

Educational Technology and Competency-Based Education in Kenya: Does Technology Matter?

Elyjoy MICHENI¹, Julius MURUMBA², Jackson MACHII³

¹ Tom Mboya University, Homabay, Kenya P.O. Box 199-40300

^{2,3} The Technical University of Kenya, P.O. Box 52428, Nairobi, 00200, Kenya

Email: elyjoymicheni@gmail.com; j.murumba@gmail.com; machiijack@gmail.com;

Abstract This paper discusses technologies available to support education, in particular the recently introduced CBC curriculum in Kenya. To achieve this, the study is undertaken a literature review, and further discusses implementation policies and challenges of technology adoption. Scientific research journals and conference proceedings are scrutinized. The study finds that many technologies exist to support CBC, albeit insufficient supporting policies. The study recommends that the national ICT policy guidelines of 2020 be reviewed to incorporate a clear and distinct overall strategy for ICT innovations and application in the education arena. Government agencies, researchers and academic practitioners are expected to benefit from the findings of this paper. The paper concludes that for CBC to be successful, policymakers must implement enabling policies, support technological tools and processes, and reduce the existing digital divide

Keywords: Educational Technology, Competence-based curriculum, Policies, Strategies

1. Introduction

Critical thinking and problem-solving abilities are required in the twenty-first-century workplace. As a result, creative abilities that can enable problem-identification, solving, and strategic brokering events are crucial for learners to acquire through educational systems. Such skill sets enable students to think creatively and solve problems. Competency-based education (CBE) is a method that can enable this by aiding students to advance in any environment centered on their capacity to learn a skill or expertise at their speed. [7] defines competency-based education as an education in which skills, attitudes, or knowledge, are clearly stated to achieve competence standards, typically within a kind of national qualifications framework. The competency-based education teaching method focuses on what students need to know and have competence in different situations rather than what academics believe students should know. The work of [7] shows that the CBE approach to education focuses on what a person can do as a result of learning, rather than the instructional processes, and emphasizes competencies relevant to the world of work. Using this method, students can know, demonstrate, comprehend, apply, analyze, synthesize, and evaluate a specific topic of instruction in the competency-based curriculum. [20] argues that the most important feature of CBE is its measurement of learning rather than time. With CBE, students advance by demonstrating competence and mastery of the knowledge and skills prerequisite for a specific course, irrespective of how long it takes. CBE learning activities are thus designed to help students acquire and apply knowledge, skills, and attitudes to real-world situations.

In his work, [1] argues that the series of reforms implemented in Kenya since 1963 is a demonstration of the country's continued commitment to improving education. Numerous

reforms have been undertaken including embedding national goals in the curriculum in 1964, revision of national education and policy objectives in 1976; introduction of the 8-4-4 curriculum in 1985; and the Koech Report of 1999 that recommended integrated quality education and training (TIQET). Similarly, the current government views education as important for its development goals and has introduced competency-based education (CBC) to enable the realization of the country's national development goals. To align its education with global standards, Kenya has adopted CBC [11], [18], [1], because of the perception that CBC is learner-centered and adaptable to changing student, teacher, and societal needs. According to [1], CBC is implemented in a variety of ways, including advocating for free primary and secondary school education, as well as vocational studies to obtain and gain skills necessary for Kenya's economic development. [17] Argues that when learners acquire competent skills, the skills will in turn transform the Kenyan economy by creating jobs through self-employment, and raising living standards.

Educational technology is the structured and systematic use of modern technology to improve educational quality and includes the incorporation of digital networks, computer hardware, and software with teaching methods to construct knowledge. According to [26], it entails a systematic approach to conceptualizing and evaluating the educational process of learning and teaching, and it can help in the application of modern pedagogical techniques. These include instructional materials, methods, work and relationship organization, and the behavior of all participants in the educational process. The Kenyan government launched the digital literacy programme (DLP) in 2016 with the belief that technology has the potential to improve basic and higher education by transforming teaching and learning through the integration of technology into the learning environment. Due to the increased use of digital technologies in many aspects of educators' and students' lives, these technologies have been transferred to the learning environment, resulting in new ways of teaching using these technologies.

