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# Teachers' use of ICT in implementing Competency-Based Curriculum in Public Junior Secondary Schools in Kisumu West Sub-County in Kenya.

Mwita, Faith Robi  
*School of Humanities and Social Sciences*  
*Strathmore University*

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**Teachers' use of ICT in Implementing Competency-Based Curriculum in  
Public Junior Secondary Schools in Kisumu West Sub-County in Kenya**

**Faith Robi Mwita**

**Adm. No: 082997**

**Submitted in Partial Fulfillment of the Requirements for the Degree of Master of  
Science in Education Management at Strathmore University**



**School of Humanities and Social Sciences**

**Strathmore University**

**Nairobi, Kenya**

**June 2025**

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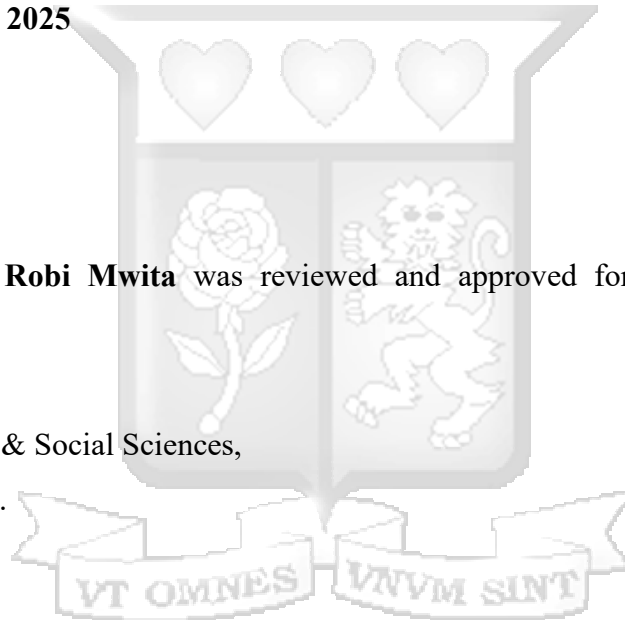
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**Date: 22<sup>nd</sup> May 2025**

## Approval

The thesis of **Faith Robi Mwita** was reviewed and approved for examination by **Dr. Mukami Njoroge**

School of Humanities & Social Sciences,  
Strathmore University.



Dr. Magdalene Dimba  
Dean, School of Humanities & Social Sciences.  
Strathmore University.

Prof. Bernard Shibwabo,  
Director of Graduate Studies,  
Strathmore University.

## Abstract

Integration of digital literacy in Competency-Based Curriculum (CBC) is a significant step towards the 21<sup>st</sup> century skills in the education system in Kenya. Global, regional, and local findings suggest that the world is rapidly changing and digital economy continues to gain traction in many societies. This study investigates the effectiveness of teachers' integration of Information and Communication Technology (ICT) in implementing a competency-based curriculum in public junior secondary schools in Kenya, focusing on whether current ICT usage aligns with curriculum goals and enhances learning outcomes. Through a mixed-methods approach, incorporating both qualitative and quantitative data, the study captured teachers' experiences, evaluated curriculum implementation strategies, and analyzed student performance metrics. Key findings indicate that while ICT is used in varied capacities, significant gaps remain in its alignment with competency-based curriculum objectives. Teachers demonstrated a generally positive attitude towards ICT integration; however, challenges such as lack of training, inadequate resources, and infrastructural limitations were prevalent, hindering effective implementation. Various challenges in integrating ICT into the curriculum have been reported in previous research, especially in Kenya. There is limited focus on public junior secondary in rural areas such as Kisumu West Sub-County. It is against this background that this study interrogates teachers' use of ICT in implementing CBC in public junior secondary schools (JSS) in Kisumu West Sub-County in Kisumu County, Kenya. The objectives of the study are: (i) to determine the availability of ICT infrastructure for implementation of CBC in public junior secondary schools, (ii) to establish teacher capacity for ICT use in the implementation of CBC in public junior secondary schools, and (iii) to examine the influence of teachers' perceptions on the use of ICT in the implementation of CBC in public junior secondary schools. This study is premised on the constructivist learning theory (Elliott, Kratoch will, Littlefield & Travers, 2000) and the Technology Acceptance Model (Davis, 1989). An embedded mixed methods design was adopted in this study. The study targeted a total of one hundred and fifty (150) teachers in all the public junior secondary schools in Kisumu West Sub-County, from whom a simple random sampling was used to identify one hundred and nine (109) to complete questionnaires. Interviews were used to complement data drawn from closed-ended questionnaires. Data was analysed empirically, thematically and inferentially. This study concluded that public junior secondary schools in Kisumu West Sub-County did not have enough ICT resources and teachers were not sufficiently capacitated on ICT use. Besides, there were hardly any school-based ICT policies necessary for sustaining the use of ICT in implementing CBC in junior secondary schools in this area. Concerted efforts are required to address the ICT infrastructure and teacher capacity gaps. Additionally, heads of these institutions should be sensitised to introduce school-based ICT policies to entrench digital culture(s). The outcomes and recommendations in this study are useful in facilitating effective implementation of CBC and informing future curriculum reviews.

