

An Exploration of the Implementation of Digital Education Policies in Public Secondary Schools in Tanzania: A Case of Kilimanjaro Region

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ABSTRACT

The employment of technologies for learning purposes has attracted much concern in many nations across the world, but the gap between policy formation and implementation has been a challenge in many developing nations. In this research, the implementation of digital education policies in public secondary schools in Tanzania has been examined with emphasis on Kilimanjaro.

Using the theoretical framework of Policy Enactment Theory (Ball, Maguire & Braun, 2012) and Street Level Bureaucracy Theory approach (Lipsky, 1980), this study adopted an exploratory qualitative case study approach in which the data was collected through semi-structured interviews conducted with 24 interviewees comprising district education officers, school heads, ICT teachers and classroom teachers, observation and review of documents.

Though there have been some successes in the implementation of ICTs in teaching and learning in many public schools, most of them face challenges like inadequate infrastructure, insufficient digital skills of the teachers, unfavorable attitudes towards use of technology in learning, insufficient time to integrate ICT in teaching, poor technological support services, and low digital skills of students.

Other variables considered by this research include better cooperation among the public and private sectors, focus on the need for ongoing professional development, local adaptation of digital materials, and good mechanisms of monitoring and evaluation as methods that could be used to address the challenges in implementing successful transformation of digital education. This paper has reached the conclusion that for the transformation of the process of learning into a digital one in Tanzania and Sub-Saharan Africa, a multi-sectoral approach is necessary.

Keywords: Digital Education Policies; Policy Implementation; Public Secondary Schools

INTRODUCTION

The field of education has seen a lot of changes owing to the fast-paced development of technology where all nations have understood the potential of ICT in improving the quality, availability, efficiency, and access to education. The current coronavirus pandemic has proved the need to be ready with digitalization since education had to shift to online mode overnight. In response, all countries created policies for digital education.

In Europe, the Digital Education Action Plan 2021-2027 strives to achieve universal connectivity, although research shows that while there is improvement in infrastructure, pedagogy remains an issue because many teachers lack the skills to integrate ICTs (European Commission, 2023).

North American educational initiatives such as E-rate have provided technology access, however, research has found that technology is mainly used for low order thinking tasks and not for transformational learning (Howard et al., 2010; Skorup & Russell, 2017). Even the most advanced Asian education systems have built sophisticated digital environments, yet the test culture and teacher readiness hamper the development of pedagogies centered on students (Looi et al., 2020).

Digitization of education in Africa has been boosted by the use of digitization in some African countries including Rwanda, Kenya, South Africa, and Ghana, in line with continental strategies such as CESA 2016-2025 and the Digital Transformation Strategy 2020-2030 (Bazzanella & Sandro, 2022). Urban centers have had some success stories in terms of digitalization of education, but the issue of sustainability remains doubtful because of deteriorating infrastructures, low level of ICT competences among teachers, and inequalities between urban and rural areas (African Union, 2020).

In Tanzania, there are policy measures put in place regarding digitization of learning. The country started with the Computer Studies syllabus in 1997, then the National ICT Policy (2003, 2016, and 2024), ICT Policy for Basic Education (2007) and finally the Education and Training Policy (2014, revised in 2023). All the above-mentioned policies are in line with Tanzania's Vision 2025 in which ICT is emphasized for building up a knowledge-based economy. However, implementing the digitization strategy in Tanzania has been problematic in that public secondary schools have had challenges such as poor electricity supplies, poor Internet connectivity, ICT infrastructure weakness, and lack of ICT competent teachers (Ngao et al., 2022; Oreku, 2022; Selemani et al., 2021). These implementation gaps warrant critical examination to understand the factors hindering effective ICT integration in Tanzanian secondary education. However, the study seeks to answer the following questions:

1. How have digital education policies been implemented in public secondary schools in the Kilimanjaro Region?
2. What are the challenges hindering the successful execution of digital education policies in the Kilimanjaro Region?
3. What innovative strategies can be adopted to improve the implementation of digital education policies in public secondary schools in the Kilimanjaro Region?

Conceptual Framework

Introduction to the two Theories

The implementation of digital education policies in Tanzanian secondary schools is explained using two interrelated theories. The first theory used in this paper is the Policy Enactment Theory by Ball, Maguire and Braun (2012). It suggests that policies are not implemented as they are stipulated, but rather interpreted and reinterpreted according to the circumstances in which schools find themselves. The second theory utilized herein is the Street-Level Bureaucracy Theory developed by Lipsky (1980), and it deals with teachers as policymakers, who have the mandate to use their discretion in implementing various tasks while considering various obstacles such as excessive workload and limited resources. Together, these theories recognize that policy implementation is not a straightforward top-down process but is shaped by both institutional conditions and individual actions.

Application to Research Questions

With first research question, which deals with the process of implementing digital education policies, Policy Enactment Theory allows understanding why there is a difference between implementation in different schools depending on among others leadership support, training of teachers, control mechanisms and ICT infrastructure; with those schools having more successful implementation being characterized by good leadership and resource availability. With respect to the second research question, which seeks to uncover factors that hinder the implementation of digital education policies, Street Level Bureaucracy Theory offers an understanding of the manner in which teachers' decisions concerning the use or non-use of digital education policies can be driven by factors such as ICT skill deficiency, lack of technical assistance, negative attitudes, and time limitations. The third research question related to innovative strategies can be considered from the point of view of the integrated framework in the sense that strategies should take into account both institutional (better leadership, planning, and infrastructure) and individual aspects (ongoing teacher training, technical support, and motivation).

