Challenges in developing Information and Communication Technology (ICT) curricula for instruction and learning: An analysis of Kibaha District, Tanzania

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ABSTRACT

Information and Communication Technology (ICT) has become a key driver of educational change throughout the world, enriching teaching and learning as well as facilitating administration processes. ICT not only updates the delivery of education, but also fosters digital literacy and skills that have become indispensable for successful learning in 21st-century employment and citizenship. Despite the various initiatives by Tanzanian government and development partners on mainstreaming Information Communication Technology (ICT) in schools, successful adoption of ICT curriculum at secondary education level is still a great challenge particularly to rural areas like Kibaha district. As such, this study aims at exploring the particular challenges for ICT curriculum implementation in Kibaha District to generate suggestions that can inform both local and national policy and practice. Guided by the Unified Theory of Acceptance and Use of Technology (UTAUT), this study assessed the challenges of ICT integration in secondary schools. The paper relied on descriptive survey. The study population included heads of school, teachers (ICT as well as other subject teachers), and students drawn from three public secondary schools in Kibaha District, Tanzania; purposefully selected. A sample size of 113 was taken from this population, which included: 3 heads of school, 15 teachers and 95 students. Students were selected using stratified sampling and the headmasters and teachers were selected using purposive sampling. Data were collected through structured questionnaires, semi-structured interviews, and observations. Qualitative data were analyzed using thematic analysis, while quantitative data were analyzed using descriptive statistical methods. Findings revealed unstable electricity supply, poor ICT resources, insufficient in-service training, and poor timetable integration. The study recommends strong government support, ICT training for teachers, curriculum revision, and robust public-private partnerships to enhance ICT integration in schools.

Keywords: Barriers to Education, ICT Curriculum Implementation, ICT Infrastructure, Secondary Schools, Tanzania, Teacher Training

I. INTRODUCTION

Information and Communication Technologies [ICT] has become a key driver of educational change throughout the world, enriching teaching and learning as well as facilitating administration processes (Sharp, 2024) and (Tulowitzki et al, 2022). Globally, ICT integration in education system is conceived to be a major subject of discussion particularly for developing countries where educational inequalities still prevail (Tandon & Sood, 2023; Chaula & Mwamlangala, 2025). ICT not only updates the delivery of education, but also fosters digital literacy and skills that have become indispensable for successful learning in 21st-century employment and citizenship (Goglio, 2025; Gupta et al., 2023).

Within the context of Africa and more precisely Tanzania, policy makers, educators and researchers have realized that ICT education is now a priority. During the last two decades, several efforts have been carried out to take ICT (Information and Communication Technologies) into schools which consists of policy development in curriculum reforms, infrastructure developments perspectives (Kiwonde, 2024). However, the development and implementation of ICT curricula in secondary schools continue to be beset by difficulties.

Earlier studies point out a number of problems that detract from effective integration of ICT, including poor infrastructure, inadequate teacher training, weak policy enforcement, and a lack of funding (Joseph, 2022; Kiwonde, 2024; Ngao & Sang, 2024). The first two are the most important because they directly involve teachers and their pedagogy, there is a very serious problem with hardware that are not working. Even if what are called "smart classrooms" are available, if the teacher is not trained to use the technology to enhance the curriculum, then there is no effective use of ICT. Also, even if the teacher is well trained, if ICT is not being used by the rest of the school, then it is also not likely that the teacher will use it either, or that the kind of change that will make a substantial impact on student learning will take place. It is crucial to comprehend the impediments to the implementation of the ICT curriculum if we are to make sensible investments and adopt effective policies in the future. Schools in urban areas have made some progress, but many schools in semi-urban and rural areas are still using non-functional or outdated equipment. (Minga & Ghosh, 2024). This study aims to examine the barriers to effective ICT curriculum implementation in selected secondary schools in Kibaha District, Tanzania. By identifying and analyzing the key factors impeding progress, the study seeks to

contribute to ongoing efforts to improve ICT integration and support the country's broader educational and development goals (Nzilano, 2025).

