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Instructional Technologies of Education in East African Countries: An Overview

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ABSTRACT

This paper investigates the use of commonly employed technologies in education across East African countries, specifically focusing on Tanzania, Kenya, Uganda, Rwanda, and Sudan. It draws on Google Scholar to identify key technologies used in teaching and learning, emphasizing their benefits, such as increased student engagement, commitment, interaction, and improved performance. However, several challenges hinder the effective use of these technologies, including unfamiliarity, time constraints, negative attitudes, lack of human resources, insufficient government support, and infrastructure limitations. To overcome these obstacles, the paper recommends providing teachers with better training and workshops on accessing and utilizing appropriate technological tools. Furthermore, it calls for enhanced government involvement to ensure modern technologies are effectively integrated, thereby improving the overall quality of education in the region.

Keywords: Common technologies, primary school, educational infrastructures, human resources

INTRODUCTION

The application of technologies in African countries existed to improve and modify teaching. The history also traces that computer hardware was used in the 1990s (Kubickova, 2019). During this time, most African countries started to use

computers in school settings. Teachers try to use CDs in the teaching process. Additionally, it was the time of one laptop per child (OLPC). This aimed at distributing laptops to students to make learning smooth. This approach failed because it was costly to buy and distribute laptops among the students. The other reason for the failure to distribute one laptop per child was electricity problems in different areas. Most places have remote areas in terms of electricity provision. The low number of literacies among African countries is also associated with the failure to use and distribute laptops in different schools.

In 2010, mobile phones and tablets came to cover as a backup after the failure to distribute and use computers in different African countries (Kubickova, 2019). The solution involves the use of tablets and mobile materials in education. At this age, teachers try to use mobile accessories in teaching and learning. Others side the application of tablets in the classroom. Additionally, the teachers start using tablets in writing notes and teaching students. This makes learning and teaching very smooth. The lack of textbooks and learning as well as teaching and learning materials should be solved using tablets and mobile devices. Most countries, such as South Africa, Uganda, and Kenya, are much more in touch with these technologies. Helping students and teachers access education globally. Make students update their labor market skills. The uses of computers, mobile devices and tablets. This makes students close and familiar with technologies at a young age. Poor internet and networks challenge the application of technologies in the process of teaching and learning in different schools in African countries. Most African schools cannot access the internet; rather, only countries such as South Africa, Egypt and Morocco use the internet more than others do. This is due to the lack of education toward the use of computers in education.

The education system in East Africa is looking alike. Kenya joined Uganda and Tanzania to create the East African Community in 1967. The three nations chose a unified educational system, the 7-4-2-3, which included seven years of elementary education, four years of secondary education, two years of high school, and three to five years of university study. Both countries' education systems face the challenge of distance from school. A poor-quality environment (in the case of infrastructure, overpopulation, sanitation, and violence). Low-quality content such as obsolete curricula and poor resources) and poor-quality processes (for example, unskilled instructors and inadequate school management) are needed.

Radio was among the earliest technologies utilized in education in Sub-Saharan Africa, beginning with an experimental school radio project in Guinea in 1986. The initiative focused on elementary teachers' demands and key topics such as French, mathematics, and science. In the early 1990s, radio played a greater role in promoting basic education, particularly female access. Educational television became popular in Africa in the 1960s, with Côte d'Ivoire being a major example. The Programme for Education by Television (PETV) was established in 1971,

resulting in a large rise in school attendance and increased French language proficiency among students. The program lasted 14 years and concluded in 1982. Between 1990 and 2000, several efforts were launched to promote education in Sub-Saharan Africa using technology. These activities included providing computer gear to schools, with NGOs such as Computer Aid International, Digital Links, School Net Africa, and the World Computer Exchange contributing to the effort. The Africa Information Society Initiative (AISI) sought to connect every village to the global information network by 2010; however, hundreds of communities remain without power or communication across various ICTs. The One Laptop per Child (OLPC) initiative, which began in 2005, sought to provide low-cost laptop computers to schools. Governments purchased the program and distributed it to schools. OLPC has already included almost 2 million instructors and students globally, delivering over 2.4 million computers.

The main objective of this study is to provide an overview of the different commonly used technologies in East African countries.

1. What is the list of instructional technologies in education in East African countries?
2. What is the utilization of instructional technologies in education in East African countries?
3. What are the challenges of using instructional technologies in education in East African countries.

