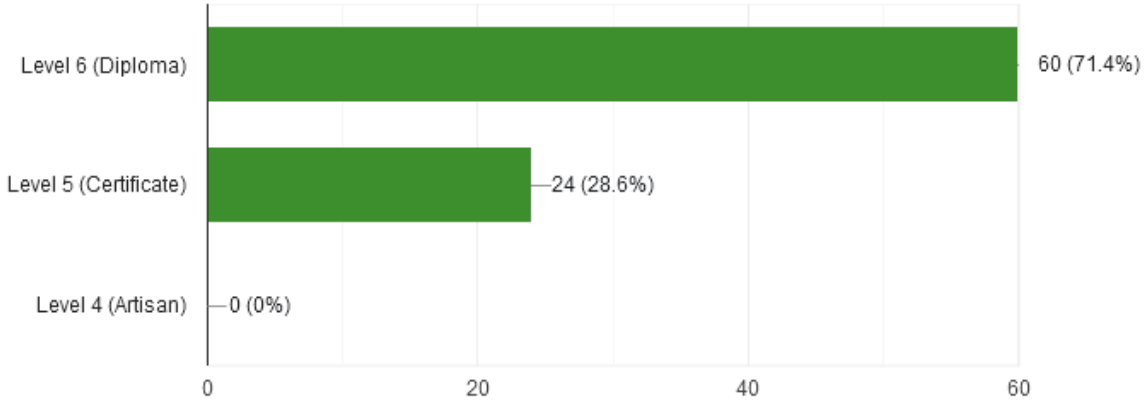


Fig. 2: Level of Study of Respondents
Source: Ndirangu, 2025

An important observation from the above distribution was the very small number of respondents at Level 4. Questions arose about whether video learning is not being used at this level of training or whether the trainees did not respond to the questionnaire. A further probe would be conducted to address these questions. The following figure summarizes the responses on the frequency of video use.



Fig. 3: Frequency of Video Use

The figure shows that 40 percent use video weekly, a significant share, followed by 22.4 percent who use it termly. These responses confirm that Nyandarua National Polytechnic uses video as a teaching and learning tool. The responses also point to efforts to use video as an innovative instructional method, given the resources required to create it. One question that might require further probing is the type of videos used; whether they are original, trainer-created, customized, or sourced from the internet. Original, trainer-created videos are expected to take more time to prepare, which might affect frequency. However, a good learning video, once created, can be reused repeatedly for some time.

The Perception of Trainees in Nyandarua National Polytechnic on Use of Video Technology for CBET Curriculum Teaching and Learning

To gauge trainees' perceptions of video learning, they first rated the videos' quality. Most trainees rated the videos as good, with only a few rating them as fair. None of the respondents rated them low, as shown in Fig. 4 below. This indicates that trainees appreciate the videos used in learning, which is a positive finding. Learning videos are expected to be high quality, as studies show that poor-quality videos can distract learners, reduce attentiveness, and become counterproductive. By contrast, skilled experts create high-quality videos, though most are not trainers. This calls for training trainers in video creation or expert support in video production, which in turn requires additional resources.

