

Review Article

Use of Information and Communication Technology (ICT) in Teaching and Learning at the Technical and Vocational Education and Training Institutions in Kenya

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Abstract

Learners at the Technical and Vocational Education and Training (TVET) need quality education which can be provided via a competent curriculum. In the contemporary world, such a competent curriculum must integrate Information, Communication and Technologies (ICT). However, there is less research outputs in this realm. This review has highlighted the role of ICT in Kenya's TVET curriculum. Information was obtained from refereed journal publications, government reports, research, technical reports, and online databases. A total of 22 articles themed "ICT, policy, TVET" were analyzed thematically based on situational analysis on access to ICT in TVET, ICT integration in curriculum of TVET, accessibility to ICT in TVET teaching and learning; ICT integration in curriculum assessment; capacity of trainers on utilization of ICT in TVET; capacity building for the Councils and Boards of Governors (BOGs) in ICT; ICT in research and innovation within TVET. The review established that low access to ICT facilities limited the integration of ICT in the Kenyan TVET curriculum. The study also established low capacity and competence of the trainers within the TVET which hampered their ability to reinforce ICT use in curriculum delivery and evaluation. TVET management councils and BOGs had a scanty capacity on ICT and therefore found it hard to reinforce the use of ICT in the prudent management and administration of curriculum. The study recommends that tutors and trainers who were trained without ICT content should organize and undertake such courses in higher learning institutions to develop the requisite ICT competencies. The management of the institutions should also undertake necessary training in ICT competencies to enhance their ability to implement the policy of ICT integration in curriculum within the institutions.

Keywords

ICT Integration, Instructional Processes, Technical and Vocational Training Institutes, TEVT Curriculum, Kenya

1. Introduction

The Technical and Vocational Education and Training [1] confer trainees with technical, professional and entrepreneurial expertise [2]. A well designed and implemented TVET system is supposed to provide practical proficiency and job-related behaviors for the students to help them gain necessary proficiencies.

The TVET sector in Kenya currently operates university TVETs, national polytechnics, the Kenya school of TVET (KSTVET) that specializes in technical teacher training, and several Technical Training Institutes (TTIs) coordinated by the Ministry of Education. There are 697 Youth Polytechnics and 1,100 private

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commercial vocational training institutes, which operate under civil society and religious organizations [3, 4]. Technical and vocational training was structured to offer opportunities to the learners to develop attitudes and values to acquire knowledge and usable skills so that they can be more useful and productive members of the community. Overall, enrolment in TVET institutions under the Ministry of Education stood at 367,925 as of October 2023. Male trainees represented 54.6% (201,895) of the total enrolment while females were 45.4% (16703).

A key competency of TVET is the successful implementation of curricula. The curriculum guiding TVET was aimed at achieving the training needs for skilled manpower after finishing secondary education in Kenya. Therefore, competent curriculum was considered a key area of TVET which should promote the practical use of digital learning resources; ICTs, capacity building for trainers/tutors and management of the institutions in delivery and evaluation of curriculum. However, the current TVET curriculum has been described as inadequate, with regard to the incorporation of ICT.

In more contemporary aspect the ICT need allow learners to apply critical thinking, digital communication and internet creativity. Knowledge of ICT allows the learners to acquire digital literacy skills which enable them to have competencies in information literacy and critical thinking [5]. These are the key competencies that will help the learners in achieving higher learning outcomes. Understanding ICT has also been linked to attainment of technical or industrial skills especially for students which can help them to succeed in the job market [6]. Significant amount of attention has been devoted to drive the uptake and integration of ICT in TVET institutions.

Integrating ICT in teaching and learning in higher education has been embraced in recent years resulting to increasing access to digital technology resulting in modern ways of dissipating knowledge (Rogers, 2002). There are several international education related organization that have been proactive in driving the narrative of ICT in TVET institutions [7]. This has been deemed successful owing to the transformative learning, easy to understand methodology and promotion of information literacy in the country. Therefore in 2005, the Kenyan Government under the directives of Kenya Education Sector Support Program (KESSP) which promoted ICT in for learning including in the TVET institutions. When the integration of ICT in education and training in TVET is seamless, then it is projected to progress

teaching within these institutions.

The TVET in Kenya has focused much on the ICT policy which should lead to several outcomes. These include: access to ICT in learning environment; incorporation of ICT in the curriculum; use of ICT in curriculum assessment; promote ICT capacity building for the trainers/tutors, learners, TEVT management, and to promote research and innovation using ICT. Although there is more emphasis to integrate ICT in management and delivery of TVET curriculum, information on its success remains scanty. Most of the studies looking at ICT in learning, teaching and management have been conducted in lower education curricula. This has therefore created a gap in knowledge on the level of integration of ICT in TVET and therefore likely to lag endeavors for better policies and interventions for enhancing ICT in TEVT curriculum in Kenya. Thus, the aim of the current review was to explore the role of ICT integration in the Kenyan TVET curriculum.