While education technology is critical to achieving CBC in Kenya, the digital divide continues to widen. Despite the cost of gadgets decreasing, there is no evidence that the digital divide is narrowing, according to [17]. In the current Fourth Industrial Revolution era, educational reforms will unavoidably necessitate the use of modern technology [17]. To achieve the adoption and use of educational technology, educators must proficiently use technology in their training to fully experience the benefits of technology in didactic practices as well as provide meaningful learning experiences.

Competence-based learning places importance on creating powerful or rich learning environments that allow students to engage in meaningful learning processes. Meaningful contexts, a multidisciplinary approach, constructive learning, cooperative, interactive learning, and so on with peers, teachers, and so on distinguish CBC [20]. These can be accomplished through the incorporation of educational technologies. A competency-based curriculum emphasizes what learners are expected to do rather than what they are expected to know. The curriculum emphasizes a learner's unique talents and abilities rather than focusing entirely on academics and exam performances.

1.1 Digitization of CBE

[17] argues that digitization makes education more accessible in Kenya, thereby closing the digital divide. This is made possible by the availability of tablets, computers, the internet, and various digital tools. This initiative is a result of collaboration between various agencies such as the ministry of education, science, and technology, the network initiative for computer education, Kenya Education Network Trust (KENET), Oracle, and Microsoft. The government's sensitization and mobilization efforts on digital equipment, connectivity and network, technical support, emerging technology utilization, and ICT policy formulation have boosted digitization in Kenya's education sector [13].

The integration of ICT at technical and vocational education and training (TVET) has necessitated the installation of fiber optics for internet connectivity, as well as modern training workshops and hubs to sensitize students to the benefits of ICT in learning [12]. Furthermore, the financial management information system (IFMIS) has been integrated into the institutional level to assist the ministry of education and TSC in managing finances, administration, resource management, placement, and decision-making in schools. As a result, technology has acted as a catalyst for a competency-based education approach by providing tools that improve research, communication, and collaborative effort.

As new generations of students enter the classroom, they are prepared to work with new and emerging technologies that play an important role in their learning and acquisition of various cognitive skills. Technology has aided learning in some ways, such as assignment completion through games such as Minecraft, collaboration through group projects, and assignments via Google Docs. Technologies including zoom, Ms. Teams, skype, and google meet improve the interaction between teachers, students, and parents about information including feedback, progress, assignment instruction, meetings, and curriculum content. Technology has advanced research in an institution. Programs such as Google forms, Jotform, LimeSurvey, survey monkey, and others can be used by students to gather, organize, analyze, and visualize data. This study through a literature review tries to describe education technologies, implementation policies, and challenges of technology adoption.

2. Methodology

The study used desktop research, which involved conducting a literature search of scientific research papers published in journals, conference proceedings, online journals, and reports. The search terms included: Educational Technology, Competence-based Curriculum, Policies, and Strategies.

3. Educational Technologies

Technology has the potential to be a powerful tool for transforming education. It can assist educators and students in strengthening and advancing their relationships, reinventing learning and collaboration approaches, closing long-standing equity and accessibility gaps, and adapting learning experiences to meet the needs of all learners. Over the last decade, the education landscape in Kenya has experienced an increase in the adoption of innovative learning initiatives in education, particularly in higher education, that make use of cutting-edge technology tools and pedagogy.

Learning management systems, textbooks, electronic whiteboards, and courses are all designed for use in educational processes and when combined with appropriate pedagogies and technologies, they can be used to support or engender learning [2]. Educational technology is a branch of psychology that studies the complex, integrated process of analyzing problems and devising solutions. It involves people, procedures, ideas, devices, and strategies. It is commonly concerned with the systematic application of scientific and other knowledge to practical tasks. It is the theory and practice of designing, developing, implementing, managing, and evaluating learning processes and resources, according to [1]. When using educational technology, we should be most concerned with the educational value of the tools and applications, how effective they are in knowledge acquisition, whether there is an interaction between users and tools, and whether we have positive effects when we use them [26].