1.1 Statement of the Problem

Despite the various initiatives by Tanzanian government and development partners on mainstreaming Information Communication Technology (ICT) in schools, successful adoption of ICT curriculum at secondary education level is still a great challenge particularly to rural areas like Kibaha district. While the Tanzania ICT Policy for Basic Education (URT, 2007 as cited in Ndume et al., 2021) provides an environment through which technology can be integrated into instruction and learning processes; many secondary schools face numerous challenges because of poor infrastructure for ICTs within some districts area needing qualified teachers to teach those subjects than available ones' is a constraint that has been examined by (Ngeze, 2017; Kalinga, 2024). Successful ICT integration depends not only on technology availability but also on the perceptions, readiness, and support of key stakeholders including teachers, students, school administrators, and policymaker (Ngodu et al., 2024).

However, little is known about how these human and institutional factors interplay to affect implement ability of ICT curriculum in practice. Most of existing literature is on general ICT usage or national level problems with no localized evidence for areas like Kibaha District. (Bendera, 2024; Kiwonde, 2024) The lack of such contextual information gap curtails targeted innovative interventions to enhance ICT adoption in secondary schools in Tanzania. As such, this study aims at exploring the particular challenges for ICT curriculum implementation in Kibaha District to generate suggestions that can inform both local and national policy and practice.

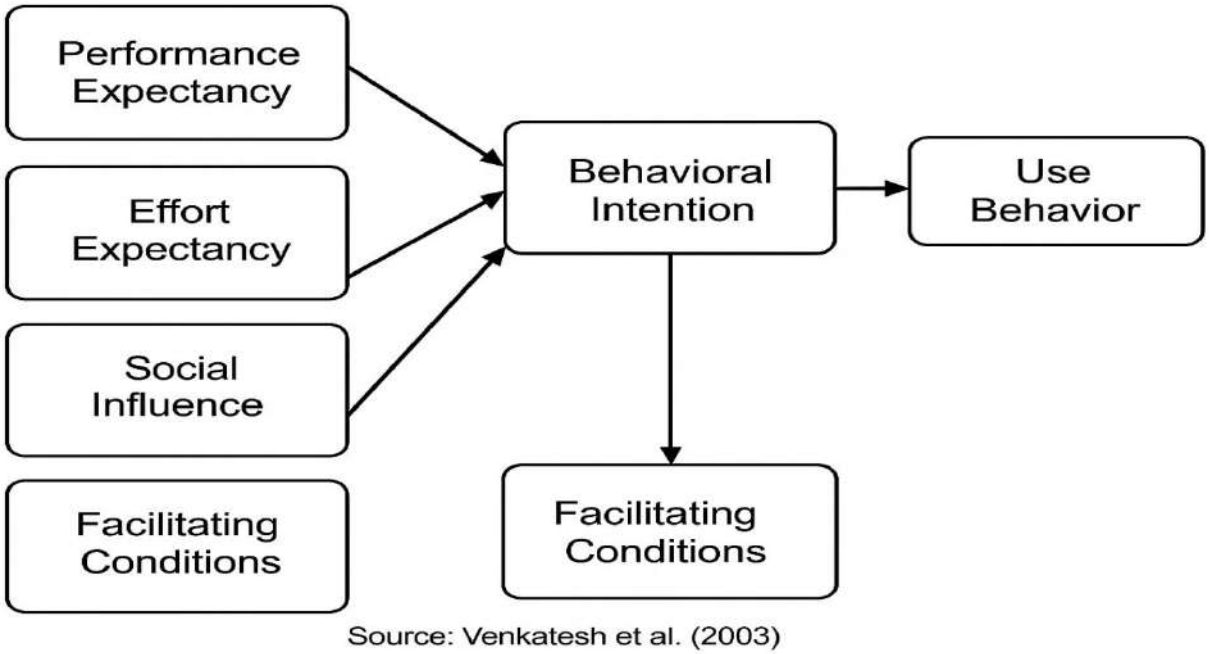
1.2 Research Objectives

i. To identify and analyze the key barriers affecting the effective implementation of the ICT curriculum in selected secondary schools in Kibaha District.
ii. To propose practical and context-specific strategies to overcome the identified barriers and improve the effective implementation of the ICT curriculum in secondary schools in Kibaha District.

II. LITERATURE REVIEW

2.1 Theoretical Review

UTAUT — The Unified Theory of Acceptance and Use of Technology. This study uses the Unified Theory of Acceptance and Use of Technology (UTAUT) developed by Venkatesh et al. (2003) to comprehend the factors contributing to ICT curriculum implementation in secondary schools. It organizes thinking about the ways in which individual perceptions and societal structural conditions mutually enable how technology is adopted and used.