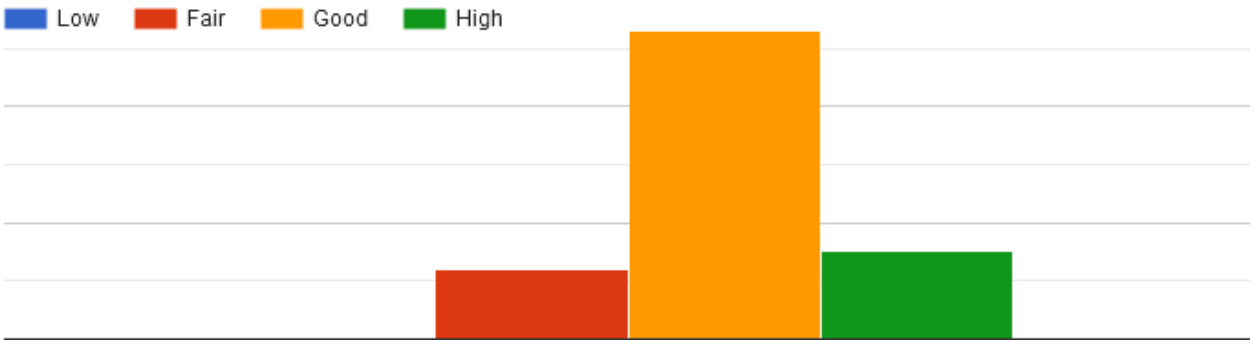


Fig. 4: Rating Of Videos as Digital Technologies in Terms of Quality

To assess trainees' perceptions of using videos for teaching and learning, trainees rated the videos they used for their helpfulness in learning. A majority of trainees rated the video technology as very helpful, followed by helpful and fairly helpful. None of the respondents rated the video as not helpful. This again points to learners' positive view of video use at Nyandarua National Polytechnic. Fig. 5 below illustrates this.

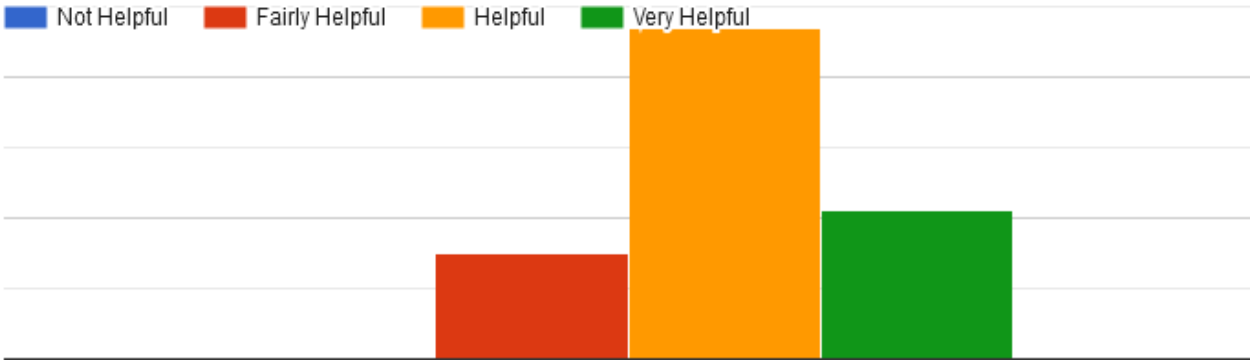


Fig.5: Rating of Videos as Digital Technologies in Terms of Helpfulness

Similar findings emerged when trainees rated the video for its usefulness in understanding. More than 80 percent rated it as 'very helpful' or 'helpful', with only 10 percent rating it as 'fairly helpful'. None of the respondents said that it was not helpful. This further corroborates that learners regard the use of video in teaching and learning positively. Table 2 clearly demonstrates this.

Table 2: Rating of Video as A Digital Technology in Terms of Helping in Understanding

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Fairly Helpful	2	10.0	11.1	11.1
	Helpful	6	30.0	33.3	44.4
	very helpful	10	50.0	55.6	100.0
	Total	18	90.0	100.0	
Missing	System	2	10.0		
	Total	20	100.0		

Respondents were also asked to rate the extent to which video made learning interesting. The following were the findings (Fig. 6). It is clear from the figure that the majority of learners considered video as a digital learning tool 'very interesting' and some considered it 'interesting', indicating a positive perception. While a few respondents thought it was 'fairly interesting', none said it was not interesting.