Pedagogies are among the technologies that educational technology orchestrates, whether intentionally or unintentionally. As a consequence, pedagogies are technologies that can be instantiated by humans and embedded in physical tools like computers. [2] defines pedagogies as "assemblies that orchestrate various phenomena, the most notable

assertions regarding how students learn." Mostly all commonly used pedagogical techniques are insufficient without the inclusion of classrooms, and courses are also considered as technologies. Technological advancements such as the rise of various social media sites, open-source platforms, breakthroughs in mobile technology, and the development of new educational models are all having an impact on teaching and learning practices. Web-based tools such as e-books, blogs, YouTube, podcasts, and so on are expanding the possibilities for multimedia computing and multisensory learning [27]. [5] Considers educational technology to encompass the ethical research practice of developing, deploying, and handling effective technical processes and resources to expedite active learning. Many complex and critical processes can be completed with greater ease and efficiency with the help of modern technology. The face of education has changed as a result of technological advancements. The use of technology has improved the teaching and learning processes [6]. With the introduction of computers into the classroom, teachers' ability to impart knowledge and students' ability to acquire it has improved.

Courseware as a wide range of educational technologies is also used. The majority of top educational institutions include courseware as part of their training packages. Computer-supported collaborative learning (CSCL) is a pedagogical approach to learning in which students interact socially with a computer or the Internet. The use of technology as a chief means of communication or as a shared resource distinguishes this type of learning because it encourages participants to share and construct knowledge. [5] suggests that CSCL can be used in both online and traditional classrooms. An interactive whiteboard allows the teacher to project images from his or her computer onto a large (usually wall-mounted) board, and users can use their fingers or a stylus to interact with the board's content. Apps are software that executes on portable devices such as tablets or smartphones. Podcasts, blogs, wikis, and Rich Site Summary are all examples of Web 3.0 features and functionality that are used to keep up with constantly changing web content as well as social networking and tagging. Many online study tools encourage students to study by making these tools more enjoyable or personalized for them. Educational and serious games have grown in popularity in recent years thanks to digital games. Digital games are used in the classroom and have received a lot of positive feedback, including increased student motivation. Educational technologies present opportunities for learning analytics. [28] writes that it is simpler to evaluate the effectiveness of current pedagogies and instructional designs when learning analytics are used. They also help in closely monitoring students' learning and persistence, forecasting their performance, and identifying students at risk so that appropriate follow-up can be done and they can get the support they need.

3.1 Government Policies

The Ministry of ICT in Kenya is responsible for developing policies on ICT human capital development, information security, innovation and enterprise, shared services, and ICT governance. The government launched the digital learning program through the ministry in 2016 as one of the strategies for implementing ICT in educational systems. Its main goal was to transform Kenyan education into a 21st-century education system by ensuring that students can use digital technology and communication in their studies [17]. The goal was to achieve digital literacy, which refers to the skills needed by individuals to learn, live, and work in a society where digital technologies such as internet platforms, social media, and mobile devices are increasingly used to facilitate communication and information access. These digital technologies are founded on various information and communication technologies that link audio-visual and telephone networks to computer networks via a single cabling or link system. The technologies place a strong emphasis on unified communications and the integration of telecommunications, computers, enterprise software,

middleware, storage, and audio-visual systems, which allow users to access, store, transmit, and manipulate data [5].

In 2020 the Government of Kenya published the National Information Communication Technology Policy guidelines through Gazette Notice No. 5472 of 20th August 2020. The policy aims at aiding government institutions to build, deploy, operate, and manage robust back-end and front-end systems in the delivery of government services. The policy further states that data originating in Kenya remains in the country whilst protecting the privacy of citizens to the utmost. These policies alone are not sufficient to enable the enhanced use of emerging technologies in educational systems. The cost of bandwidth and end devices for instance remains prohibitive for many learners. The government must have a national ICT policy with a clear and distinct overall strategy for the development of ICT research, advancement, and innovation in the education context. Pedagogy of ICT Training and awareness are necessary to guarantee that ICTs are gradually incorporated in aid of pedagogy [4].