2. Study Methodology

This scoping review was done using an analysis of the existing literature through desk review of refereed published journals, data mining from publicly available databases, and information from the TVET report databases. The latest available data were used whenever available. Analysis was limited to studies from 2010 to 2024.

3. Findings and Synthesis

3.1. Accessibility and Use of ICT in Learning

Studies on the situational analysis on ICT, curriculum in TVET are provided in Table 1. The study analyzed 22 publications concerning integration of ICT devices in learning environments in TVET in Kenya. In general, these studies note that access to ICT facilities limited the integration of ICT in the Kenyan curriculum within the TVET with six out of 8 authors certifying it as critical. Most of these studies noted that the student: computer ratio was 4 to 50 in most of the TVETs in Kenya.

Table 1. Situational analysis on ICT, curriculum and teaching and learning in TVET in Kenya.

Theme	Year	References
General discussion on challenges of TVET	2020	[3]
Curriculum assessment in TVET in relation to ICT	2023	[8]
ICT incorporation in curriculum of TVET in Nyeri and Nairobi counties	2023	[9]
Integration of ICT on quality of learning in TVET	2019	[10]

Theme	Year	References
Curriculum implementation and integration of ICT through distance learning in TVET	2023	[11]
ICT in teaching engineering subjects (mechanical and automotive engineering) in Kenya TVET	2023	[12]
ICT in the overall management of the TVET institutions	2023	[13]
Challenges in access to ICT in TVET in Nyanza Region	2022	[14]
Integrating digitalization of ICT in teaching at TVTs	2021	[15]
Integration of ICTs in curriculum within TVET in Kenya	2017	[16]
Application of ICT in training and curriculum in online distance learning	2023	[17]
Integrating ICT in curriculum and learning outcomes in Kenyan TVET	2016	[18]
Integrating ICT in teaching in Kenyan TVET	2019	[10]
Integrating ICT in curriculum in Kenyan TVET	2014	[19]
Utilization of ICT in curriculum instruction in Kenya TVET	2018	[20]
Utilization of ICT by tutors in curriculum instruction in Kenyan TVET	2012	[21]
Obstacles in implementing ICT in curriculum in public TVET in Kenya	2018	[22]
Integrating ICT in curriculum	2014	[19]
Teacher competence in use of ICT in curriculum	2022	[23]
Availability of ICT materials in teaching	2023	[24]
Use of ICT in management of TVET institution	2016	[25]
ICT in governance of higher education institutions in Kenya	2020	[26]
Management of TEVT through ICT	2018	[27]
Impediments to the application of external technology (including ICT) in innovation in TVET of Kenya	2023	[28]
Uptake of ICT technology in innovation in TVET	2021	[29]
Adoption of ICT for strategic innovation management	2020	[30]

Although access to ICT was found to be low, there have been reports that the government has endeavored to increase access to ICT in TVET. The government report on ICT indicate that by the year 2022, about 77% of the students in TVET had access to ICT, which is corroborated by some of the above studies [10, 17]. Some reports also indicate that ICT resources are available in 66% of the institutions which was lower in other studies [18], this indicated that all TVETs have digital devices but the numbers were low and therefore hampered its integration in curriculum delivery, evaluation and management. In Another study of coastal TVETs in Kenya, it was established that accessibility to the ICT equipment was a major challenge to the learners and trainers and therefore affected the integration of ICT in learning [24].

3.2. Reinforcing the Utilization of ICTs in Curriculum Instruction

There is evidence that ICT is used in curriculum instruction in Kenya. In Nyeri and Nairobi counties, there was evidence

that some trainers used ICT during teaching and students responses were positive to the learning [9]. This notion was also supported in an earlier study where tutors in several surveyed TVETs in Kenya were found to integrate ICT in curriculum instruction [21]. Similarly, there are reports that ICT is integrated in curriculum and enhance quality of learning outcomes in distance learning [11]. There was one study that looked at the integration of ICT in learning some engineering courses like mechanical and Automotive engineering in the Kenyan s [12]. One of the studies on ICT integration in curriculum suggested that ICT improves the overall learning outcomes owing to its interactivity between the tutors and students [18]. Therefore, it is clear from these studies that ICT was reinforced in curriculum instruction within these TVETs in Kenya.