Overall Contribution of the Framework

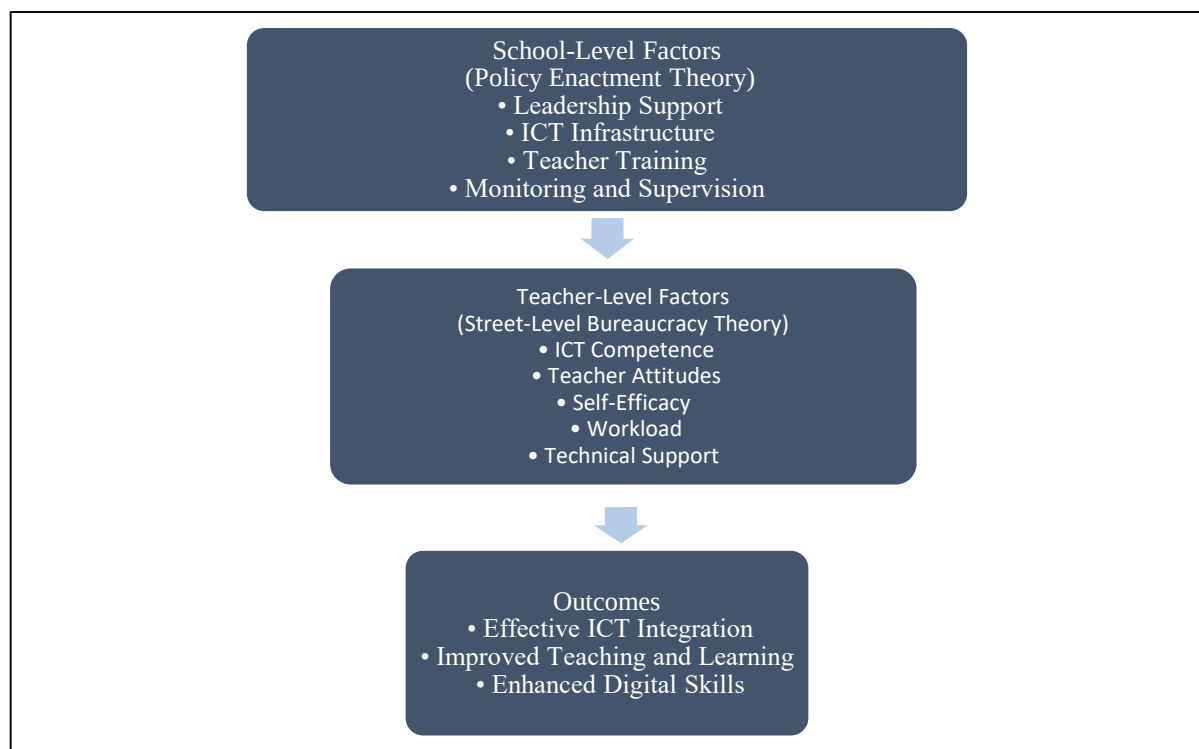


Figure 1: Conceptual Framework

The integration of these two theories gives an elaborate framework to explain the complicated process of digital education policy implementation within the Kilimanjaro Region. The framework recognizes the fact that the implementation of such policies is dependent on the combination of both the school-level and the teacher-level factors. The school-level factors include school leadership, available resources, and the monitoring processes while the teacher-level factors include competence, attitudes, self-confidence, and workload management. Therefore, the framework helps the study not only in recognizing the existing implementation practices and challenges, but also gives ways of solving the identified problems.

LITERATURE REVIEW

Digital Education and Policy Development in Tanzanian Schools

In Tanzania, digital education was introduced in the late 1990s through the implementation of the Computer Studies curriculum in 1997, whereby computer literacy lessons and computer laboratories were developed in select schools (Hare, 2007; Tilya, 2007). The above phase was succeeded by an array of policies such as the National ICT Policy (2003; revised in 2016), ICT Policy for Basic Education (2007), and Education and Training Policy (2014; revised in 2023), where ICT was recognized as mandatory in achieving quality education (MoEST, 2023; MoEVT, 2007; Ministry of Works, Transport and Communication, 2016). The above policies have similar pre-requisites, which include infrastructure development, maintenance programs, ICT proficiency of teachers, workshops and peer learning, among others.

Digital Education Policies Implementation

Teacher Training and Professional Development

The professional development forms a key component of the implementation of digital education in Tanzania's secondary schools. Through the SEQUIP program, 15,000 teachers have been trained (4,000 in 2023), and UCSAF trained around 650 teachers in 2021 on ICT skills and online platforms (URT, 2025). Literature shows that teacher training quality and length positively influence their confidence and motivation levels (Mwalongo,

2023; Alieto et al., 2024; Mayantao & Tantiado, 2024). However, Peter (2024) indicates that there are still significant gaps in digital skills among teachers. In other African nations, Ghana, Ethiopia, and Rwanda have also adopted such programs in line with their education reforms (Aidoo et al., 2024; Yigezu, 2021; Twagilimana et al., 2025), but rural accessibility for training still faces difficulties (Kormos & Wisdom, 2021; Wang et al., 2024). In international literature, ICT integration relies not only on technological infrastructure but on teacher capacity too, as shown by the EU's Digital Education Action Plan, China's technology-based lesson planning system, Ireland's digital competency in teacher education, and Germany's teacher readiness approach (EU, 2020; Zhou et al., 2023; Gabriel et al., 2022; Arruda et al., 2024).