Source: Venkatesh et al. (2003)

Figure 1
The Unified Theory of Acceptance and Use of Technology (UTAUT) Framework

Venkatesh et al. (2003) proposed a Unified Theory of Acceptance and Use of Technology (UTAUT), which is a comprehensive model for explaining technology adoption and use in organizations. It relates specifically to the use of Information and Communication Technology (ICT) in secondary school education as it considers individual perception along with systemic elements that attribute to technology adoption. UTAUT is founded on 4 key constructs that determine technology acceptance, performance expectancy, effort expectancy, social influence and facilitating conditions. In the context of this study, performance expectancy is related to teachers and students having confidence that using ICT will improve outcomes in teaching and learning. Effort expectancy reflects their attitudes about the ease of use of ICT tools, and holds particular relevance in Tanzanian contexts where training to technology often limited. Social influence is the representation of school leaders, peers and policymakers in individuals' decisions on ICT adoption. Facilitating conditions involve the availability of essential infrastructure, support, and resources such as electricity, internet connectivity, and technical assistance.

These constructs jointly influence behavioral intention and actual ICT usage. Applying the UTAUT model enables this study to examine how human, technological, and institutional factors affect the implementation of the ICT curriculum in secondary schools within Kibaha District.

2.2 Empirical Literature Review

Globally, integration of Information and Communication Technology (ICT) into school systems has gained momentum to prepare learners with the digital competences required by modern economy. There are some evidences for the transformative potential as well as the realities of introducing ICT in schools. Researchers highlighted. True digital inclusion extends beyond infrastructure to ensure similar access across marginalized population. Sharp (2024). A digitally skilled requires education policy Goglio (2025) insisted that, preparation requires context-sensitive, platform-based policies. Also, Tandon & Sood (2023) Inclusive ICT frameworks tailored to national realities.

On a related note, in an Asian context, Natarajan, Lim, & Laxman (2021) examine Singapore's ICT Masterplans and argue that visionary leadership, organised teacher preparation, and ongoing evaluation mechanisms are vital for effective implementation of ICT. Information literacy, complementing technical ICT competence, is emphasized by Withorn et al. (2021) and Caffrey et al. (2024) who has insisted that learners must be able to find and assess information in the digital era. European ICT applications in the knowledge domain compared to proven benefits from African studies.

According to Agyei (2021), while in Africa the programs on professional development in teachers are gratefully acknowledged, classroom implementation is often undermined by poor institutional support. According to Traxler (2021), that presents opportunities of mobile learning but cautions about persistent challenges such as cost, connectivity and lack of systemic backing. In Kenya, Murithi and Yoo (2021*)* demonstrate that misalignments exist, between teacher training and curriculum prevent from adopting ICT in competency-based education models.

For another East African example, Barasa et al. (2025*)* documents how curriculum reforms in Uganda uncovered equity dimensions in under-resourced schools—a story that resonates with the technological disparities between Tanzania and most of the rest of the world. Alexander (2020) —Girls' Technical Education (GTE) in Tanzania that attempts to bridge gender divides by offering girls coding and digital literacy skills.

Research in Tanzania has confirmed a number systematic weaknesses that inhibit successful integration of ICTs. Leadership is key in Tulowitzki et al. (2022), but they highlight that this support is often absent. Professional learning communities (PLC) significantly promote teacher ICT adoption as illustrated by Ngao & Sang (2024). Kalinga (2024) notes that while there is a high level of teacher knowledge about policy aspirations, the actual incorporation are obstructed by resource shortages. Nzilano (2025), explore the fact that they have limited classroom ICT and administrative ICT use, attributed to insufficient power capacity and lack of internet access Further publications by Kiwonde (2024)*,* Shekaoneka and Arthur (2024)*,* as well as Minga & Ghosh (2024) further demonstrate the scope of these problems highlighting shortage of training and resource scarcity as key obstacles to meaningful ICT adoption.

Gupta et al. (2023*)*, extends this to pre-pandemic including post-pandemic view and explained that in crises, ICT systems would serve as a resilience space for keeping education on reach which is supported by a systematic review undertaken by him. Pinto et al. (2024*)* — show how "socio-material bricolage" helped communities to creatively mobilize digital platforms in the face of COVID-19." Jibril et al. (2024*)* extend this framing to SMEs in emerging economies, showing how institutional readiness and strategic technology use are essential—parallels that reinforce findings from Tanzanian educational settings.