LITERATURE REVIEW

This research aims to examine the accessibility, use, quality, and problems of instructional technology utilized in education in East African nations. With the rest of the globe responding to changes in information and communication technologies in pedagogy, East Africa's ICT growth looks to be slow. This research examines several forms of instructional technology, their applications, and obstacles to presenting them to educational officials throughout the continent. The growth of educational offerings in this new information era is examined through the lens of progress made in developing ICT techniques for instructional technology. The study uses the Google Scholar search engine and ERIC to review instructional technologies in education based in Tanzania, Kenya, Uganda, Sudan and Rwanda.

Context of Tanzania

The use of instructional technology has undergone many phases in East African countries. From the period of colonialism to the period after colonialism, the error of COVID-19 was also present. A study conducted in Tanzania on rural areas in schools listed smartphones and tablets as instrumental instruments in

teaching. This study lists no prior familiar with technology as one of the challenges of using technology in schools Uchidiuno et al. (2018).

The need for early exposure to technology in primary schools. In the same vein, other research in Tanzania has investigated the use of mobile technology to facilitate teaching and learning in higher education. In the same vein, the Open University of Tanzania (OUT) has implemented compact disc (CD)-based teaching resources to overcome knowledge and technological deficiencies. However, pupils' perceptions of CD-based products are limited. Research conducted in Tanga, Kilimanjaro, and Morogoro revealed that 68% of pupils had positive opinions of CD-based resources owing to their perceived utility. However, 32% expressed negative sentiments owing to obstacles such as a lack of access to computers, electronic device abilities, electrical connectivity, and dependability. The study indicates that OUT employs both hardcopy and softcopy documents for preferable distribution (Khatibu, 2018).

Another study looks at norm instructional approaches in higher education institutions, namely, the Mwalimu Nyerere Memorial Academy and the University of Dar es Salaam. Data were analyzed through observation, semistructured interviews, and an examination of documents. In this study, the competence-based model and moderated traditional model were the most commonly used instructional models, whereas the elderly competence-based model, elevated traditional model, and concentrated competence-based model were adopted. The report advises that educational innovations be piloted before being scaled Kinyaduka et al. (2019).

Africa's youth population, which is expected to increase by 42% by 2030, is largely unemployed. Despite government efforts to reduce unemployment through vocational education and training (VET), many graduates lack the necessary employability skills. A project aimed to increase employability skills through ICT in Tanzania's four centers, including Ketumbeine secondary school, aimed to equip students with ICT and 21st-century skills. A self-administered survey and qualitative data instruments were used to evaluate the project. The results revealed moderate competence in multimedia technology knowledge; high confidence in 21st-century skills; and high confidence in collaboration, communication, leadership, and creativity and innovation. Research suggests that with planned activities, students can easily acquire the necessary employability skills Mtebe et al. (2020).

Another study demonstrated that the use of mobile phones such as smartphones facilitates teaching and learning at the college. The communication process among learners includes teachers sharing information, downloading materials, checking semester results, and fees. The findings indicate that poor mobile networks and high airtime costs still hinder the effective use of mobile phones in facilitating teaching and learning in higher education (Mbunda and Kapinga, 2021).

This study focuses on adopting information and communication technology (ICT) in rural Serengeti District community secondary schools. A number of factors, including energy, ICT equipment, technical assistance, and a favorable view of technology usage, might lead to the adoption of ICT. Nevertheless, limitations include inadequate gadgets, technical assistance, and ICT competencies. To lessen digital disparities, the report suggests government funding in rural CSSs Warioba et al. (2022).

Recognizing that contemporary technology can be an effective instrument for both practical experience and high-quality instruction, the Tanzanian government has included it in secondary schools. According to research evaluating stakeholder views of technology usage in Mvomero District secondary schools, there is a favorable correlation between stakeholder perception and technology use. However, obstacles, including inadequate infrastructure, financing, and teachers, make it difficult for people to accept new technologies. The report suggests that the government funds the improvement of school ICT infrastructure, the development of teachers' ICT abilities, the maintenance of a steady power supply, the inclusion of ICT skills in the curriculum, and the subsidization of ICT device expenses Betrina et al. (2023).