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### **List of Abbreviations**

<b>DEB</b>	:	Digital Economy Blueprint
<b>DVD</b>	:	Digital Versatile Disc
<b>GDP</b>	:	Gross Domestic Product
<b>HoI</b>	:	Head of Institution
<b>ICT</b>	:	Information Communication Technology
<b>JSS</b>	:	Junior Secondary Schools
<b>KEMI</b>	:	Kenya Education Management Institute
<b>KEPSHA</b>	:	Kenya Primary Schools Heads Association
<b>KESSHA</b>	:	Kenya Secondary Schools Heads' Association
<b>KICD</b>	:	Kenya Institute of Curriculum Development
<b>PC</b>	:	Personal Computer
<b>PJSS</b>	:	Public Junior Secondary Schools
<b>TSC</b>	:	Teachers Service Commission
<b>TV</b>	:	Television
<b>UNESCO</b>	:	United Nations Educational, Scientific and Cultural Organization
<b>WWW</b>	:	World Wide Web.

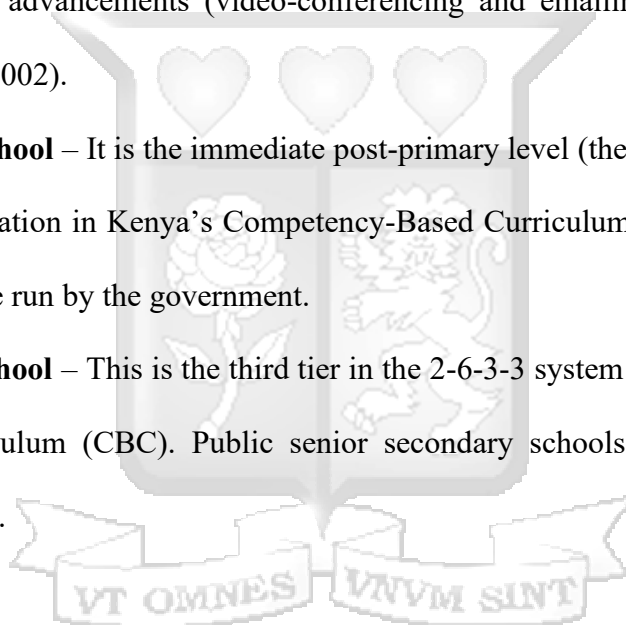
## Operational Definition of Key Terms

**Competency-Based Curriculum** – It is a learner-centered approach to education which places a premium on what learners are expected to do rather than what they are supposed to know with a view to acclimatising to the changing needs of society.

**Information and Communication Technology (ICT)** – This refers to the technology that is used to transmit, store, create, offer, or trade data (UNESCO, 2002). This broad definition encompasses radio, TV, video, DVD, telephone (both fixed line and cell phones), satellite frameworks, PC and system equipment. Programming, instrumentation, and administrations connected with these advancements (video-conferencing and emailing functions) are also included (UNESCO, 2002).

**Junior Secondary School** – It is the immediate post-primary level (the second tier in the 2-6-3-3-3 system) of education in Kenya's Competency-Based Curriculum (CBC). Public Junior Secondary Schools are run by the government.

**Senior Secondary School** – This is the third tier in the 2-6-3-3 system of education in Kenya under the new curriculum (CBC). Public senior secondary schools are managed by the Government of Kenya.