The body of literature is vast; however, to the best knowledge of the researcher, there are no enough studies investigating ICT curriculum implementation at district level in Tanzania, with combined qualitative and quantitative approaches. Most of the research on those themes is partial, focusing on single areas such as infrastructure, policy or training and not seeing them in relation to one another. Currently, a research gap exists on schools in Kibaha District which this study addresses to identify reasons and move toward the right direction in implementing ICT integration strategies.

2.3 Conceptual Review

There are numerous interrelated factors affecting the successful implementation of ICT curriculum in secondary schools. Studies that have been done which are often based on interviews and surveys have identified some critical challenges including inadequate teacher training (Kiwonde, 2024; Minga & Ghosh, 2024), limited time allocation for ICT lessons (Murithi & Yoo, 2021), implementation problem as well as low awareness of policy in relation to the use of ICT in schools (Kalinga, 2024), infrastructure problems such as unreliable power due to inconsistent electricity supply and internet connectivity (Nzilano, 2025) as well as administrative constraints because including weak leadership support poor planning (Tulowitzki et al., 2022). All these factors add up and limit integration of ICT in meaningful way, leading to adverse effects both on teaching and learning processes.

Additionally, broader socio-economic issues, such as financial limitations and inequities within the education system, exacerbate these challenges (Shekaoneka & Arthur, 2024; Agyei, 2021). The objective of the study is to view the barriers for ICT curriculum implementation as a complex of human capacity, infrastructure, policy and governance and organizational practices which together determine the success or failure of ICT adoption in secondary school. This frame work used to investigate barriers that are occurring in the selected schools in Kibaha District and guideline to based approaches for effective integration of ICTs.

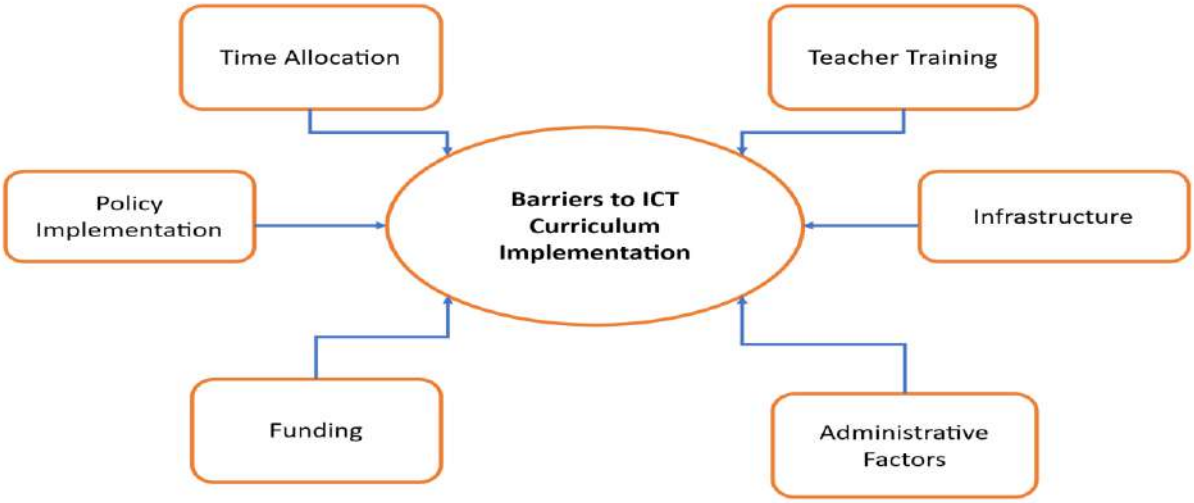


Figure 2

Conceptual Framework for ICT Curriculum Implementation Challenges in Secondary Schools

Figure 2 illustrates the key factors identified from the literature and preliminary findings as necessary for the effective implementation of the ICT curriculum in secondary schools. Factors such as teacher preparation, time spent teaching, policy development, adequate funding, and administrative encouragement play a significant role. The interconnectedness illustrates the intricate and systemic nature of issues that are presented when trying to integrate ICT. A clear understanding of these relationships will lay the foundation for a critical analysis of barriers and the development of context-specific interventions in secondary schools in Kibaha District.