The Tanzanian government has adopted programs to guarantee that students are proficient in reading, writing, and arithmetic by the end of second or third grade. However, some students finish their mandated seven-year basic school without acquiring these abilities. A survey of 36 respondents from six elementary schools in Dodoma City revealed that digital media is often utilized for instructional reasons, hence improving reading skills. According to the report, educational institutions should prioritize the use of curriculum-specific digital resources, including various media types, and accommodate different learning styles (Maeda and Juma, 2023).

The study investigates teachers' opinions of using ICT to promote teaching-learning processes at the senior secondary level in Tanzania. According to the study, most instructors utilize ICT to improve teaching efficacy, emphasizing learning that is simple to comprehend, profound, and long-lasting. The study suggests a comprehensive strategy for integrating ICT to improve the teaching and learning process, which includes embracing a flexible culture and lifelong learning to increase student understanding and engagement (Chrispin and Saraswati, 2024).

Context of Uganda

Uganda is the other country in East Africa with the same education system as Tanzania from precolonial to colonial and post-COVID-19. The investigations in Uganda concerning the application of mobile phones in teaching and learning for secondary schools are in accordance with the success and challenges of such studies. There are positive attitudes for both parents and teachers regarding the use

of mobile devices in the classroom. This practice increases interest and commitment in learning to students. This leads to very good classroom interaction among learners, teacher-to-learners and learner-to-technology, as well as teacher-to-technology. The study also shows that there are some challenges related to the lack of skills and materials used to promote interaction in the classroom. There are a limited number of accessing computers and poor network connectivity. Thus, the total application of technologies such as mobile and computer technologies in secondary education is still limited (Busulwa and Bbuye, 2018).

Another study sought to explore the influence of instructional technology on student success in chosen schools in the Nkozi subcounty, Mpigi district. Several forms of instructional technology, such as computers, have been investigated, including their advantages and obstacles for instructors and students. The study focuses on quality education, instructional technology literature, and the target audience of the two secondary schools. The difficulties experienced by instructors and pupils were also examined. The findings are described in five areas, and recommendations for future research and action are given. Research has sought to increase the effectiveness and quality of schooling in the Mpigi area (Esau, 2019).

Similarly, the Uganda Management Institute (UMI) is preparing to include technology-enabled learning (TEL) in its teaching procedures. A poll of 827 students and 47 faculty members revealed that UMI contains elements of a TEL system, policy, and infrastructure. However, there is a need for better ICT infrastructure, specialized units, and enhanced collaboration among students, facilitators, and content. The survey advises that UMI's administration support TEL policy, form a TEL steering committee, build TEL capability, create TEL material, and establish an institutional research cluster on TEL practices (Kamya and Otim, 2019).

E-learning has become a popular alternative to traditional education in Uganda, although its use has been gradually increasing. This study sought to evaluate whether instructional design promotes e-learning uptake in midwifery schools. Ten schools, totaling 224 individuals, were sampled. The study indicated that instructional design considerably impacted e-learning adoption, accounting for 38.7% of the variation. The key distinguishing characteristics include selecting an effective instructional design model, material interaction, collaborative working, feedback elicitation, and participation in numerous e-learning activities. To increase e-learning uptake, midwifery schools should focus on these six characteristics Bigirwa et al. (2020).

To support this idea, another investigation conducted in Uganda examined the challenges of using information and communication technology in teacher colleges during the pandemic era. The results indicate that teachers suggest and appreciate the application of ICT in education, especially for colleges. Lack of skills and experience in interacting with technologies, inadequate hard wares,

software, and human resources, overpopulated classes, electricity problems, poor and slow networks and no government policies to support the use of technologies in colleges still challenge this area Nyakito et al. (2021).

The purpose of this study was to evaluate the association between primary teacher trainees' ICT capabilities and pedagogical practices in Uganda. The study employed a cross-sectional, correlational survey approach and included second-year primary teacher trainees. The findings revealed a positive and substantial link between ICT abilities and pedagogical practices, which was mediated by tutors' modes of teaching and ICT infrastructure. The report proposes that all stakeholders in teacher education enhance their ICT abilities and adapt to the changing educational landscape (Besigomwe and Opata, 2022).