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## Chapter 1: Introduction

### 1.1 Background of the Study

The global education landscape is undergoing a transformative shift, driven by the increasing integration of Information and Communication Technology (ICT) as a crucial tool for teaching and learning. This shift is particularly evident in the implementation of competency-based curricula (CBC), which focus on developing 21st-century skills such as critical thinking, problem-solving, and digital literacy. In Kenya, the adoption of the CBC in 2017 represented a significant step toward aligning the education system with the demands of the modern, technology-driven world.

The Kenyan government's dedication to this educational reform is reflected in the Digital Economy Blueprint, outlining the country's vision to become a regional technology hub. A key aspect of this blueprint is the integration of ICT in the education sector, aimed at equipping learners with the essential digital competencies to thrive in the global knowledge economy (Irungu *et al.*, 2024). However, effectively implementing the CBC and integrating ICT seamlessly in public junior secondary schools pose significant challenges, as teachers struggle with inadequate resources, limited training, and varying levels of digital proficiency (Ainoutdinova *et al.*, 2022).

This study aims to investigate the extent to which teachers in public junior secondary schools in Kisumu West Sub-County utilise ICT tools and resources to implement the competency-based curriculum. By examining the availability of ICT infrastructure, teachers' capacity to integrate technology, and the impact of their perceptions on the implementation process, this research seeks to provide critical insights to inform policy decisions and guide the development of targeted interventions to enhance the effectiveness of the CBC in Kenya's public education system.

Globally, the use of ICT has registered a significant growth. Institutions use ICT resources to make life simpler in many respects. New technology, methods, abilities, and innovations are becoming well-known around the world. The introduction of ICT has revolutionised ecosystems. Policies and underlying frameworks have become commonplace within organizations that seek to transform their efficiency. Today, technological innovation plays a pivotal role in developing the new global economy and facilitating quick public communication (UNESCO, 2002).

Many researchers have conducted investigations to demonstrate the centrality of ICT in transforming institutional efficacy and promoting learner-centered education. ICT was considered 'an important tool in achieving Millennium Development Goals related to education' (Njoroge, Ngugi and Kinzi, 2017; KEMI, 2015; RoK, 2008). Kozma (2003) compared the nature of technology and classroom methods in a cross-national research. There were twenty-eight (28) states in this study. According to Kozma's (2003) research, nations like Taiwan, Finland, the Netherlands, Norway, and Singapore have synchronised their educational reforms with worldwide shifts. According to Kozma's research, in order to make students more digitally savvy, educational reforms in the aforementioned nations prioritised ICT training and interpersonal skills over academic content. In a different research, Kozma (1991) reiterates his arguments in favor of using technology in the classroom, arguing that children's attention is captured by many voices and noises, which leads to brain processes that aid in the formation of meaning.

Aktaruzzaman, Rashedul and CheKum (2011) argue that the effective integration of ICT in education can enhance access, relevance, and the quality of education by making the teaching and learning process more interactive. The World Wide Web (WWW) has also revolutionised access to online information, opening doors for e-learning and lifelong learning. Omwenga, Waema and Wagacha (2004) suggest that while WWW-based learning won't replace

teachers, it enables students to connect with experts, researchers, and fellow learners. Through these interactions, students gain firsthand knowledge and exchange ideas with peers from across the globe (Redempta, 2012). According to Hennessy and Harrison (2010), ICT fosters a lasting desire for learning, an essential skill for adapting to a rapidly changing world.

The use of technology in education results in a shift in pedagogy, and a healthy transition from conventional teacher-centered tactics to heuristic approaches (Mingaine 2013). Experiential learning techniques make classrooms more engaging, allowing students to manipulate technology. This transformation improves the creativity and critical thinking abilities needed in the twenty-first century (Mwangi and Mutua, 2014). Heuristic approaches may be useless in big courses and difficult to implement; yet, the use of technology is appropriate for catching and holding learners' attention in such situations (Majumdar, 2015). A good grasp of ICT and its key concepts is a vital component of effective instruction, since it is the established cornerstone of the modern world (UNESCO, 2002)

Innovation has the potential to reshape educational strategies, influencing where and how learning takes place, as well as redefining the roles of both students and teachers (UNESCO, 2002). Information and Communication Technology (ICT) is revolutionizing education by fostering a sense of collaboration in both traditional and digital learning spaces. As a powerful and interactive tool, ICT enhances educational opportunities, and it is anticipated that future learning platforms will be further developed through advancements in data and communication technologies. The integration of ICT in education is a crucial step toward achieving this vision, necessitating an assessment of how teachers utilize these technologies.