3.2 Significance of Technologies in Education

Learners are frequently enthralled by digital technology, which can help to create a more engaging learning environment. Technology improves education and is becoming increasingly important in the learning process. According to [10], technology aids in the development of basic academic skills in students, especially those who are at risk. Access to the Internet and distance learning opportunities encourage relevant learning experiences that are not constrained by geographical distances and improve information access for students and teachers. In addition, technology, particularly video-conferencing, aids in the understanding of other cultures. Technology has several advantages, including the use of visual images, which have a stronger appeal than words, the use of projectors and visuals to aid learning, the use of PowerPoint presentations and projections to keep learning interactive and interesting, and virtual reality, and gamification. By supplementing and connecting learning activities, various technologies can help to improve learning. The instant feedback provided by digital technology benefits both the learner and the teacher. The technology available today has made a wealth of knowledge available to students, which offers great potential for the speed and style of learning. Information is presented in so many different ways that any type of learner, whether gifted or disabled, can find and use it. This is true not only for the Internet but for all of the technological advancements in education, from smart boards to handheld devices [2].

The significance of information and communication technologies (ICT) stems from the fact that technology also enables easy access to various learning materials. These include E-books, revision guides, and past examination papers that are freely available on the Internet and can be used by students to expand their knowledge base. When it comes to continuous learning, students can continue to learn regardless of where they are physically located thanks to the use of information technology in education. To share knowledge, students from all over the world can come together and share their experiences; geographical distances are no longer an impediment; this is only possible because of technology. Technology also enables the use of learning aids. Using audio and visual materials, we can add some practical elements to the theory taught in class, and students will gain a better understanding of the topics. Distance learning is also digitally enabled, as it is now possible to attend a college abroad without leaving your home country and at your own pace. By taking online courses, anyone can earn a second degree or additional certifications. The use of information technology in education has also improved record-keeping by allowing for safe and accurate record-keeping [6].

The use of information technologies in education has the following advantages: 1) Methods of teaching and learning that are effective. The usage of technology enables

teachers to implement teaching methods adequately because the advancement of technology enables educators to gain a deeper understanding of concepts and pass them on to students. 2) Students' abilities to carry out independent work are improved through the use of technology. Students, particularly those who are slow to grasp concepts or who have learning disabilities, can improve their understanding in terms of the concepts. Such students can overcome various barriers and challenges associated with the implementation of learning tasks if they understand the subjects and concepts properly. 3) The use of information technology contributes significantly to the improvement of the educational system. The educational environment is influenced by teaching-learning methods, instructional strategies, interactive learning, a personalized and differentiated approach to teaching, cognitive activities among students through the use of video and audio information, control through testing, and a system of equations through self-control. 4) Because students learn how to use information technology, their primary goal is to ensure that they use it effectively to achieve academic goals. 5) Students, teachers, and other members of educational institutions can all increase their creativity in their projects, assignments, tasks, and other activities. 6) Individuals in education engage in formal and informal communication processes enabled by digital technologies, which include computers, laptops, and mobile devices that facilitate communication processes.

4. Implementation Challenges of Educational Technology in CBC

Sub-Saharan Africa still faces several issues even after implementing sustainable development goals through education and harnessing the integration of ICTs in all stages of education [4]. According to [22], even though a CBC is far more effective in assisting learners in acquiring the competencies required to perform specific things, education technology adoption initiatives face several challenges, including insufficient infrastructure, electricity, and internet connectivity; a lack of training, and opportunities for the pedagogical use of digital technologies. Although teachers were provided with the equipment needed, the insufficiency of the Internet deemed the equipment useless. Because a CBC necessitates a major shift from passive to student engagement, the infrastructure required for this model is quite distinct. The scarcity and high cost of electronic devices, bandwidth teacher preparedness, and insufficient support are all potential barriers to the successful deployment of technology-based CBC. Governments and policymakers have widely advocated for the use of ICT in education as a critical 21st-century skill. Nonetheless, numerous obstacles to ICT Implementation into the curriculum have been reported in recent research [13]. Regrettably, the use of ICTs has been slowed down by a lack of expertise, lack of quality hardware and software, and unaffordable bandwidth among other challenges [22]. Kenya is a developing nation which means that implementing CBC is likely to face numerous challenges, including the quality of both learning and teaching resources and teachers' pedagogical content knowledge [17].