The study looks at the influence of instructional design quality on student learning outcomes in Ugandan higher education institutions. It focuses on students' reported happiness, academic accomplishment, and long-term learning aspirations with Cisco e-learning courses. The study employed an e-learning instructional design quality measure sent to 805 trainees from 10 universities. The findings revealed that all instructional design quality subconstructs strongly influence perceived satisfaction, providing useful insights for higher education institutions seeking to improve e-learning performance (Bashir, 2023).

This study aimed to determine the impact of learner-centered instruction on learners' visible academic skills in Kiswahili at Mbarara Municipality secondary schools in Uganda. The study employed a quasiexperimental methodology with stratified random sampling and Kiswahili examination. The findings revealed that learner-centered strategies were employed 34.4% before and 85.4% after teacher training. The study suggested that instructors be educated to adopt and use more learner-centered instructional strategies to increase learners' observable academic skills in Kiswahili (Arishaba and Balimuttajjo, 2024).

Context of Kenya

Critical thinking is an important life skill that students should master to fulfill Kenya's 2030 vision and sustainable development goals. It eliminates bias and blind acceptance of opinions, allowing for strategic, creative, and problem-solving talent. However, there is a gap between schooling and the development of critical thinking skills among secondary school students in Kenya. The study aims to provide insights and information on how educational technology might inspire critical thinking among learners during the teaching and learning process for sustainable development in Kenya. This study used social cognitive theory (SCT), which is based on a library evaluation of secondary data and published reports on how to use educational technology to foster critical thinking among secondary school students (Njoka and Perminus, 2018).

Similarly, another investigation conducted in Kenya investigated the use of information communication technology for students’ performance in secondary

schools. Listing computers as the technology used in teaching and learning processes influences performance for students (Malungu, 2019).

Distance learners bring a variety of personal and professional experiences to the classroom, necessitating modifications in their learning methods and capacities. This study investigates the effects of instructional technology on both distant learners and teachers. A mixed methods strategy, which included questionnaires and interviews, was employed to collect qualitative data. The results revealed that instructional technology was beneficial to the majority of distance learners; however, most were bachelor's-level students. The report suggests in-service training and encouragement to improve technology delivery at institutions (Mutie, 2020).

Research conducted in Kenya has investigated the uses of technologies in learning in primary schools. The findings indicate that radio and television were the technologies most commonly used in teaching and learning during the pandemic era in rural areas. Shorter times, electricity issues, conflicts in radio and television uses, and deficiencies in internet connections still challenge the use of technology in education (Makira and Owino, 2021).

Stakeholders continue to be concerned about the performance of Kenya's enhanced additional county schools, particularly as the KCSE results are revealed. A survey of 8 administrators and 295 teachers from these schools revealed that while textbooks were available in sufficient quantities, learning tools for instructors, such as reference books, were not. Furthermore, the study revealed no significant association between instructional material planning and school performance. The study advises that schools use innovative instructional media to improve teaching and learning (Wekesa and Kitainge, 2022).

School administrators must encourage the use of technology in education. However, many schools do not have essential resources, such as the capacity to acquire and maintain digital infrastructure, inspire instructors, adapt to technological developments, and provide technical assistance. Research in Kakamega County, Kenya, revealed that schools lack adequate technology support systems, lowering their academic attainment. However, technological assistance systems substantially impact students' academic progress, highlighting the need for a more effective support system Lyanda et al. (2023).

This study investigates the influence of ChatGPT affordances on adaptive learning experiences for undergraduate religious education teacher trainees at the University of Nairobi. The study, which was led by Vygotsky's Zone of Proximal Development and the Technology Acceptance Model, discovered that learner interaction with ChatGPT had a beneficial effect on adaptive learning experiences. The study proposes that higher education institutions employ ChatGPT as a supplemental instructional resource to assist in teaching and learning processes rather than concentrating on the issues it presents Jepkemoi et al. (2024).

Context of Rwanda

The use of instructional technology in education, especially in Rwanda, has also been in different phases, with some challenges and benefits. In that case, the study looks at Rwanda's educational reform using ICT, focusing on progress and difficulties. It employs quantitative and qualitative research techniques and examines government records and documents. Although programs and regulations have been implemented, integration remains lacking. Differences vary between rural and urban locations, education levels, and end users. The report suggests equal funding for ICT infrastructure and literacy, adequate tool maintenance and replacement, and the ability to learn from successful ICT deployments (Bizimana, 2018).