Modern educational institutions can leverage ICT to equip students with essential 21st-century skills (Andoh, 2012). According to Andoh, integrating technology boosts the

availability of training, enhances instructional communication, disseminates value-added learning programs, supports teacher professional development, and helps streamline educational administration. Consequently, key instructional issues such as access, inclusivity, and standardization can be effectively addressed through ICT. The use of ICT improves the quality of education by fostering learning through enhanced discussions, asynchronous chats, interactive guidance, self-directed learning, critical thinking, information retrieval, and analysis (Yuen, Law, & Wong, 2003). Additionally, ICT can enhance outcomes, instruction, and organizational capacity in marginalised communities (Sharma, 2003), influencing educational practices and research processes (Yusuf, 2005).

The adoption of a competency-based curriculum (CBC) in Kenya signifies a notable transition from conventional content-centric educational frameworks to an approach that prioritizes skills, critical thinking, and practical application. The Kenya Institute of Curriculum Development (KICD, 2017) states that the Competency-Based Curriculum (CBC) seeks to provide learners with essential 21st-century abilities, including problem-solving, cooperation, and digital literacy. This paradigm shift imposes significant demands on educators to incorporate contemporary teaching approaches and resources into their instructional practices. Information and Communication Technology (ICT) is one of the most essential instruments in this revolution. Wambugu and Changeiywo (2019) assert that ICT facilitates efficient CBC implementation by offering platforms for interactive learning, tailored training, and resource accessibility. The efficacy of CBC is significantly contingent upon teachers' capacity to adeptly integrate ICT into their daily pedagogical practices, an issue noted across diverse educational settings worldwide.

Notwithstanding the prospective advantages of ICT in improving CBC implementation, numerous educators in public junior secondary schools encounter significant obstacles in its integration. A research by Oyier et al. (2020) in Kisumu West Sub-County indicated that

inadequate training, insufficient infrastructure, and restricted access to digital resources impede teachers' ability to effectively employ ICT. Moreover, several educators demonstrate reluctance to embrace new technology owing to apprehension regarding change or insufficient trust in their technical abilities. UNESCO (2018) asserts that effective ICT integration necessitates not only physical access to devices but also ongoing professional development programs designed to enhance instructors' competencies in utilizing these tools. In Kisumu West Sub-County, where resource limitations are common, these obstacles might considerably hinder the achievement of CBC objectives. Confronting these difficulties is crucial for guaranteeing equitable and high-quality education for all pupils.

The application of ICT in education has demonstrated the capacity to elevate student involvement, stimulate creativity, and improve learning results when executed well. Kiptoo and Sang (2021) assert that ICT resources, including e-learning platforms, multimedia presentations, and virtual simulations, empower educators to develop dynamic and engaging lessons that conform to CBC principles. Moreover, ICT enables differentiated instruction, permitting educators to address varied student requirements within a unified classroom environment. The efficacy of ICT in attaining these aims significantly relies on teachers' readiness and the support mechanisms provided by institutions. Ngumi and Mwiria (2020) noted that schools with strong ICT policies and supportive leadership generally attain superior outcomes in CBC implementation compared to those lacking such frameworks. In public junior secondary schools within Kisumu West Sub-County, utilising ICT could address disparities in educational quality and guarantee conformity with national educational objectives.

## **1.2 Statement of the Problem**

The implementation of the Competency-Based Curriculum (CBC) is regarded as a significant achievement in Kenya's educational reforms. Digital literacy is a key competency highlighted