In his work [10], desktops, laptops, tablets, an Internet connection, computer labs, and technical support are all necessary for an effective CBC program. While some schools have a handful of computers, they are insufficient to support an entire class or multiple classes at the same time. Schools should invest in wireless Internet infrastructure to improve internet connection consistency. Although there are many challenges, many are attributed to insufficient ICT infrastructure among the institutions, technology accessibility, lack of ICT institutional policy usage, socio-cultural and literary factors, instructors' attitudes, pedagogy, expertise, knowledge, and beliefs about ICT, students' ICT literacy, insufficient support from educational institutions and government. African institutions generally face challenges in the adoption of technology in teaching as a consequence of scarce ICT facilities manifested in form of limited computer labs, few computers, limited supply of

electricity, and unaffordable bandwidth [21]. Furthermore, many African schools in developing nations lack resources and ICT policies to support the teaching process including student books, laboratory equipment, computer labs, modeling techniques, and charts [16]. According to previous research, ICT facilities such as laptops for teachers, projectors, tablets PC devices for students, and other enabling installations are insufficient [13].

The key issues impeding the successful implementation of technology-enabled CBC include: 1) Teachers' readiness to implement CBC is a source of contention. 2) Lack of teachers' participation in and implementation of CBC. 3) Lack of digital literacy skills among teachers in CBC implementation, and 4) Inadequate resources for successful CBC implementation, such as computers, smartphones, power outages, and network issues. Teacher preparedness and comprehension based on skills, knowledge, and perceptions can guarantee the effectiveness of the use of technology in a competency-based curriculum and its implementation at all educational levels [15]. Teachers are the enablers of whatever curriculum, and for them to fully concentrate on the task, they must be extensively ready through in-service training.

5. Strategies for the adoption of educational technology in CBC

Education technology is critical to achieving CBC. The digital divide widens as we approach 2030. Even though the cost of gadgets has decreased, there is no evidence that it is narrowing. In this extremely competitive Fourth Industrial Revolution, CBC will unavoidably necessitate new technology [17]. CBC necessitates substantial investments in laboratory facilities and innovation hubs. For CBC to thrive, basic education technology including smart boards, virtual simulation labs, and maximum use of modern technology is required. To high internet invasion in rural areas, the government will allow students to access unlimited online resources. Students in Kenya's top schools use this type of technology. Digital innovation is unquestionably transforming inventions. [1] Implementing a CBC necessitates adherence to the aforementioned guiding principles: i) students' progress based on proven mastery. ii) competencies where learning objectives are specific, measurable, and adaptable and that motivate students. iii) evaluation is a worthwhile and enjoyable learning experience iv) students are provided with timely, distinguishable support according to their particular learning needs. v) Learning outcomes emphasize competencies such as knowledge application and creation, as well as the advancement of important abilities and personalities.

The capability to articulate knowledge besides skills about varied digital devices, such as smartphones and PCs, commonly referred to as digital literacy is important for educational technology. Digital literacy is obligatory for CBC to work, and teachers must receive training to gain the technical skills necessary to act as a bridge from the 8-4-4 system of education being phased out in Kenya to the novel CBC. This will allow teachers to combine technical skills into their teaching so students to acquire competence [17]. To fully accomplish the objectives of CBC, schools must be properly resourced, all stakeholders must be significantly engaged, and teachers must be reskilled and provided with training on CBC as they are the center of the innovation. The government must have a national ICT policy with a clear and distinct overall strategy for the development of ICT research, advancement, and innovation in the education context. Pedagogy of ICT Training and awareness are necessary to guarantee that ICTs are gradually incorporated in aid of pedagogy [4].