Digital Access and Infrastructure Development

In Tanzania, there has been increased digital access via the National ICT Infrastructure Backbone (NICTBB), which offers affordable internet services and distribution of more than 31,000 desktop computers and 10,000 laptops to public secondary schools. The African countries such as Rwanda (digitized devices and digital classrooms) and Nigeria (ICT in education policies) have done the same, but the existing literature shows that even the availability of gadgets cannot lead to successful use of these gadgets without any technicians and trained teachers (Carvalho et al., 2024; Onasanya et al., 2025; Vitalis et al., 2025). In addition, the coronavirus crisis has highlighted digital inequalities worldwide, thus leading to measures such as the provision of laptops by Ireland for its disadvantaged children, online lessons for Hungary's weak children, merging of schools with online courses in Japan, national broadband program in Australia, and acquisition of computers and digital boards in Portugal (OECD, 2025; Hungarian Government, 2016; Iwabuchi et al., 2021; OECD, 2019; Gabriel et al., 2022).

Enhancing Teaching and Learning Through ICT-Based Tools

Digital content delivery has been emphasized in Tanzania through revision of the online library of the Tanzania Institute of Education in 2022/23, uploading of free digital textbooks for Forms 1-6 and the E-Learning project by Christian Social Services Commission and Global e-Schools and Communities Initiative (URT, 2025; Patrobas, Machumu, et al., 2023; Oreku, 2022). The teachers are usually equipped with their own devices where Ngeze (2017) indicated that 84.7% had smartphones and 29.3% had laptops while lack of devices among students prevents digital learning in entirety. All over Africa, Kenya, Rwanda and South Africa are emphasizing digital platforms, virtual labs, and e-learning facilities (Ehimuan et al., 2024; Mckay, 2024; Rubagiza et al., 2011) although unreliable electricity, costly Internet and poor technical support are important challenges (Nirman, 2025).

Challenges Facing Implementation of Digital Education Policies

Barriers to Access and Infrastructure

There is a lot of challenge in terms of ICT access and infrastructure in Tanzania, where about 50% of teachers have no ICT resources and more than 50% do not have computers connected to the Internet, and many schools lack necessary tools (Kivaria & Mwila, 2025; Oreku, 2022). Swai (2021) revealed that more than 75% of the surveyed teachers indicated unavailability and inadequacy of ICT tools, while more than one-third of teachers pointed to internet-related problems. According to Selemani et al. (2021), only 28% of the schools have operating ICT laboratories, whereas according to Serda et al. (2013), donated computer equipment was not used because there were no electricity and technicians. In general, power failures affect teaching in Zambia and South Africa (Kala, 2023), while Internet use in Africa (39.7%) falls behind the world level (66.3%) (ITU, 2022).

Lack of Digital Skills and Professional Support

Inadequate digital skills and professional support pose significant barriers to implementation. It is known that not all teachers recognize the importance of ICT in teaching and hence feel reluctant (Ngao et al., 2022), whereas 86% of them noted that the absence of training decreased their confidence and skills (Msami, 2020) and lack digital competencies (Oreku, 2022). The issue is complicated by inadequate planning at schools and insufficient technical assistance, with 88% of teachers lacking ICT support (Msami, 2020) and inflexible classroom environment and scheduling hindering ICT integration in 33% cases (Selemani et al., 2021). While 89% of

teachers possess mobile phones, only 17% apply them for educational purposes (Komba, 2024). There is gender inequality because women teachers are 2.3 times less likely to undergo digital skills training (Makolo et al., 2024). Currently existing CPD programs do not target rural areas where teachers should independently pay for travel and accommodation.

Weak Governance, Incoherent Policies, and Insufficient Funds

Weak governance greatly hinders digital education growth, with fragmentation of the institutions within the various ministries contributing to duplication and inefficiency in decision making (Alphonse & Mwantimwa, 2019). According to Mwalongo (2023), schools supplied with SEQUIP gadgets do not have any follow-up mechanism leading to their under-utilization, whereas according to Karogi & Haule (2025), the ICT Policy of 2007 is not implemented in 78 percent of districts. Lack of involvement of the community in policy formulation leads to low levels of policy acceptability and implementation (Oreku, 2021).

Gap in Knowledge

Although many ICT policies have been launched in Tanzania, there is a lack of understanding about the impact of such policies on teaching and learning in secondary educational institutions. Most studies carried out until now are concerned with teacher training, supply of computers, or infrastructure construction but do not take into consideration the extent to which these activities have influenced teaching and learning processes. Not enough is understood about how technology has been used by teachers in the process of teaching and learning, the benefit received by learners from these processes, and the extent to which positive changes have positively impacted their learning results.