in the CBC. The revised curriculum recognises the worldwide importance of ICT as a catalyst for innovation and competitiveness, with education serving as an essential facilitator of the digital ecosystem required for national development. Nearly a decade post-introduction, the curriculum has revealed deficiencies that prompt inquiries regarding its execution. Stakeholders have raised concerns about the sufficiency of ICT infrastructure, the training of teachers for junior secondary schools (JSS), and ICT policies to promote a school-centric ICT perspective. In Kisumu County, the focus has been on schools in the urban areas at the expense of the many public institutions in peri-urban and rural areas. Concerns of stakeholders in this county, like other parts of the country, have not been adequately resolved. While research has been undertaken about ICT integration in education, less attention has been given to the influence of ICT infrastructure, teacher competence, and perceptions of ICT on the implementation of the Competency-Based Curriculum in public junior secondary schools in Kenya. Several of the examined studies shown a deficiency in sample representativeness. Some of these studies identify skills deficiencies in public senior secondary schools and recommend additional research on ICT infrastructure and educators' ICT competencies; however, they fail to address these deficiencies in public junior secondary schools or their implications for CBC implementation. The identified knowledge gaps necessitate this study, which investigates teachers' use of ICT in implementing CBC in public junior secondary schools within Kisumu West Sub-County, Kisumu County.

### **1.3 Research Objectives**

The general objective of the study was to investigate the use of ICT in the implementation of the Competency-Based Curriculum (CBC) in Kisumu West Sub-County, Kisumu County, Kenya. The specific objectives are:

- i. To determine the availability of ICT infrastructure for the implementation of CBC in public junior secondary schools in Kisumu West Sub-County, Kisumu County,

Kenya.

- ii. To establish teacher capacity for ICT use in the implementation of CBC in public junior secondary schools in Kisumu West Sub-County, Kisumu County, Kenya.
- iii. To examine the influence of teacher perception on the use of ICT in the implementation of CBC in public junior secondary schools in Kisumu West Sub-County, Kisumu County.

#### **1.4 Research Questions**

The study responded to the following questions:

1. What is the availability of ICT infrastructure for the implementation of the competency-based curriculum in public junior secondary schools in Kisumu West Sub-County?
2. What is the capacity of teachers to use ICT in the implementation of the competency-based curriculum in public junior secondary schools in Kisumu West Sub-County?
3. How do teachers' perceptions influence the use of ICT in the implementation of the competency-based curriculum in public junior secondary schools in Kisumu West Sub-County?

#### **1.5 Scope of the Study**

The study focused on whether existing ICT infrastructure facilitated the effective implementation of the Competency-Based Curriculum (CBC), how teachers' ICT capacity had been developed in relation to the use of digital technologies in CBC implementation, and how teachers' perceptions impacted the use of ICT in implementing CBC in public junior secondary schools in Kisumu West Sub-County, Kisumu County, Kenya. This study was anchored in the constructivist learning theory, as proposed by Elliot (2000), and the Technology Acceptance Model (TAM), advanced by Davis (1989). The study examined five primary aspects of TAM: (i) 'perceived ease of use,' (ii) 'perceived usefulness,' (iii) 'attitude

towards use,' (iv) 'behavioral intention,' and (v) 'actual use' (Alshammari & Rosli, 2020, p. 13). Critics regard TAM as a general theory and argue that it cannot give an adequate explanation of how users accept technology; nonetheless, refashioning it to accommodate external factors such as 'culture and work settings' makes 'valid,' 'robust' and improves its explanatory power, thereby diminishing its limitation (Venkatesh & Davis, 2000). Constructivist learning, which regards learning as a process of constructing personal knowledge, has been criticised for its relativity (Scerri, 2003).

### **1.6 Significance of the Study**

The findings of this study will contribute to the ongoing efforts to enhance the effectiveness of the competency-based curriculum implementation in Kenya's public education system. The insights generated will inform policymakers, school administrators, and teacher training programs on the critical factors that influence the integration of ICT in the CBC, enabling them to develop targeted interventions and support mechanisms to address the identified challenges.

Furthermore, this research will add to the existing body of knowledge on the role of educational technology in curriculum implementation, particularly within the context of developing countries like Kenya. The recommendations provided can serve as a valuable resource for other sub-counties and counties facing similar challenges in the integration of ICT and the successful implementation of the competency-based curriculum

## **Chapter 2: Literature Review**

### **2.1 Introduction**

This chapter reviews studies related to teachers' use of ICT in implementing the competency-based curriculum in public junior secondary schools in Kisumu West Sub-County, focusing on ICT infrastructure, teacher capacity, and digital culture. It also discusses the theoretical framework on which the study is based. Additionally, this chapter provides an illustration of the conceptual framework for the study and summarises the existing gaps that justified the need for the study.