There is an increasing need to include learners as part of stakeholders in curriculum change deliberations. This will provide the innovators with social support as well as an ability to engage substantially with their viewpoints endorsing the ICT integration [1]. For

Kenya, it is often suggested that the Kenya Institute of Curriculum Development (KICD) and the Ministry of Education schedule training to bridge capacity challenges associated with pedagogy, evaluation, and preparedness of CBC learning.[12], highlighted some of the strategies being pursued by the Kenyan Government to ensure the successful implementation of CBC. These include 1) the availability of in-service training for teachers, including the shortlisting of some teachers from each school for training on ICT-enabled CBC; 2) Teachers' participation in curriculum transition decision-making; 3) Provision of adequate learning and teaching resources, such as online platforms and online teacher self-assessment; 4) Creation of a national secretariat on CBC; 5) Policy of lawful tools for the CBC; 6) Creation of a technical paper on CBC for teacher education; 7) Learning from the most successful implementer countries; and 8) Recruiting more teachers.

Teachers should be technologically savvy to successfully implement competency-based curricula. One of the critical competency areas highlighted for CBC is digital literacy. Teachers must transition from traditional methods of teaching to modern teaching methods such as training and learning integrated with ICT. Teachers' content and pedagogical understanding are also indispensable for CBC implementation. Teachers should be familiar with the learning approaches to be used, the learners' areas of difficulty and foreknowledge, subject matter knowledge, teacher professionalism knowledge, and the desired outcomes of CBC. The extent to which an educator knows and understands the subject determines how well they can teach the curriculum content to students [15]. The deployment of CBC is largely dependent on teachers' awareness, knowledge, skills, and overall impression of the curriculum change. Teachers play an essential part in any reform process, and the aforementioned facets should be taken into account in the implementation of the revised curriculum for the efficacy of the innovative teaching processes to be incorporated [9].

[13] argues that teachers should be given computers so that they can easily obtain materials and start preparing for the integration of technology. This will enable instructors to become more acquainted with computer hardware and software, lowering the necessity for computer technicians in classrooms. Teachers who are utilizing the new curriculum must therefore participate in regular training programs. In situations where device shortages are unavoidable, teachers should be trained on how to promote collaboration among students by sharing technology devices and working on responsibilities as a team. Issues concerning the facilitation of competency-based education and training (CBET) should be highlighted and implemented. Among these are a CBET policy covering curriculum and the availability of both material and human resources [19]. [21] training of personnel associated with the execution of the CBC at various levels using a multi-sector approach is also important. To enforce a CBC, educational institutions must contain everything from modern classrooms to creative centers, smart boards, and laboratories, as well as the most up-to-date technologies, to help students assertively engage with the instructional process.

6. Case studies

In his work [24], technology is used to develop competency-based learning. This method enables learners to gain knowledge from an e-learning platform, tutorial videos, and e-teachers. [23] agreed with [13], globalization and swift technological change have resulted in the creation of a knowledge-based economy in the twenty-first century. As a result, governments have made investments in the integration of ICT in education at all levels to provide students with the skills they need for modern life or even beyond [25]. This integration, as well as massive investments in educational technology, are thought to have had a significant impact in some countries, such as South Korea, which has witnessed incredible growth in the economy. Furthermore, a cross-national closer examination of

technology and classroom practices encompassing 28 states claims that Taiwan, Finland, the Netherlands, Norway, and Singapore have implemented educational reforms to harmonize with global trends. The use of technology in the classroom, including digital learning platforms and interactive technology, is indeed enhancing student participation and academic performance. Including interactive learning functionalities such as quizzes, simulations, as well as gamification in an educational curriculum can boost students' learning inspiration, achievement, and success.

According to [25] Singapore's National Institute of Education provided its ICT with a significant formal curriculum. Instructors must offer collaborative projects in the context of lesson packages, together with teaching materials involving concepts of effective teaching, and virtual, and digital learning.

Edith Cowen University in Australia transformed its established learning through technology classes from one that relied primarily on immediate teaching techniques such as PowerPoint and computer-based learning to one that employs constructivist frameworks and believes in the strength of ICT in influencing, sharing, and articulating ideas and concepts throughout the Web [3].