National policy matters have mostly been studied; little attention has been paid to the process taking place at schools. Teacher professional development is one more area that lacks sufficient coverage in the literature. Several projects such as SEQUIP and UCSAF have reached thousands of teachers but there is no evidence proving that they have made any contribution to sustainability concerning teaching planning, practices, and assessments. There is an evident lack of information about the process of implementing digital education policies in the Kilimanjaro Region of secondary schools. This study fills that gap by providing empirical, context-specific evidence on how digital reforms are being implemented, utilized, maintained, and experienced by teachers and learners in this region.

RESEARCH METHODOLOGY

Research Design

Qualitative research methodology was used in the study. This method is highly efficient when dealing with issues concerning the human experience, perception, and behavior. The justification for choosing this approach lies in the need to investigate the process of digital education implementation in secondary schools with respect to the experience, behaviors, and issues related to the process of learning and teaching.

The use of the qualitative research methodology facilitated the possibility of collecting information which is not quantifiable and includes perceptions, situations, and classroom relationship dynamics (Merriam & Tisdell, 2016).

Qualitative research was complemented by the use of case study research design, which is the most appropriate for investigating any phenomenon within its natural context. Case study research design facilitated investigation of the phenomenon of implementation of digital education in secondary schools in Kilimanjaro Region in detail. As stated by Yin (2004), the case study design is the best approach to deal with a contemporary phenomenon set in some real-world context. With the help of the case study design, it was possible to collect data from various sources.

SAMPLING AND SAMPLING METHOD

Targeted Population

The targeted population consisted of District Education Officers, School Heads, ICT and Classroom Teachers in six districts of the Kilimanjaro Region. They were selected since they had direct involvement in the planning, conduct and implementation of digital teaching and learning in secondary schools and had direct experience in the adoption of ICTs in teaching and learning.

Sampling Method

Non-probability purposive sampling method was employed. Purposive sampling is one of the non-probability sampling methods that entail purposeful choice of participants according to set criteria (Patton, 2015). The participants in this study were selected according to their roles and involvement in ICTs. The schools were selected considering several criteria including the presence of ICT infrastructure, efforts by the school to adopt ICT in teaching and learning, the presence of ICT teachers and both urban and rural schools.

Sample Selection and Participants

In total, 24 individuals took part in the study where six District Education Officers, six School Heads, six ICT Teachers and six Classroom Teachers were selected from six districts of the Kilimanjaro region. The selection of these individuals ensured diversity in views on how digital learning could be achieved by the stakeholders of policy-making and teaching in schools. Although there were few participants, the sample size ensured the researcher gathered comprehensive data for all the educational positions. Table 3 gives the details of the sample size used in the study.

Methods Used for Data Collection

The main methods for data collection used in this study included semi-structured interviews, non-participant observations and documentary analysis.

Semi-structured Interviews

Semi-structured interviews were conducted with education stakeholders so as to gather detailed information on the research topic. The use of the semi-structured interviews gave the researcher control of the direction of the interviews but was open to any new ideas (Merriam & Tisdell, 2016). Information about the communication and implementation of the policies at the district level was provided by the District Education Officers. School Heads provided information on their understanding and implementation of the policies.

2.4.2 Non-Participant Observation

The method enabled the researcher to keep track of the school environment, classroom environment, computer labs, and general use of electronic gadgets without interacting directly with participants (Kawulich, 2005). The indicators used in the non-participant observation include availability of ICT facilities, availability of digital gadgets in classroom, internet connectivity, use of digital gadgets by teachers, use of technology by the learners, and presence of policies from the school level to promote ICT use.

Documentary Review

The method involved the critical analysis of written documents so as to obtain information from them (Bowen, 2009). Documents examined included plans for implementing ICT, documents showing availability of gadgets and their use, teachers' training documents, lesson plans involving ICT, official circulars, policy framework, strategic plans, and monitoring reports. Table 5 below shows the documents that were examined.

Validity and Reliability

Validity

Validity is determined by how much the results of the research reveal true experiences and perceptions of the participants (Creswell, 2023). In this particular situation, triangulation was used to collect data using different sources (interviews, observations, and documents) for comparison purposes (Creswell & Poth, 2023). Another approach to increasing validity could be peer debriefing, which involves discussing the instruments and interpretations with those people who have not been part of the research process.

Reliability

As far as qualitative research is concerned, reliability is a consistent process and product of the research (Merriam & Tisdell, 2016). Lincoln & Guba (1985) claim that dependability is one of the key aspects of reliability. An audit trail could be used to improve reliability, which implies detailed documentation of all aspects of research design, data collection, coding, and theme development (Creswell & Poth, 2023). Standardization of interview guides and observation checklists was used in all schools participating in the research.

Data Analysis Procedures

Thematic analysis, which was informed by the six-stage procedure outlined by Braun & Clarke (2006), was chosen because of its adaptability and potential for identifying meaning, perspectives, and experiences of the participants. First, the researcher became familiar with the data by thoroughly examining interview transcripts and observation notes. Preliminary coding was carried out whereby meaningful segments of the text were coded according to their relationship to the research goals. The coding was aided by the use of Microsoft Word and Excel.