III. METHODOLOGY

3.1 Research Design and Approach

The paper relied on descriptive survey in exploring the barriers of ICT curriculum implementation as per secondary schools in Kibaha District, Tanzania. This was a mixed-methods study involved the use of both structured questionnaires (quantitative) and interviews as well as observation (qualitative) that enabled a comprehensive and triangulated approach to understanding challenges. Original data used in this study was from a Master's thesis at St Augustine University of Tanzania. Although the data was only collected in 2021, but findings still represent current challenges impeding implementing ICT curriculum in Tanzanian secondary schools. It was appropriate to receive measurable trends as well as qualitative perceptions from different groups.

3.2 Study Area and Target Population

Within Kibaha District, the study took place in three public secondary schools specifically selected because of its implementation of ICT in the curriculum. In this regard, these schools represented a combination of urban and peri-urban settings that allowed to explore a broad range of implementation challenges. It also took into consideration requests from schools that had historically run ICT, until recent interruptions due to resource issues. One hundred thirteen (113) respondents were the study participants, 95 students from different classes, 15 subject teachers -both ICT and non-ICT and 3 headmasters.

Table 1

Distribution of Participants by Category

Respondent Type	Number
Subject Teachers (ICT & others)	15
Students	95
Headmasters	3
Total	**113**

3.3 Sampling Procedures

To make certain that there was representation from all roles and both genders, we used stratified sampling for the students. For the headmasters, ICT teachers, and other subject teachers (e.g., math, English, chemistry) who are involved in the school but not necessarily specialized in ICT, we used purposive sampling. Having multiple categories of respondents allows for triangulation and validation of findings from different perspectives.

3.4 Data Collection Methods

Information was collected through the application of structured questionnaires, semi-structured interviews, and observation checklists. Questionnaires were administered to both teachers and students to collect quantifiable data about their access to ICT facilities, their perceptions of whether ICT has been integrated into teaching, and the nature of the problems they face with ICT. Semi-structured interviews were conducted with headmasters and selected teachers to gather in-depth qualitative data about the kinds of institutional, administrative, and pedagogical factors that affect the implementation of ICT in the school. In addition, observation checklists were used to collect data about the condition of computers lab, the kind of internet access available and the likely reliability of an electricity supply.

3.5 Data Analysis Techniques

Descriptive statistics, such as frequencies and percentages, were used to summarize the challenges of employing ICT in education. Yet, more importantly, qualitative data were analysed using thematic analysis. Notes taken during the study and interview transcripts were coded into themes like: Infrastructure, Teacher training, Policy alignment and Resource availability. This is meticulously done so that the results can not only be trusted but also understood.

3.6 Validity and Reliability

To make sure the research tools are reliable and valid, a pilot version of the questionnaire was tested in a secondary school that is not included in the sample. The feedback collected from this pilot study was used to enhance the clarity, language, and organization of the questions. Before starting the data collection, appropriate educational authorities granted ethical approval, and all participants signed forms of informed consent.

IV. FINDINGS & DISCUSSION

4.1 Infrastructure and Equipment Challenges

Shortage of ICT infrastructure in the three schools surveyed has obviously had a considerable impact on effective implementation of ICT curriculum in schools. In all three schools there was no fully equipped computer laboratory but existed computers were appeared to be old and sometimes did not even work. That meant students rarely got a chance to learn about the digital tools. In addition, internet access was either patchy or non-existent, in turn greatly reducing the opportunity for schools to bring online resources directly into their digital learning plans.

This was further supported by observation of poor maintenance of existing ICT facilities, suggesting a lack of sustainable support systems and technical expertise within the schools. Compounding these infrastructural weaknesses, unreliable power supply frequently disrupted ICT activities, reflecting a broader challenge faced by many Tanzanian schools in both rural and peri-urban settings. The results of the study parallel reports in some national-level studies like those by Kiwonde (2024), which have underlined the persistent infrastructural inadequacies as principal barriers to ICT

integration in Tanzanian education. In the absence of some essential physical and technological resources, there will be impacts on curriculum delivery resulting in low Teacher motivation, as well as poor student participation in ICT learning.

In addition, the infrastructural difficulties highlight systemic resource distribution and planning deficiencies which require joint efforts between government agencies, school management as well as development partners to make it part of ICT infrastructure investment. The real challenge remains unsolved — ICT literacy and digital skills of students will not be improved as long as these core barriers are present severely constrained, undermining the broader goals of educational modernization and digital inclusion.