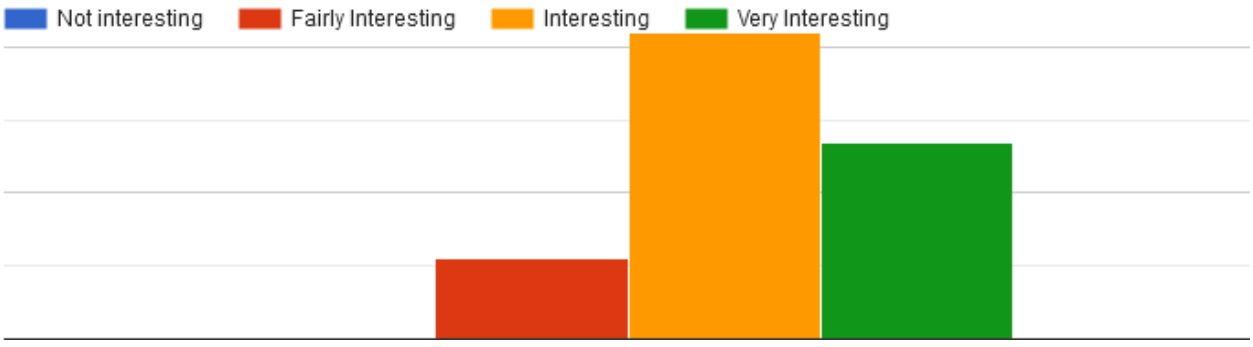


Fig. 6: Rating of Video as A Digital Technology in Terms of Making Learning Interesting

In terms of relevance, the findings were largely positive. Although a significant number of respondents felt that the videos used for learning were fairly relevant, a few others thought that the videos were not relevant at all, as Fig. 7 indicates. This finding suggests that some videos used in teaching and learning may have been ineffective because they lacked relevance. This again raises questions about the type and source of videos used in teaching and learning; for instance, whether they are online-sourced, originally created, or customized for relevance. Irrelevance is most likely to arise when videos are online-sourced and not customized to match the learning content. Learners may fail to identify with such videos or relate them to their learning needs, so they view them as irrelevant.

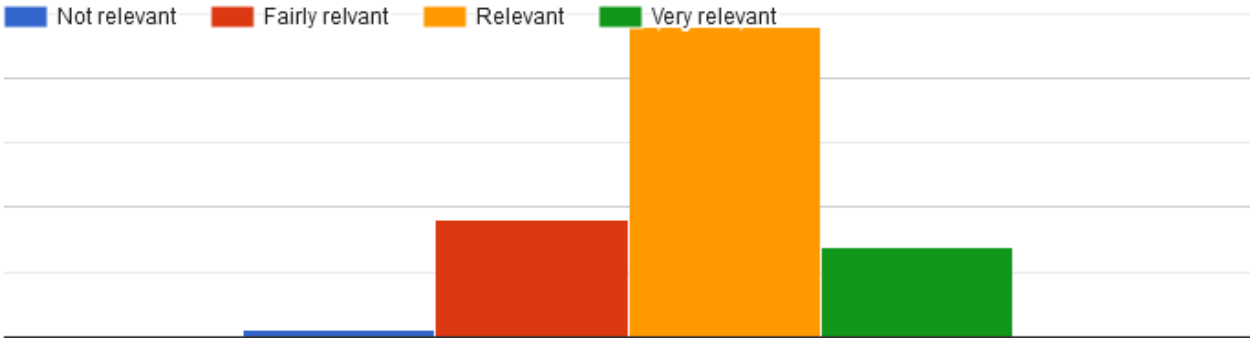


Fig.7: Rating of Videos as Digital Technologies in Terms of Relevance

Overall, respondents highly recommended using videos for teaching and learning, with only a small percentage holding contrary views. This is expounded in Figure 8. This suggests that learners highly value the use of video technology for teaching and learning.