3.3. Use of ICT in Curriculum Assessment Process

Curriculum assessment involves collection of information

for the purpose of evaluation and eventually improve the overall student learning outcomes. The vast majority of studies in TVETs failed to look at the application of ICT for the assessment and overall evaluation of the curriculum. Studies on the use of ICT for curriculum assessment have been done in secondary schools to look at how ICT is used in assessment of the competency-based curriculum. In a study of impediments confronting TVETs in their endeavor to integrate ICT in curriculum [22], it was established that not many TVET used ICT in curriculum assessment and evaluation. In another study that looked at integration of ICT in TVET [19], there was a recommendation for the use of ICT in curriculum assessment.

3.4. Capacity Building of Teachers and Trainers on ICT Usage

One of the aims of integrating ICT in learning institutions is to build capacity of the teaching staff to ensure that they deliver their mandate of teaching and training to the students and improve quality of instruction. Therefore, the teachers and trainers are supposed to be competent in the use of ICT. However, there is evidence that most of the teachers and trainers in TVETs are not competent in the use of ICT [18]. The main reason that was cited for low capacity of the teachers and trainers to use ICT in learning was lack of necessary ICT skills and competency since some of the 'older teachers' did not undergo any or sufficient training on ICT during their time in training. It is also evident that ICT is a new concept and that teachers who were trained in the 1980s and 1990s were not introduced to the concept of ICT or the use of ICT tools. Some of the teachers were found to harbor no further ambitions to learn ICT. Meanwhile another study established that there is continued professional development among teachers in TVETs in the use of ICT for instruction [23].

3.5. Capacity Building of TVET Management on Use of ICT in Curriculum Implementation

The management of TVET institutions is expected to be competent in ICT and hence encourage the teachers and trainers in these institutions to use the same. Therefore, it is important to determine the status of ICT use in managerial functions within the institutions. Among the studies available, we found that there are some TVETs that were using ICT in doing their internal administrative functions [25]. There is also a study that has looked at the application of ICT in management of higher education where the authors discuss management of universities and tertiary colleges including TVETs [26]. Another study looked at possible funding mechanisms to enable TVET institutions to undertake proper management [27]. A major conclusion from these studies is that many TVETs in Kenya are at their infancy stage of using ICT in management. However, there is a lack of studies that

have focused on how the management of the institutions use ICT to administer curriculum and how this may affect learning outcomes.

3.6. Promote Application of ICT in Research and Innovation

One of the key competencies of TVET is the quality of research and innovation within their institutions. Therefore, programmes that integrate ICT in research may enhance the quality of learning at the institutions. There are studies that have indicated that research and innovation at the TVET rely on the use of ICT [9]. Some studies have reported the use of external technology of which ICT is included in innovation in Kenya and some of the challenges that have impeded the use of these technologies in TVET in Kenya [28]. In another study of TVET's uptake of technology, it was established that many TVETs in Kenya are now adopting technology that are useful in innovation and research [29]. In another study of strategic innovation in TVET, it was established that in TVET, the use of ICT enhance strategic innovative management [30]. A major conclusion from these studies indicates that TVET institutions engage ICT in research and innovation. However, the application of ICT to conduct research and improve innovation is still at its infancy in most of these institutions.

4. Conclusions and Recommendations

Based on the analysis of 22 publications, this study established that low access to ICT negatively impacted the integration of ICT in Kenyan curriculum within the TVET. The study also established low capacity and competence of the teachers and trainers within the TVETs which limited their ability to reinforce ICT use in curriculum delivery, as well evaluation. The study also established that management of the TVET had low capacity on the ICT and therefore hampered its use in curriculum implementation. The role of curriculum in ensuring quality of education and training cannot be overlooked. Further, curriculum that is fully integrated with ICT has proven to lead to positive learning and management outcomes. However, the low teacher competency on ICT will continue to impede the utilization of ICT in TEVT learning. Therefore, the study recommends that teachers and trainers who were trained without ICT content should organize and undertake such courses in higher learning institutions to develop the requisite ICT competencies. The study also recommends that ICT should be integrated in all the subjects being taught at the TVET as this will improve the quality of learning outcomes. The management of the institutions should also undertake necessary training in ICT competencies to enhance their ability to implement the policy of ICT integration in curriculum within the institutions. In general, ICT should be adopted by all TEVTs in their curriculum for improved competency-based education and training outcomes.

Abbreviations

BOGs	Board of Governors
ICT	Information and Communication Technology
KSTVET	Kenya School of TVET
TVET	Technical and Vocational Education and Training

Author Contributions

Elijah Omutange is the sole author. The author read and approved the final manuscript.

Conflicts of Interest

The authors declare no conflicts of interest.

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