4.2 Teacher Training and Human Capacity

These teacher interviews revealed that most had undertaken little or no formal in-service training since the introduction of ICT into their schools. That said, some teachers reaped the benefits of occasional external training sessions, such as a series of digital competency workshops arranged through an NGO. The training began with ICT teachers, who were then widened to include other subjects so that there was a layered-digital presence in the schools. Few computer teachers were formally trained as such; most were subject area specialists. Teachers of non-ICT subjects report using computers privately to support their teaching of other subjects. These teachers also face challenges related to limited ICT skills and insufficient training, which can affect their instructional effectiveness. These results stem from a more general portrait within the framework of Ngao and Sang (2024) and Minga and Ghosh (2024), who emphasized the importance of developing teacher ICT integration. Areas such as digital pedagogy were identified as weak in the current curriculum, to be strengthened through ongoing professional development for teachers.

Additional assessments to determine teacher competence involved questionnaires and interviews. It was observed that all 15 teachers had computer competences and they said they underwent basic courses on computers, in areas such as Microsoft Office, internet browsing and some programming basics. At the same time, few were skilled in computer hardware maintenance.

Regarding in-service training, while some teachers had the opportunity to attend occasional workshops or training sessions organized by external organizations, all respondents confirmed that no formal or structured in-service training programs were consistently available for ICT teachers within their schools. This highlights a significant gap in ongoing professional development. In a small number of instances, educators explained that they had gained training sessions by outside entities. For example, one ICT instructor said:

> *"We once received training from an NGO that selected ICT teachers for a short digital skills workshop. The training was conducted at a regional teacher resource centre. Later, the same organization invited some non-ICT subject teachers to attend a similar program, which helped build broader capacity within the school."*

This comment illustrates that there are programs out there that can help teachers gain new skills and knowledge. Discussions with school head highlighted the essentiality of teacher competence for the successful completion of the ICT curriculum. For instance, the head of School M confirmed that a serious shortage of qualified ICT teachers exists. He pointed out that even the few staff members with relevant credentials weren't even enough to meeting the demand. He then said that teachers who possess strong ICT skills are much more confident when it comes to teaching ICT content. This emphasizes the need for even more potent ICT training at the teacher education level.

It examined student readiness of computer literacy and found that only 33 students (35%) were familiar with computers before entering high school, the remaining of 65% had never use a computer (refer to Figure 3). This underscores the essential role of teachers have in developing foundational computer literacy. Teachers face pressure to teach from very basic ICT skills if students come with no previous experience of using ICT. However, students with basic computer knowledge are better able to learn advanced concepts and engage well in class.