### **2.2 Theoretical Framework**

The study was grounded in two key frameworks: the constructivist learning theory (Elliott, Kratochwill, Cook, & Travers, 2000) and the Technology Acceptance Model (TAM) (Davis, 1989). Constructivism emphasizes the active involvement of learners in building knowledge. Instead of passively absorbing information, learners reflect on their experiences, create mental representations, and integrate new concepts, fostering comprehensive learning. Elliott et al. (2000) describe constructivism as a learning approach in which individuals actively generate their own understanding, shaped by their experiences. Similarly, Arends (1998) argues that constructivism promotes meaning-making through experience, with learners' prior knowledge interacting with new information to shape understanding.

According to Elliott et al. (2000), constructivism is based on several key principles. The first is that knowledge is actively constructed rather than passively received. Learners develop new knowledge based on what they already know, with prior knowledge shaping how they interpret new experiences (Phillips, 1995). The argument that this study seeks to advance is that active construction of knowledge can be facilitated through the use of ICT tools. Learners under the current education system can utilise ICT resources for prior interaction with learning materials. This ICT-based prior interaction facilitates their comprehension of

learning concepts as well as their individual experiences. The second principle highlights that learning is an active process (Elliott *et al.*, 2000). In contrast to the passive view of teaching, where learners are seen as ‘empty vessels’ to be filled with information, constructivism argues that learners gain understanding through active engagement with their environment. This includes activities like experimentation and solving real-world problems. While information may be provided passively, true comprehension occurs when learners make meaningful connections between previous knowledge, new information, and their learning processes. Dewey also supported real-world problem-solving in education, asserting that students who passively encounter problems without experiencing their impact will not meaningfully adapt or construct new habits.

The third principle, as described by Elliott *et al.* (2000), posits that all knowledge is socially constructed and personal. This research will assess how the learning environment impacts ICT knowledge acquisition, how teaching fosters this environment, and how learners’ experiences influence their learning process. Specifically, the study aims to determine whether the ICT infrastructure in public junior secondary schools facilitates the construction of knowledge by encouraging active participation.

In the context of is study, the Constructivist Learning Theory serves as a lens through which teachers can understand how to use ICT tools and resources to build engaging, learner-centered learning environments. Teachers can use digital technology to provide interactive, collaborative, and inquiry-based learning experiences that allow students to actively construct their knowledge and abilities (Vygotsky, 1978; Piaget, 1977).

The research objectives that fit into the Constructivist Learning Theory are: (i) to assess the availability of ICT infrastructure for competency-based curriculum implementation in public junior secondary schools and (ii) to evaluate teachers' ICT skills for

competency-based curriculum implementation. The actualization of these two objectives is centered on understanding the availability and adequacy of ICT resources, and teacher capacity for implementation of ICT-based learning in public secondary schools in the research area. This is what establishing constructivist learning environments that use digital tools and resource entails.

The Technology Acceptance Model (TAM), introduced by Davis (1989), proposes that two main factors influence whether users accept a computer system: its perceived usefulness and its perceived ease of use. This model emphasizes the user's perception of technology. Even if a developer believes a product is both useful and user-friendly, it may still face rejection by users who do not share these perceptions. In this study, the researcher explored how these factors affect teachers' technological proficiency and the teachers' perceptions within public junior secondary schools in Kisumu West Sub-County, forming part of the study's conceptual framework. In the context of the current study, the researcher sought to determine how these two factors impact on the technological savviness of teachers and the digital teachers' perceptions in public junior public secondary schools in Kisumu West Sub-County.

The TAM is important to this study because it investigates the impact of teachers' attitudes on the usage of ICT in the implementation of the competency-based curriculum. The third research objective which is to examine how teachers' perceptions affect the use of ICT in implementing competency-based curriculum in public junior secondary schools aligns with the principles of TAM. Understanding teachers' attitudes, beliefs, and perceptions regarding the use of ICT in the CBC allows the study to identify the elements that facilitate or impede the effective integration of digital technology into the teaching and learning process. This knowledge can help to shape targeted initiatives and support systems for addressing identified difficulties and fostering a healthy digital culture in schools. The integration of Constructivist Learning Theory and the Technology Acceptance Model provides a comprehensive

theoretical foundation for this study, guiding the investigation into the availability of ICT infrastructure, teachers' ability to use technology, and the impact of their perceptions on the implementation of the competency-based curriculum in public junior secondary schools in Kisumu West Sub-County. In a nutshell, the two theories are utilised complementarily. The researcher does not intend to use any of them in isolation; they are used concurrently in the actualization of the three objectives of this study.