Another study sought to determine how TVET teachers in Rwanda perceived their technological, pedagogical, and content knowledge (TPACK) degree. The findings revealed that most TVET teachers in Rwanda have a poor level of TPACK. The report recommends that Rwanda's government construct a preservice institute for educating trainers, provide technological and pedagogical education to in-service teaching personnel, and invest in training and consultation businesses to improve tutors' TPACK. This contributes to Rwanda's evaluation of educational goals and implementation review by demonstrating the degree to which TVET instructors are connected to TPACK. The commercial sector could also invest in training and consulting firms to help teachers enhance their TPACK (Mporananayo and Ng'umbi, 2019).

Another study investigated the effects of locally produced instructional materials on students' academic performance and retention in scientific education in Rwanda. The study employed a quasiexperimental approach, with a pretest–posttest nonrandomized control group structure. The research included 82 pupils, 42 instructors, and four principals. The results revealed that pupils in the control group performed worse than those who were taught utilizing locally created materials. According to previous studies, course instructors should be encouraged to employ locally manufactured materials to stimulate and encourage active involvement, which can ultimately improve students' academic achievement Twizeyimana et al. (2020).

Research conducted in Rwanda on the impact of COVID-19 on education has led to the application of technologies in primary, secondary and higher education. The study list includes computers, television, radio, mobile, and the tube used in teaching and learning. Network connectivity issues, power problems, and the unavailability of resources still challenge the use of technologies in education (Rwigema, 2021).

This study looks at Rwandan mathematics instructors' and pupils' self-efficacy in using technology during the COVID-19 epidemic. To evaluate variations in technology usage, the researchers employed an online questionnaire and an independent t test. The results revealed that most teachers lacked

appropriate knowledge and abilities, making e-learning technology cumbersome. However, there are significant discrepancies between rural and urban pupils and teachers, indicating the importance of ongoing training in adopting new technology Iyamuremye et al. (2022).

The study looks at the link between instructors' use of instructional materials and students' attitudes toward learning science topics in Rwandan secondary schools. The sample included sixty-three instructors from Muhanga district. Data were gathered via an online survey and questionnaires. Pearson's product moment correlations revealed significant relationships between the use of illustrations, pictures, and visual aids; laboratory equipment; models; drawings; originality; inventions; and audio–visual aids. Research suggests that teachers employ a variety of instructional tools in the classroom to increase students' involvement and attitudes toward learning Twizeyimana et al. (2023).

This study investigates the impact of virtual labs on students' attitudes toward biology and performance in challenging areas. It combines survey research and a quasiexperimental approach, focusing on 168 Rwandan upper secondary school students, whereas a control group consisted of 83 traditional teaching-style students Byukusenge et al, (2024).

Context of Sudan

Apart from being known as a place with various experiences of war. The application of technology in the classroom is highly beneficial to students. The study conducted in Sudan investigated ICT and the performance of the staff in education. The study mentioned computers, videos, CD ROMs, DVDs, internet, software, and mobile devices. The uses of software, such as websites, projectors, e-resources, sup, chats, forums, and social networks, are the technologies used in the country. The results of this study support the challenge of electricity, illiterate, negative attitudes from older teachers in supporting the use of technologies in the education sector (Ahmed , 2016).

In the same vein, ICT policy in K-12 education in Sudan, namely, its planning and potential to improve educational results, should be investigated. The study looks at two plans, interviews, and suggestions from past studies. The findings indicate a need for policy emphasis on technology use, improved technology equipment, and inclusive ICT policies in elementary and secondary education. Evaluations and assessments are recommended for successful solutions and global educational growth (Tairab and Ronghuai, 2017).

Teachers' perspectives of ICT integration in Sudanese TVET courses, finding a lack of defined ICT policy, poor infrastructure, and a lack of support from educational management. These findings imply that the government of Sudan should increase its efforts to integrate ICT and improve the quality of technical and vocational education and training (TVET) (Ramadan and Chen, 2019).

This study examines the importance of e-learning in education in poor nations, with an emphasis on Sudan. The study employs an exploratory research design with data gathering devices such as questionnaires and semistructured interviews. The results demonstrate that academics and policymakers have conservative attitudes about e-learning and ICTs. Research indicates that there is an increasing desire for realistic learning opportunities and simulations, yet e-learning necessitates new roles and methods for educators (Eltahir, 2019).