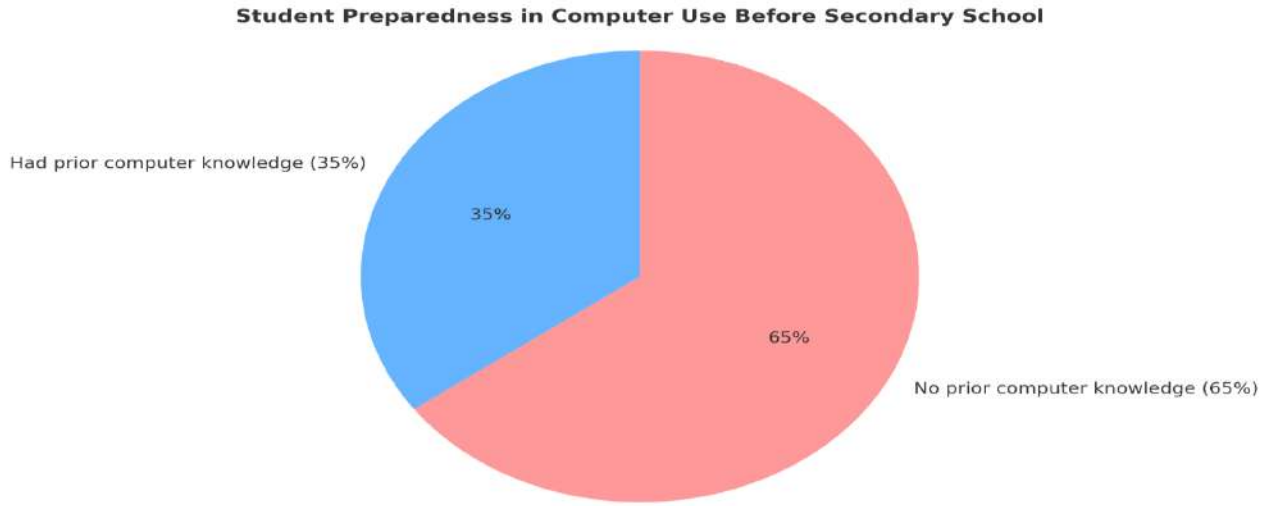


Figure 3
Students' prior knowledge on ICT

From the figure 3, above 35% (33) of students attempted to study computer before and other hand there were 65% (62) that had no any idea about how to use a computer. This means that teachers have a great responsivity in terms of teaching and providing an atmosphere for developing computer skills. Teachers can build upon existing knowledge.

Looking at the students' responses in more detail, it was observed that among those who had some ICT experience, most of them was basic skills of word processing, internet browsing and gaming as well as hardware identification. Table 3 summarises the finding in details.

Table 2
Self-*reported prior computer skills of the 33 students (N = 33)*

Skill	Frequency	Percentage
World wide web	33	100
Database	0	0
Hardware naming	33	100
Game playing	31	93.9
Word processing	24	72.7
PowerPoint presentation	0	0

Overall, the shortage of well-trained ICT teachers, coupled with low student entry-level knowledge, points to the need for targeted interventions. Expanding teacher training programs, providing refresher courses, and ensuring equitable access to ICT tools are critical for effective curriculum delivery. The findings show most of the learners only possess basic ICT skills like word processing, games playing and naming Computer hardware.

4.3 Challenges in Administrative and Curriculum Implementation of ICT

Based on interviews with the headmasters, use of ICT for administration was still low due to limited training, internet connectivity but not steady and electrical power cut in some areas. Despite pressing need of institutions digitizing school operation for an intent to manage their operations more efficiently, the initiative has been impeded due to infrastructural and capacity limitations. This result concurs with what Nzilano (2025) found about the ICT use in school management crossing five domestics barriers.

Besides administrative issues, the participants — particularly, teachers and headmasters — also pointed out execution-related hurdles of ICT curriculum. They noted ill-defined guidance on how to implement curriculum, difficulties in aligning ICT goals with existing resources at the school level, and insufficient follow-up support. These observations are consistent with Shekaoneka and Arthur (2024) and Nzilano (2025), which documented similar structural and institutional limitations in the integration of ICT within Tanzanian schools.

4.4 Financial Constraints

One of the main inhibitors to effective ICT integration in secondary schools is financial constraints. All the respondents mentioned that their respective schools mostly relied on parental contribution and in some cases donors to

acquire ICT resources. The support from the Government was stated to be sporadic and intermittent resulting in non-viable ICT ecosystem.

> *An ICT teacher explained: "Most of the ICT equipment that we use such as laptops, etc have been provided through help from outside. Initially, we received five laptops and three projectors from an international organization and a few months later ten desktops delivered to the school through our corporate donor. These have been very constructive contributions. While we do our best to maintain the equipment, we still face some challenges in keeping everything running smoothly."*

These donations have been instrumental, but they often fall short of meeting the full demand for ICT tools in teaching and learning. Moreover, they are rarely accompanied by ongoing support for maintenance, upgrades, or teacher training. This reflects broader concerns raised by Hunduma and Mekuria, (2023), who identified financial constraints as a systemic obstacle to effective ICT implementation in schools.

4.5 Time Allocation and Scheduling

The most cited challenge by teachers, was to place adequately scheduled ICT classes inside the school time table. This was largely to do with the fact that there were not enough qualified ICT teachers and many schools also had barely little or no working ICT facilities for students. As a result of these limitations, ICT lessons were often offered to investigate higher grades, such as Forms Three and Four, however lower grades mostly had limited access to coordinated computer education. This restriction on scheduling means that more than half of the students were missing the chance of starting learning ICT skills from form one. These findings are consistent with observations made by Murithi and Yoo (2021) in the Kenyan educational context, as similar staffing and resource challenges have impacted the equitable delivery of ICT education across grade levels.