## **2.3 Empirical Review**

### **2.3.1 Information Communication Technology in Education**

Habibi et al (2021) describe Information Communication Technology (ICT) in education as a method of teaching and learning using a specific media and technology. This kind of education uses information communication technologies to optimise, improve, and support information transmission, with the ultimate objective of improving overall educational delivery and performance. At its 29th session general congress in November 1997, the United Nations Education, Scientific, and Cultural Organisation (UNESCO) founded the UNESCO Institute for Information Technologies in Education (UNESCO IITE), giving it a global mandate to integrate ICT in education.

UNESCO IITE's mission is to advance the innovative use of ICT as a model of best practice and act as a catalyst in achieving Sustainable Development Goal 4, which emphasises inclusive, equitable, quality education and lifelong learning through ICT. In 2011, UNESCO IITE launched a project centered on utilising ICT in education to foster dialogue and establish a foundation for effective education (UNESCO, 2012). Its vision is to encourage the global adoption of ICT policies in education by urging nations to create supportive policies that align with its goals. UNESCO IITE is spearheading efforts to redefine education paradigms to meet the demands of modern society, focusing on new educational approaches that emphasise ICT.

Iqbal and Mohammed (2010) observe that with the rapid expansion of the global economy and information-based society, education systems worldwide face significant pressure to integrate ICT. For a nation to achieve growth and success, it must strengthen its education system by adopting comprehensive and effective ICT policies. Furthermore, the study underscores the necessity for strategic interventions from educational stakeholders to improve infrastructure and resources, thus promoting equity in education (Irungu *et al.*, 2024). To further amplify these efforts, Dullah *et al.* (2024) contend that future research should explore the longitudinal effects of professional development programs specifically aimed at ICT integration, assessing their ultimate impact on teaching efficacy and student achievement. Additionally, inquiries into the students' perspectives regarding ICT usage in relation to their learning experiences could yield valuable insights for educators (Mokganya *et al.*, 2024).

An investigation into the variability of ICT integration practices across different regions and socio-economic contexts in Kenya may also illuminate broader challenges and opportunities within the educational landscape (Syukri *et al.*, 2024). Given the dynamic nature of technology, it would be prudent to assess how emerging trends in ICT can be effectively incorporated into curricular frameworks to bolster teaching practices further (Smirnova, 2023). The exploration of collaborative models that harness community and parental involvement to support ICT initiatives in schools could additionally serve as a crucial area for future studies (Domhnaill *et al.*, 2021).

Aristovnik (2012) highlights that the level of success in integrating ICT into education differs across countries. Some, especially developed nations like Finland and the United States, have shown effective use of ICT in teaching, with educators frequently incorporating it into their practices. While the success varies, both the European Union (EU) and the Organisation for Economic Cooperation and Development (OECD) countries have made ICT integration in education and training a priority. ICT greatly influences the education sector, shaping both

organizational structures and teaching methods (Aristovnik, 2012). According to Wu (2014,) schools across Europe and Asia are well-equipped with information and communication technology (ICT) infrastructure. In Europe, 95% of schools have access to computers, laptops, broadband, interactive whiteboards, learning management systems, and digital cameras. Both students and teachers utilize ICT to enhance learning outcomes and develop necessary skills (Wu, 2014). Similarly, Kozma (2003) points out that nations such as Taiwan, Finland, the Netherlands, Norway, and Singapore have adapted their educational reforms to align with global trends. These reforms prioritise not only the content taught in schools but also place a greater emphasis on ICT training and interpersonal skills, aiming to prepare students to be more adaptable to technological changes.