The study investigated the effects of instructional technology on English language acquisition and instructors' attitudes toward it. It involved 392 instructors from Khartoum State's basic schools. The findings revealed that technology increased learners' collaboration and participation, which led to enhanced performance and competency. The author conducted this study because she feels that studying English is critical and meets contemporary global demands. She suggested that incorporating instructional technology into the English language learning process for EFL learners is critical and results in efficient and adequate outputs. However, teaching English to EFL learners is inefficient. Thus, the current study primarily asks those in charge of English language education to integrate instructional technology in teaching English for EFL and to improve it (Mohammed, 2020).

The research investigated the usage of information and communication technology (ICT) in talented elementary schools among 56 instructors. The results revealed that ICT tools were available, occasionally utilized, and never used. There was no association between ICT use and age, years of experience, or credentials. However, there are considerable disparities between schools and a favorable relationship between ICT access and use (Ahmed and Bakhiet, 2021).

Sudan's education system is increasing due to increased student demand, necessitating the adoption of new technology such as iPads. iPads provide networking, social, interactive, and remote learning options. However, problems include the preference for older techniques, a lack of defined device usage guidelines, and inadequate training. The report suggests increasing facilities for incorporating technology into Sudan's education system while addressing physical, human, and space constraints (Onia, 2022).

This study examines the factors influencing instructors' use of instructional videos during the COVID-19 pandemic. The authors reported that perceived usefulness, ease of usage, and attitude significantly influence instructors' propensity to use instructional short films, with perceived usefulness being the most influential factor Suliman et al. (2023).

Given the situation in Sudan (the internal fight between the regular army and the Rapid Support Forces), we needed to find a means to continue our study in colleges by utilizing e-learning. The purpose of this study is to examine the readiness of the University of Gezira to identify the obstacles that may impede the implementation of the e-learning process so that they may be addressed as soon as

possible. The survey revealed that 94% of faculty members had a computer and knew how to use it, and 71% had a smartphone (or tablet). Additionally, approximately 83% of faculty members may prepare their lectures electronically, which is quite Babikir et al.(2024).

The above are the different studies conducted among East African countries that mention the technologies commonly used in higher education and secondary and primary education. This proves that there are limited commonly used technologies in primary education in East African countries.

METHOD

This study analyzes instructional technology in education in East African countries, focusing on Tanzania, Kenya, Uganda, Rwanda, and Sudan. It uses databases such as Google Scholar and ERIC to gather information and conduct a literature survey. The research reveals progress and challenges in technology infrastructure in these growing countries, particularly in areas with limited access to and availability of technology. The study uses buzzwords such as instructional technology, educational technology, and information and communication technology. The research included participants from East African nations that have integrated instructional technology into their primary school systems. Tanzania, Kenya, Uganda, Rwanda, and Sudan are the five nations involved. This was a selection technique that included countries from diverse parts of East Africa.

RESULTS

The research lists common instructional devices utilized in East African education, such as smartphones, tablets, mobile phones, compact disks, computers, iPads, radios, televisions, and laptops. These technologies are used to teach, share information, download materials, check outcomes, pique students' attention, improve academic achievement, and promote classroom engagement. Challenges include a lack of prior technological expertise, high airtime prices, time limits, overcrowded courses, illiteracy, unfavorable attitudes, software and human resource availability, inadequate network access, and a lack of government legislation.

The findings of educational instructional technology (EAC)

The findings suggest that in Tanzania, innovations such as smartphones, Tablet, Mobile technology, Compact disc (CD), Information and Communication Technology (ICT), computers, and iPad. This is employed in effective teaching tools. Share information, download resources, check semester outcomes, and determine charge status. It also faces problems such as lack of experience with technology, a bad cell network, and expensive airtime costs. Uchidiuno et al.

(2018), (Khatibu, 2018), Kinyaduka et al. (2019), (Mtebe et al. 2020), (Mbunda & Kapinga, 2021), Warioba et al. (2022), and Betrina et al. (2023). and (Chrispin and Saraswati, 2024).