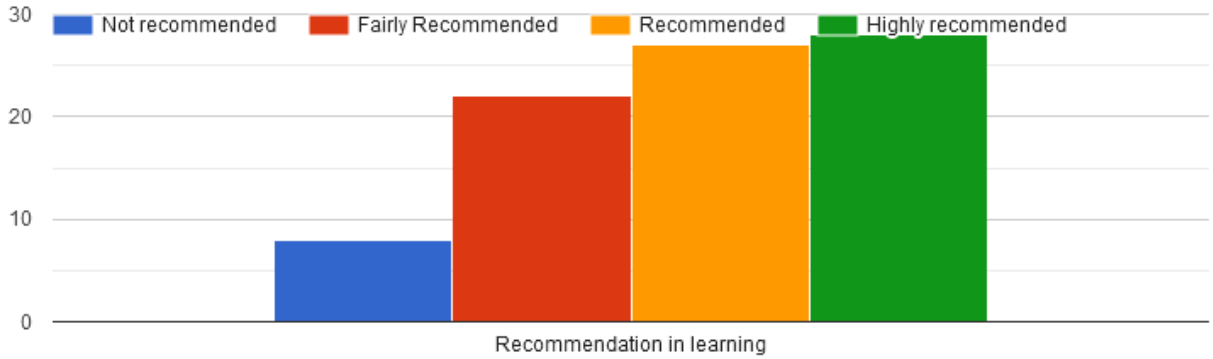


Fig. 8: Rating of Videos as Digital Technologies in Terms of Recommendation in Learning

The findings show that trainees at Nyandarua National Polytechnic generally view video as a positive digital teaching and learning technology. Trainees rated video technology use in teaching and learning highly in terms of quality, helpfulness, aiding understanding, making learning interesting, and relevance. It was thus highly recommended for learning in this era of Competency-Based Education and Training (CBET).

Nevertheless, the study also found that some of the videos used in teaching and learning lacked relevance or deviated from the learners' learning area. Such deviations would make the videos ineffective at achieving the intended objectives. Therefore, for video learning to be effective and meet expected learning objectives, teachers should use only relevant videos. Ensuring that learning

videos are relevant requires extra effort and resources, such as creating original videos or customizing existing videos to suit the learning objectives. This raises the question of whether videos used for teaching and learning are appropriate, which the current study may not adequately address and could be a topic for another study.

The Challenges Impeding the Use of Digital Technologies Among Trainers and Trainees in Nyandarua National Polytechnic for CBET Curriculum Implementation

Responses regarding the challenges to using digital technologies among trainers and trainees were grouped into several thematic areas. Internet accessibility emerged as the most prominent challenge, accounting for 54 percent of the responses. Respondents reported low or no internet access, inadequate data bundles, unreliable or poor network connectivity, internet failures, and slow institutional Wi-Fi. This was followed by language and understanding, which accounted for 13.9 percent of the responses. Participants indicated that extensive use of English, difficulty understanding some content, hidden meanings, misunderstandings, and language omissions made it difficult to use digital learning resources effectively.

Participants also identified content quality as a significant challenge (12.5%). Respondents noted that some digital materials were difficult to understand, contained irrelevant or excessive information, provided incorrect or insufficient information, or offered only shallow explanations of concepts. Others observed that some videos were contextually foreign, too long, too fast, or did not fully cover the concepts being taught.

Other challenges included technical problems encountered when using digital technologies (6.9%), such as technical failures, equipment breakdowns, inadequate training, and power outages. 5.5 percent of respondents cited issues with delivering digital content, describing some digital learning approaches as tiresome or boring, particularly when they had to watch lengthy videos or access content without a trainer's guidance. Equipment and devices accounted for 2.8 percent of responses, mainly because digital devices were not readily available. A further 2.8 percent of respondents identified interruptions from advertisements, particularly when using video-based learning materials, while 1.4 percent cited poor or inadequate sound as a challenge.

Despite these constraints, 2.8 percent of respondents reported no challenges with using digital technologies. Overall, the findings indicate that limited internet connectivity was the most significant barrier, while challenges related to language, content quality, technical infrastructure, and the delivery of digital resources also affected the effective use of digital technologies.