Searching for themes came second; here themes were identified by analyzing the connections among codes, and grouping codes into categories representing major themes. Theme review entailed refining of themes through collapsing similar themes and clarifying vague themes. Definition and naming of themes followed thereafter, after which themes were presented in an organized way to answer the research questions. Participant quotes were used to support and give validity to the findings. Strategies that were employed for enhancing trustworthiness were triangulation, peer debriefing, member checking, and reflective journaling (Lincoln & Guba, 1985).

Consideration of Ethical Issues

The process of obtaining informed consent was carried out by the participants before carrying out data collection. This involved making clear the objectives of the research and how the data would be collected along with the rights of the participants. It was made clear that the participants had the freedom of withdrawing themselves from participating in the research at any stage without facing any consequences. Participation was on voluntary basis. Anonymity was ensured through coding rather than using real names. The electronic records were stored in computers protected with passwords while the hard copies were secured.

RESULTS OF THE RESEARCH

Implementation of Digital Education Policies in Public Secondary Schools

Compliance, Policy Planning and Monitoring Gaps

The participants revealed different levels of compliance with digital education policy guidelines. Four schools (66.7%) were compliant in having computer laboratories and ICT teachers in place, while two schools (33.3%) were partially compliant with less utilized facilities. Five schools (83.3%) have ICT policies in their annual plans, yet only three (50%) have put these policies into practice. One head confirmed that "Our school complies with government policy... digital technology is used in lesson planning of all subjects" (HS-01, Female, 14 years), while another confirmed "We receive constant advice on how to engage in activities in accordance with

government policies... this will make teachers more confident" (HS-05, Male, 19 years). Nonetheless, monitoring was inadequate. One head expressed his disappointment saying "We are given instructions on digital education, but there is no much follow-up" (HS-02, Male, 20 years). One ICT teacher explained "We are rarely questioned about ICT integration in most inspections. The main point is to check exam preparation and lesson plans" (ICTT-03, Male, 6 years). Only two schools (33.3%) have continuous monitoring of ICT infused lessons, three (50%) ICT usage records, and only two (33.3%) had recent external inspection records.

Leadership, Administrative Support and Budgetary Allocation

Leadership and administrative support proved to be important. According to one of the teachers, "School administrators monitor class sessions to see if we use ICTs and provide us with some training to help us adhere to the regulations" (CT-06, Female, 29 years). Goal setting was apparent in that "We always have ICT goals set from our head of school at the very beginning of each year" (CT-02, Male, 12 years). Leadership made it possible to mobilize resources, including finance and ICTs. Four schools (66.7%) provided budget for ICT activities for maintenance, subscriptions and ICT usage schedule.

Constraints in Infrastructure, Availability of Resources, and Digital Divide

ICT infrastructure was available but inadequate to meet the need for learning. An explanation from a DEO state that, "We have computer laboratory and also have some projectors... but the challenge is that the amount of equipment is not enough for all learners" (DEO-06, Female, 29 years). An ICT teacher stated: "Even though we have ICT services and other gadgets, they usually let us down" (ICTT-03, Male, 6 years). During observations, it was noticed that out of six schools, three (50%) have functional laboratories, two (33.3%) used partially functional infrastructure and one (16.7%) faced challenges of disruption (urban student-computer ratio: 1:61; rural student-computer ratio: 1:42). As mentioned by a Head, "Sometimes our students watch without doing anything due to lack of devices" (HS-04, Male, 12 years). According to an ICT teacher, "the rural learners are taught about computers theoretically but do not get much time to practice, making them unconfident" (ICTT-07, Female, 18 years). Student attendance was found to be almost 98% at urban and 92% at rural schools.

Teacher Training, Digital Literacy, and Adoption of Teaching Methods

Professional development showed marked variations. A DEO observed: "We realized the need to ensure that our teachers understand that ICT is no longer an option. Our first phase included training 62 teachers." Four schools (66.7%) recorded participation of teachers in at least two ICT training sessions in two years, but only two (33.3%) provided sustained and self-driven professional development programs by the school. Teachers from three schools (50%) were digitally literate. As an ICT teacher observed: "Video presentation and computer-assisted learning have played an important role in making teaching process more interesting" (ICTT-02, Female, 16 years). But as one head teacher observed: "Although we have tried using digital materials, shortage of gadgets and slow internet prevents us from engaging all learners." Digital teaching methods were utilized in only 38% of the observed classes (9 out of 24), whereas traditional methods were followed in 62% of the classes. ICT was incorporated into only 36.7% of lesson plans (11 out of 30).

Challenges to the Implementation of the Policy

Knowledge Gaps, Absence of Vision, and Poor Time Management Skills

Knowledge gaps influenced the implementation process. As a DEO put it: "Not all teachers are knowledgeable about the policy of digital education" (DEO-03, Male, 24 years). Schools did not have institutional ICT visions. "ICT is not a priority in some schools. There is no direction," said one school head (HS-04, Female, 17 years). Though four schools (66.7%) had teachers who were knowledgeable about the government policies, lack of implementation was evident. All schools except one (83.3%) had policy guidelines, but only two schools (33.3%) had made their action plan concerning the same. Time constraint emerged as the major problem. "It takes much more time teaching with technology than in traditional way," said one teacher (CT-07, Male, 10 years). Another head said: "They do administration, meaning that they don't have enough time to prepare lessons using digital technologies" (HS-02, Female, 15 years). In five schools (83.3%) lessons were conducted under tight time

constraints (40-80 minutes periods), and four schools (66.7%) did not allocate any time for digital learning in the timetable.