Table 3

Summary of Key Barriers to ICT Implementation in Kibaha District Schools

Barrier	Frequency (n)	Source
Inadequate ICT Labs	3	Observation
Limited ICT Training for In-service Teacher	13	Interviews
Poor Internet Connectivity	3	Observation, Teachers
Limited ICT Implementation Guidelines	2	Headmasters, Teachers
Unreliable Power Supply	2	Observation

Table 3 shows that the most common barrier reported by 13 of the 15 teachers was absence of in-service training. This underscores a vital human capacity gap with the use of ICT. All schools reported to have insufficient ICT infrastructural at the computer labs and poor internet connectivity, which is a characteristic of the underlying broad infrastructural inadequacies observed during field visits. Reliable power supply is also cited as a barrier, which limits ICT integration into school operations and teaching, together with an inadequate framework for implementing the curriculum.

4.6 Linking Findings to Research Objectives

The foregoing listed barriers fall under the study objective which was: to determine and examine the main challenges of implementing ICT curriculum in selected secondary schools as it was stated in objective one. These results provide a holistic view of the infrastructural, human resource, and policy level issues pertaining to these schools. Based on these, the study moves to Objective 2-Propose pragmatic and context-specific solutions in order to deal with these barriers and ensure that the ICT curriculum is implemented effectively. Recommendations for addressing these challenges are outlined in the Recommendations section.

V. CONCLUSION & RECOMENDATIONS

5.1 Conclusion

The study identifies various systemic and operational obstacles that hinder the efficient delivery of ICT curriculum at the secondary school level in Kibaha District, Tanzania. Main challenges including ICT infrastructure, insufficient IT equipment, poor internet quality, and unstable power supply. Lack of competent ICT teachers and no regular in-service programmes that leave everything for teachers to function at their best, leading them to be incapable of integrating as a means of communication.

Furthermore, the lack of clear implementation strategies, misalignment of the curriculum with school realities, and insufficient financial support further exacerbate these challenges. This is being compounded with organizational inefficiencies such as poorly timetabling for teaching of ICT lessons and limited application of ICT in running the school

administration. This has resulted in a reduction or discontinuation of ICT education in some schools, depriving students of crucial digital literacy skills. Study identified a fairly optimistic attitude towards ICT in education on both teacher and student sides suggesting that a realization of successful integration might be within reach should propitious conditions ensue. This underscores a big gap between policy and practice that need a huge resolution. Bridging this gap will not only enhance the quality of secondary education but also prepare students for active participation in a digital economy. ICT literacy is no longer optional but essential for national development and global competitiveness.

5.2 Recommendations

For the effective implementation of ICT curriculum in secondary schools, teacher capacity must be strengthened by means of targeted professional development courses. The Certification of ICT skills programs for teachers should be open to educational authorities. These will define clear standards of not only fundamental and advanced digital accomplishments but also the specific competences involved in using ICT in one's work across all subjects: if all goes well then integrating this sort into pre-service teacher training, and with repeated in-service professional development on an ongoing basis, will guarantee that the supply of teachers who can handle new tricks is constant.

Moreover, accessible, localized training workshops can provide practical, context-specific ICT skills to teachers and school leaders, helping to address gaps where formal training opportunities are limited. In addition, investment in ICT infrastructure is very important. School requires stable internet access, sufficient computers and uninterrupted electricity. There must be a set of clear guidelines and supports in place to allow for schools to plan, handle and uphold these resources. Support private sector partners, nongovernmental organizations, and development agencies in noncompetitive collaboration with governments to co-finance innovative training solutions through financial contributions and technical assistance. This collaboration can improve sustainability, and diversify the prospects for ICT inclusion.

The ICT curriculum should be regularly reviewed and adapted to reflect the capacities and challenges of schools, particularly those in resource-constrained environments. A flexible and modular curriculum design would enable schools to implement ICT education progressively based on their available resources and staff competencies. Also, the use of smartphone and other digital devices apart from the formal school-based ICT education, teachers and parents can play significant part in positively helping students. This can be through support students to begin adopting some of the digital literacy skills like smartphone. Parents can support students to learn about internet safety and how they can become good internet users through safe browsing, determining what sources are accurate, and avoiding inappropriate material. This is an excellent way to teach critical thinking skills and promote responsible online behaviour. Strong collaborative relationship between educators and families is necessary for the effective use of technology in education.

By addressing teacher training, infrastructure, partnerships, curriculum adaptability, and home-school collaboration, education stakeholders can foster supportive learning environments that improve ICT integration and prepare students for participation in the digital age.

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