Discussion

The study found that Nyandarua National Polytechnic uses digital technologies to implement CBET. Of the nine sampled academic departments, 98 percent of responding trainees reported using video in their learning at some point. Trainees also used video learning across various subjects and at different levels of study. However, missing data on usage among Level Four trainees (Fig. 2) are concerning and warrant further investigation. Usage frequency was also high (Fig. 3), further indicating that TVET institutions are using video learning. This aligns with CBET principles of active learning and enhancing skills uptake by using innovative instructional methods and tools to facilitate knowledge and skills transfer. These methods and tools also support trainee engagement, aligning with learner-centeredness, which is another key CBET principle.

Trainees' perception of video as a digital technology was also positive. They rated it highly for quality, helpfulness, understanding, relevance, and interest, and they strongly recommended it for learning. These findings align with earlier findings in the literature review on current trends in integrating digital technologies in learning and the associated benefits of such integration. Some

studies note a shift in learning preferences in the digital age, with many learners turning to digital technologies for their educational needs and video becoming a popular learning tool (Adler et al., 2025).

In spite of the above positive discoveries, the study revealed a number of challenges that hamper the use of digital technologies for CBET in TVET institutions in Kenya. Internet access problems topped the list, accounting for 54 percent of the challenges. This is despite increased national internet penetration (48%). Data from the Communications Authority of Kenya *Fourth Quarter Statistical Report (2025)* indicate a 42.9 percent total growth in data/internet subscriptions, both mobile and fixed, from last year.

Despite this positive growth in internet access countrywide, internet access for students in learning institutions remains poor, based on responses in this study. This finding is likely replicable in other TVETs and institutions of higher learning in Kenya, especially public institutions that serve large student populations, with most students coming from poor backgrounds and largely relying on government support. The quality of internet access in these institutions is therefore paramount to implementing digital technologies for teaching and learning. This is because most uses of digital technologies require sharing files, whether text, audio, visual, or other formats, which the internet alone can facilitate.

Some digital instructional materials, such as videos, are large, and uploading or downloading them requires substantial data capacity and high-speed internet for meaningful learning. The lack of high-capacity internet where video learning is intended would therefore slow or stop teaching and learning. In some institutions, internet is available only in specific spots and not in all learning venues. Often, trainees must use data bundles on their smartphones, which some can barely afford. For most trainees, the institution's Wi-Fi is their sole means of internet access, even for non-academic purposes. As a result, they are unlikely to purchase data bundles for learning. This leaves some students behind in their learning, which goes against the CBET principle of inclusivity.

Further, the quality of content developed for digital technologies and the language used also contributed significantly to the challenges. This may be because much of it was sourced from the internet and did not always align with the learning content. Some materials also featured accents trainees did not fully understand, as noted above, with respondents saying the videos were mostly foreign. Poorly created learning materials using digital technologies can hinder, rather than aid, learning. They can lead to misunderstandings among learners and undermine knowledge transfer. Adler et al. (2025) clearly document the drawbacks of poorly created instructional videos. In addition, digital technologies in learning do not replace the trainer. Trainers are still needed to help trainees use these technologies and to interpret and understand the ideas and concepts within them.

Conclusions and Recommendations

The study concludes that poor internet access remains the greatest impediment to using digital technologies to implement the CBET curriculum in TVET institutions in Kenya. The quality of instructional materials used with digital technologies in these institutions currently falls short of learners' expectations and needs improvement. Digital equipment and devices for CBET learning in these institutions are inadequate, and some are not functional. The trainer's presence, either physically or virtually, is important for learners' motivation and understanding when learning with digital technologies. The trainer should still be present to help learners interpret instructional materials delivered through digital technologies.

The government, through the Ministry of Education and the management of TVET institutions in Kenya, should improve internet access quality for trainers and trainees in these institutions.

Trainers in TVET institutions should continually receive training in using digital technologies for learning and content creation. The government, through the Ministry of Education and the various TVET institution management, should facilitate this. The government, through the Ministry of Education, and TVET institution management should adequately equip these institutions with the necessary digital equipment and devices. TVET institutions should have trainers present to support and guide trainees in interpreting and understanding instructional materials delivered through digital technologies.

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