Gaps in Digital Competency and Negative Attitudes among Teachers

Low digital competence was another major issue found in the research. One teacher observed that "there is still quite a number of teachers who struggle to integrate those technologies in class lessons" (CT-01, Female, 6 years). According to another DEO: "There are teachers who are not acquainted with projectors, interactive white boards, and other educational software and therefore stick to chalk and board" (DEO-02, Female, 19 years). While three schools (50%) were known to have some digitally competent teachers, others indicated the need for assistance from several teachers. Four schools (66.7%) participated in ICT workshops during two years; however, only two (33.3%) schools claimed at least half of their teachers were digitally competent in teaching. Teachers' attitude toward ICT played a key role in its success since some teachers refused to accept changes. One head observed that "some teachers do not want ICT because they are afraid it will influence their teaching method" (HS-05, Female, 18 years). Another teacher pointed out that "some teachers are afraid of computers because they do not know what to do if the computer does not work" (CT-08, Male, 11 years).

Lack of ICT infrastructure, maintenance, and support

Lack of sufficient ICT infrastructure posed another problem. As stated by one head, "The amount allocated to digital education is very minimal to allow our school to buy computers and projectors" (HS-04, Female, 24 years). Another head stated that "Since the introduction of free education in 2016, schools no longer have funds for maintenance or purchase of ICT equipment" (HS-05, Male, 19 years). There were three schools (50%) with computer laboratories that possessed working computers with ratios ranging between 1:62 in urban schools and 1:42 in rural schools. Maintenance posed a big challenge in ICT utilization. According to an ICT teacher, "whenever our computers or projectors break down, we must wait several weeks before they are fixed as we do not have technicians within the area" (ICTT-02, Female, 2 years). A head stated, "Though there are some devices, they cannot be used regularly due to lack of technical support" (HS-03, Male, 17 years). There were four schools (66.7%) with at least one non-functional ICT tool. Only two schools (33.3%) possessed a budget and maintenance structure, but none of the six schools had ICT technician who offered consistent support.

Insufficient Digital Competency and Engagement of Students

Inadequate digital literacy levels of students was a major constraint. One head said, "Others cannot even log into the computer or learning platform. We waste a lot of teaching time in assisting them." (HS-08, Female, 12 years). Another ICT teacher remarked, "During digital activities, the majority of students fail to participate due to fear of making any mistakes." (ICTT-03, Male, 9 years). Only 58 percent of the students were able to engage themselves in digital activities independently. Poor performances by students in actual ICT activities rather than theoretical learning was reported in four schools (66.7 percent).

Innovative strategies for improving digital education policy implementation

Public-private Partnerships and Stakeholders Engagement

The participants emphasized that partnering with private sector organizations is an efficient way of enhancing implementation. The DEO argued that "partnering with privatized organizations like Vodacom, Airtel, and TTCL has helped us change our perspective about technology. These organizations are giving us devices, internet connection, and technical expertise" (DEO-02, Female, 19 years). In three out of six schools (50%), the partnerships were resourceful in providing schools with computers, projectors, routers, and technical expertise. In four schools (66.7%), external stakeholders were engaged in infrastructure development, teachers' training, and DEP initiatives. Stakeholders' engagement was found to be an efficient strategy. One Head of School mentioned that "when the parents realize the benefits of ICTs, they will motivate their kids and allow enough time for them to use the computer" (HS-10, Female, 15 years). The schools with stakeholders' engagement performed better in ICTs management than the schools without it. Four schools (66.7%) were having discussions on ICTs issues, and five schools (83.3%) discussed ICTs in the stakeholders' meetings.

Enhancing ICT Infrastructure Capacity

It was noted that infrastructure building is important in the improvement of policy implementation. One school head observed, "If we have a resource center having sufficient computers and education software then we can use these digital devices more easily" (HS-13, Male, 16 years). The digital resource centers have many uses; for example, students' usage, training center for teachers, peer learning center, and preparation room for experimentation with digital pedagogy. Schools that had electricity, strong internet connectivity, and sufficient number of devices were more likely to have integrated ICT.

Capacity Building and Continuous Professional Development

Continuous professional development became an important intervention. One ICT teacher pointed out, "With continuous training, we would come to know how to use the technology while teaching and would get updated about the latest developments" (ICTT-04, Male, 12 years). The participants felt that there must be a comprehensive plan for continuous professional development of teachers. ICT trained teachers were more likely to have integrated ICT. Out of four schools (66.7%), four schools did ICT training in the last two years and only two schools (33.3%) did continuous professional development.