Mauritius can be another country at the leading edge of digital advancement that deserves to be mentioned. ICT efforts in the region are modeled after Singapore's perception as a cyber-island, with a significant portion of its ICT policy devoted to education. Mauritius authorized the Universal ICT Education Programme (UIEP), intending to supply hardware, Internet connectivity, and computer proficiency skills to school children and other target audiences via ICT skills courses [8].

One class at the Korea National University of Education was chosen to test a new version of its lengthy theories and practice for the instructional media development program. The curriculum concentrates on the production of visual, audio, video, and animation materials to be utilized in a variety of presentation modes, such as games. Teachers can enhance their technology integration capabilities by using a wide range of software and freeware [3][18].

In the case of Rwanda, support training, where the establishment of a national library network as well as reflects the changing training and research institute to serve Rwanda and the sub-region. A regional computer curriculum for secondary and primary schools, as well as cooperation in its execution, is also recommended. The strategy also indicates the development of e-learning subject matter; however, the policy suggests translating educational software into the local Kinyarwanda dialect so that it is suitable for Rwanda. It also suggests that existing computer-based learning and e-learning material be converted to Kinyarwanda. It is also posited that the Education Management Information System (EMIS) be implemented to improve the usage of ICT in schools and universities[8].

South China Normal University uses its Computers in its technology-based education to create a methodical approach to improving teachers' abilities and knowledge in founding philosophies, computer-based learning, and application research. The curriculum assessment method was altered from final exams to one that inspires student teachers to cooperate and collaborate via the Blackboard platform. They get to practice their expertise in real school settings. It demonstrates benefits to students who enroll in the course and offers promising evidence of real-world experience that could influence policy reform or new open education reform that promotes innovation and open-mindedness, as well as technology-enhanced education [3].

According to [13], changes in global technological change have resulted in a knowledge-oriented economy in the twenty-first century. Governments have committed to investing in integrating ICT into every level of education to provide students with the skills needed for contemporary life or even beyond. This incorporation, as well as huge investments in educational technology, are thought to have had a positive influence in

certain countries, such as South Korea, Taiwan, Finland, the Netherlands, Norway, and Singapore have implemented education reform to line up with global trends. Such countries' education programs centered on what students were taught at school and positioned a stronger focus on ICT and interpersonal skills.

In the Kenyan context, a series of reforms have been implemented since Kenya's independence in 1963 demonstrating the country's commitment to improving education [1]. The ongoing improvement agenda was motivated by anomalies and inefficiencies discovered in the 8-4-4 system. In addition, the 21st-century classroom is inexorably moving away from autocratic and teacher-centered classes.[14] Asserted that with the assistance of smart education, mobile applications, and AI-based programs, educational institutions are concentrating on technology-oriented curricula. Incorporating technology into the educational curriculum, where textbooks are being replaced by laptops or tablets, and smart boards are replacing chalkboards. Institutions now in Kenya are partnering with IT and software companies to create smart learning apps and tools. The goal is to offer students with immediate access to a variety of information and learning materials. When creating a curriculum for tech-savvy students, institutions can consider the following improvements: 1) Creating and delivering learning material.2) Blended classroom is adopted where it incorporates online lectures and interactive lessons.3) Utilize course management software to improve collaboration. Making instructional videos and audiobooks.4) Deployment of online collaboration and broadcasting tools to make courses available from any location.5) Implementation of cloud-based apps like a learning management system to improve learning outcomes.6) Using simulation and gamification to create learning more enjoyable and 7) Need for learning software to improve comprehension.

7. Conclusion and Recommendations

This paper has discussed the technologies available for use in Kenya during the transition of the educational system to CBC. The significance of these technologies in education systems is also discussed as well as challenges and implementation strategies. The various educational technologies, when integrated into competency-based education, are likely to have a significant impact by enhancing cognitive development and experiences. A few case studies are also highlighted. The paper concludes that teachers' content and pedagogical knowledge are integral to the adoption of technology in CBC implementation hence technology matters. The study recommends a review of the national ICT policy guidelines of 2022 to incorporate a clear and distinct overall strategy for ICT development, advancement, and innovation in the educational context.

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