According to the data, mobile phones, PCs, disks (CDs), iPads, and tablet radios are widely used in Ugandan classrooms. This promotes interest, commitment, and interaction. On the other hand, there are still challenges: a lack of skills and experience, a lack of hardware/software resources, a scarcity of experts, overcrowded classes, an electricity problem, a poor and slow network, and no government policy (Busulwa and Bbuye, 2018), (Esau, 2019), (Kamya and Otim, 2019), Bigirwa et al, (2020), Nyakito et al. (2021), (Besigomwe and Opata, 2022), (Bashir, 2023), and (Arishaba and Balimuttajjo, 2024).

The findings show that radio, television, computers, new teaching materials, digital infrastructure, and ChatGPT are being employed in Kenya's education sector by both instructors and pupils. These technologies aid students' learning, improve academic achievement, reduce time constraints, and alleviate electrical difficulties. There are still issues with radio and television, as well as bad international relations (Njoka and Perminus, 2018), (Malungu, 2019), (Mutie, 2020), (Makira and Owino, 2021), (Wekesa and Kitainge, 2022), Lyanda et al. (2023), and Jepkemoi et al. (2024).

The findings show that in Rwanda, the use of television, radio, mobile, ICT, and a virtual lab with technologies, audiovisual aids, laptops, and tablets is still in the works. This involves both instructors and students making an effort to learn and teach, as well as motivating everyone. Network connectivity, power outages, a lack of resources, and poor policies with no government support continue to impede the use of technology in Rwanda's education sector (Rwigema, 2021), Iyamuremye et al. (2022), Twizeyimana et al. (2023), and Byukusenge et al. (2024).

In Sudan, computer, cellphone, television, and laptop usage is heavily emphasized in high school. It is effective for improving student/staff performance. Electricity, illiteracy, and unfavorable attitudes, as well as a lack of government assistance, continue to be barriers to the use of technology in education (Mohammed, 2020), (Ahmed and Bakhiet, 2021), (Onia, 2022), Suliman et al. (2023), and Babikir et al. (2024).

Conclusively, the study investigates the use of educational instructional technology in East African nations, identifying the most widely utilized devices and their applications. Smartphones, tablets, mobile phones, compact discs, computers, iPads, radios, TVs, and laptops are all examples of common technology. They are used to teach, share information, download resources, check outcomes, pique students' attention, improve academic achievement, and promote classroom participation. Challenges include a lack of prior technological expertise, high airtime costs, time constraints, overcrowded courses, illiteracy,

unfavorable attitudes, software and human resource limitations, inadequate network access, and the absence of government initiatives

CONCLUSIONS

This study highlights the most widely utilized instructional technologies in East African education, such as cell phones, tablets, mobile devices, compact discs, radio TVs, and laptop computers.To support the idea the University of Gezira's readiness to implement e-learning due to the internal conflict in Sudan. It reveals that 94% of faculty members have access to computers and smartphones, and 83% can prepare lectures electronically, indicating a promising future for e-learning Babikir et al.(2024).

The study investigated the use of instructional technologies in East African education, highlighting their effectiveness in teaching, sharing information, downloading materials, checking results, enhancing student engagement, and improving academic performance. on the same vein the University of Nairobi explores the impact of ChatGPT affordances on adaptive learning experiences for undergraduate religious education teacher trainees, suggesting that higher education institutions should use ChatGPT as a supplementary instructional resource Jepkemoi et al. (2024).

This study highlights challenges in East African education, including a lack of familiarity with technology, high costs, time constraints, overcrowded classes, illiteracy, negative attitudes, software availability, and a lack of government policies.There fore the influence of virtual labs on students' attitudes towards biology and performance in challenging subjects, still has a probl;em in icoperating technology in the class Byukusenge et al. (2024).

IMPLICATIONS

African policymakers must embrace synergistic instructional technology to remain relevant and actively engage in educational practices. The digital divide between Africa and the rest of the world is enormous, and closing it will require strong policies that institutionalize instructional technology practices at all levels.

Technology transfer is a fiction, and East African countries must prioritize human resource development, including capacity building and educational training. Financial resources should be allocated to the development of technological infrastructure, allowing organizations and institutions to benefit from synergies in instructional technology. Implementing measures such as Kenya's one laptop per child program can help stimulate technical innovation while also contributing to a country's overall development. The article suggests that East African countries should focus on integrating various instructional technologies into their educational offerings post-COVID-19 to foster

development and improve their workforce and educational institutions, as a deepening of technology at all levels could be beneficial.

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