Integration of locally relevant digital content, innovative pedagogy, and monitoring

Integration of locally relevant digital content was viewed as successful. One DEO said: "The learners tend to understand the content of digital lessons well because of relevance to their environment" (DEO-05, Female, 26 years). Innovative methods of teaching with the help of technology were highlighted. As noted by one ICT teacher: "Technology usage in the form of videos, simulations, and quizzes helps make students active and learning process easy" (ICTT-08, Male, 15 years). Through observations, locally relevant digital materials in the form of videos, slides, simulations, and examples in accordance with the local curriculum have been used in nine out of twenty-four lessons (37.5%). In only two out of six schools, digital content produced by teachers was used. The participants pointed out that monitoring and evaluation is an important part of implementation. As one DEO put it: "There should be some system for assessment of the usage of digital content by the educators and studying process of students for understanding of how things work" (DEO-02, Female, 19 years). Effective monitoring systems for ICTs were introduced in two out of six schools using laboratory schedules, teachers' logs, and computer monitoring.

DISCUSSION

There were significant differences observed in the manner in which the implementation of digital education policies was done in schools within the Kilimanjaro region. Some of the schools had successfully implemented the use of digital technologies in their curricula and teaching through defined procedures and proper monitoring. However, there were other schools that showed inadequate or inconsistent use of digital technology. It is thus evident that although there are national policies for digital education, the implementation of these policies varies from school to school. The reasons for such variation include leadership competence, teachers' readiness, monitoring, and other conditions.

The implementation of policies depends significantly on school leadership. Competent leaders tend to interpret the policies and incorporate them into the school plans and follow up on them while incompetent leaders do not have good direction and poor monitoring. Knowledge and skills of the teachers in ICT also determine the level of implementation of the policies and incorporation of the digital technologies in the curriculum. Structural constraints like shortage of ICT infrastructure, lack of Internet connectivity, and uneven allocation of resources also act as obstacles to policy enactment. These results lend credence to Policy Enactment Theory since it posits that policy implementation is dependent on the contexts of individual schools, resources, and professional skills. Indeed, similar patterns have been observed in other African countries, where leadership, supervision, and institutional factors play a significant role in the process of implementing digital policies.

Lack of time was found to be another obstacle to effective digital integration of education. Teachers noted that digital teaching necessitates extra time in terms of planning lessons, finding resources, organizing equipment,

troubleshooting technological issues, and helping students in using technology. The pressures of extra workloads, administrative duties, big classes, and finishing the curriculum in time make the problem even worse. Thus, many teachers find it difficult to integrate digital technologies in their lessons all the time. This outcome confirms the ideas of Street-Level Bureaucracy Theory, which holds that frontline employees tend to selectively implement policies owing to their lack of resources and time. Such problems have been observed not only in some African countries but also worldwide.

It was also discovered that partnerships and collaborative support play a key role in implementing policies of digital education. Schools that are supported by businesses, NGOs, community organizations, and other partners gain better access to ICT devices, connectivity, technological support, and training of teachers. Through collaboration, schools can overcome their limitations financially and institutionally because of the additional support and resources they can get through the collaboration that cannot always be provided through governmental funding alone. Alongside with material support, collaboration also helps develop institutional capacity due to professional development and collaboration of the stakeholders. These results confirm the Policy Enactment Theory that emphasizes the significance of the external network in policy implementation. Examples from Africa and abroad also show how partnership improves access to ICT infrastructure and teachers' readiness for digital learning.

The problems faced during the implementation of the digital policy included both institutional and resource-related constraints. Many of these institutions have problems with basic requirements like computers, projectors, internet connectivity, electricity supply, and technical assistance. The shortage of these requirements is mainly due to the lack of adequate funds, inadequate focus from school management on digital education policies, and lack of ICT technicians. These findings are in line with Policy Enactment theory because it takes into account the effect of institutional context on policy implementation. Such challenges are quite common in developing nations where there is inadequate technical and institutional support for digital education initiatives.

Moreover, significant deficiencies were noted in the level of digital competence among teachers. Even though the adoption of digital teaching techniques is gradually increasing, there are many teachers who do not have sufficient skills, confidence, and knowledge in order to successfully incorporate technology in the process of teaching and learning. Low budget prevents teachers from participating in ICT training due to the fact that such trainings usually offer fundamental knowledge about computers and do not concentrate on using technology in relation to specific subjects. Moreover, the lack of professional development does not allow teachers to keep up with new technological advancements.

Lastly, the paper brings out the importance of innovation in implementing digital education policies. Some of the recommended innovations include building stronger monitoring and evaluation framework, creation of digital resource centers, and creating locally relevant digital materials. Monitoring helps in promoting accountability and proper use of ICTs. Resource centers help schools with inadequate infrastructure by facilitating technology sharing. On the other hand, locally relevant materials help in increasing learners' participation and community involvement. There is ample evidence from Africa and international experience that good governance, community involvement, and appropriate interventions make digital education policies sustainable and effective.

CONCLUSION

The current research highlights some key issues related to the implementation of digital education policies in public secondary schools in the Kilimanjaro Region, Tanzania. The results demonstrate that there are various interrelated factors such as ICT infrastructure, teacher readiness, support from school management, technical assistance, familiarity with the policies and monitoring processes that are needed for an efficient implementation of digital education policies.

It can be stated that one of the major conclusions made during the course of the current research is that teacher capacity is crucial to implement the policies efficiently. ICT training that is provided on a regular basis enables

teachers to use technologies in the classroom successfully and confidently. Thus, ICT pedagogy should be further enhanced in both pre-service and in-service teacher training programs.

The research study also emphasizes the significance of collaboration and partnerships in helping the process of digitization of education. The sole government initiative will not be enough to fulfill all the requirements regarding implementation. Partnership with telecommunication companies, private organizations, NGOs, and local communities can provide the required infrastructure and internet connectivity, teacher training, and development of locally relevant content.

One other important aspect of the research is the issue of monitoring and evaluation. Monitoring and evaluation of the implementation of the policy on regular basis at different levels of schooling can prove useful in assessing the problems and progress made by the policy and taking evidence-based decisions accordingly. Though there are some barriers like lack of infrastructure, lack of time, technical issues, negative attitude towards technology, and uneven distribution of resources, still it is possible to overcome these obstacles through locally appropriate initiatives.

On balance, the study provides critical insights for policymakers, educators, and development agencies in improving digital learning in Tanzania. With the identification of the current problems and development of sustainable digital learning environments, Tanzania is likely to make rapid progress towards meeting its national educational objectives and getting learners ready for an increasingly digital world.

Recommendations

The qualitative analysis, framed through Policy Enactment Theory and the Street-Level Bureaucracy lens, reveals a critical gap between national digital mandates and on-the-ground execution. While policy texts prescribe rigid ICT integration, our data consistently shows that teachers as the ultimate "street-level bureaucrats" do not passively implement these mandates. Instead, they actively mediate, adapt, and at times resist them based on localized realities. The most pervasive empirical barrier identified is severe time constraints: teachers report that existing curricular workloads leave virtually no space for mastering new platforms or preparing tech-supported lessons, prompting them to selectively ignore digital requirements or reduce them to administrative record-keeping rather than transformative pedagogy. Furthermore, infrastructural deficits (unstable electricity, poor internet) force ad-hoc improvisations that deviate substantially from the intended policy design, illustrating Policy Enactment Theory's premise that policies are continuously re-interpreted at the school level rather than linearly executed.

Based directly on these empirical insights, the study proposes the following targeted, actionable recommendations. Unlike broad aspirational calls, these interventions are designed to explicitly counter the specific adaptive/resistance behaviors observed in our data: Schools must formalize partnerships (MOUs) with telecommunications companies, NGOs, and local businesses to secure stable electricity, backup power, and internet. However, given empirical evidence of frequent outages, we further recommend prioritizing offline-capable content (audio lessons, illustrated materials in Kiswahili) to ensure continuity when connectivity fails thereby aligning policy goals with the enacted reality of unreliable infrastructure. Secondly, since the findings show that time scarcity is the primary driver of teacher non-compliance, we recommend that school leadership mandate explicit, protected blocks for digital learning preparation and peer-coaching within the weekly timetable. Without this structural allocation, our data suggests teachers will continue to prioritize traditional instruction, effectively nullifying the policy.

Thirdly, rather than top-down prescriptive targets, each school should develop site-specific Digital Action Plans, co-created with teachers, that set realistic, phased targets (e.g., ratios of devices, teacher usage benchmarks). Our empirical evidence indicates that when street-level bureaucrats are involved in interpreting the policy for their local context, ownership increases and resistance decreases. Performance monitoring (teacher ICT usage, device functionality, student participation) must be coupled with quarterly district-level review cycles that allow for iterative policy adaptation, not just punitive audits. Finally, to ease the translation of policy into practice, each school requires an ICT Coordinator. However, the data suggests their role must shift from purely technical support to pedagogical mentorship specifically helping time-poor teachers integrate ICT progressively (from

administrative tasks to full technology-supported lessons), thereby reducing the cognitive load that currently drives resistance.

Further Areas of Research

While this study provides a robust qualitative snapshot of policy enactment and street-level mediation, several avenues remain unexplored and require dedicated scholarly attention to validate and extend our findings. Future research must move beyond implementation processes to examine sustainability and long-term outcomes. Specifically: Longitudinal studies are critical to assess whether the adaptive strategies (or resistive behaviors) observed among teachers persist, diminish, or transform as their ICT competence improves over several years; Comparative analyses across different regions of Tanzania (e.g., urban vs. rural, well-resourced vs. under-resourced) are essential to isolate contextual moderators such as local infrastructure or administrative support that shape how Policy Enactment unfolds differently in varied settings; Crucially, we recommend a distinct phase of quantitative impact research focusing on student learning outcomes, particularly in Science and Mathematics. Given that our current qualitative work reveals processual barriers, future empirical work must now provide the outcome-based evidence (e.g., test scores, conceptual understanding) needed to robustly justify continued resource allocation to digital education.

However, to deepen the analytical rigor of this field, future researchers are strongly encouraged to retain and refine the application of Policy Enactment Theory and Street-Level Bureaucracy Theory. Upcoming studies should investigate: How newly introduced policy amendments (e.g., updated curricula or new digital platforms) are actively "re-enacted" by teachers and school leaders over time, tracking the iterative negotiation between top-down directives and bottom-up realities; The specific coping mechanisms (e.g., triage, routinization, or outright non-compliance) that street-level bureaucrats employ when facing contradictory mandates and how institutional leadership can intervene to turn resistance into productive adaptation. Integrating these longitudinal, comparative, and theoretical dimensions is crucial to build a comprehensive, evidence-based roadmap for the sustainable digitalization of education in Tanzania.

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