Kihoza, Zlotnikova, Bada, and Kalegele (2016) note that Korea, Singapore, Japan, and China have invested in high-quality technology, providing schools with advanced computer systems, educational platforms, high-speed internet, diverse digital learning resources, and information terminals for students. Previous studies indicate that ICT contributes to improved student learning and enhanced teaching methods, thus promoting the integration of ICT in educational systems. Kihoza, Zlotnikova, Kizito, and Kalegele (2016) also reference a report by Japan's National Institute of Multimedia Education, which shows that increasing the use of ICT in education, particularly by incorporating it into the curriculum, has a notable positive impact on student performance.

According to Fisseha (2011), ICT is fast impacting all aspects of human life in Africa, and it is playing a critical role in employment, commerce, and leisure, with the potential to positively increase access to, and improve the relevance and quality of education. This is because it promotes information acquisition and absorption while also improving educational institutions (Fisseha, 2011). Poor policy remains a major challenge for African nations attempting to implement ICT programs in education, with studies indicating that in sub-

Saharan countries such as Zimbabwe, ICT infrastructure and equipment such as most computers sit idle in classrooms due to untrained personnel, a lack of electricity, or supporting facilities such as computer laboratories (Kabanda 2012)

Mariga, Ogenga, Shikali, Casper, and Muliaro (2017) point out that Kenya has initiated its digital transformation to ensure that the benefits of a digital economy are realized, with hopes that other African nations will follow. Like other sub-Saharan countries, Kenya has incorporated ICT into its education policies (Muinde & Mbataru, 2019). Although there is limited empirical data to assess the impact of ICT on learning in Kenya, the National Education Sector Plan 2013–2018 prioritized ICT integration (Piper, Jepkememei, Kwayumba, & Kibuko, 2015). This effort was supported by the National ICT Policy established in 2006, aimed at providing accessible, affordable, and dependable technology services across all sectors (Republic of Kenya, 2006; DEB, 2019). Further research is necessary to assess how this policy is being applied within the new curriculum.

### **2.3.2 ICT Infrastructure in Relation to Implementation of Competency-Based Curriculum**

ICT infrastructure, according to Laan (2011), refers to a set of Information Technology (IT) components that provide the foundation of an IT service. It encompasses both the physical components (computer and networking hardware and other tangible facilities), and software and network (non-tangible) components of an IT service. Both components are integral to this study.

According to Malungu (2019), ICT infrastructure is the primary pillar and backbone of every ICT programme's execution, whether in education, business, or any other industry. Without fundamental and reliable ICT infrastructure, an IT service cannot be efficient. Hardware, software, network connectivity, physical facilities such as computer laboratories, and power supply must be addressed for a successful execution of any ICT-based programme.

According to Murithi and Yoo (2021), 'ICT facilities were inadequate, including laptops for instructors, projectors, tablets, PC devices for kids, as well as other enabling installations' (p. 9). They argue that there is a need for adequate supply computers to schools to facilitate teachers' access to these resources and prepare them for technology integration. Familiarising instructors with computer hardware and software can significantly reduce overreliance on computer technicians in schools. This study points to poor ICT infrastructure as an impediment to the successful implementation of CBC. It does not, however, show the nexus between inadequate ICT infrastructure and effective implementation of CBC, a gap that the current study seeks to address.

Liang *et al.* (2005) emphasise the importance of adequate infrastructure and resources for the successful implementation of ICT policies in education. They argue that certain foundational resources are crucial for integrating ICT into education, including devices for both students and teachers, shared display systems, network connectivity, and other necessary installations. This perspective is supported by Mingaine (2013), who points out that access to electricity, computers, software, and internet connectivity are vital for ICT integration. While these studies highlight the significance of infrastructure, they do not, like Murithi and Yoo (2021), examine the relationship between infrastructure and the successful implementation of the Competency-Based Curriculum (CBC). The current research seeks to address this gap by investigating how ICT infrastructure impacts CBC implementation.

Langat (2015) found that shortages of infrastructure and ICT equipment were major challenges in implementing ICT in Kenyan primary schools. The study, which included 40 primary schools and 450 teachers, reported that 94% of the schools lacked ICT equipment, all faced classroom shortages, and only two private schools had functioning computer labs. Similarly, other studies (Tonui *et al.*, 2016; Muinde & Mbataru, 2019) highlighted the limited use of computers for educational purposes and the lack of digital classroom customisation in

Kenyan primary schools. These findings are pertinent to the proposed study as they highlight infrastructure as a key factor in the successful implementation of CBC, although the focus was on primary schools, whereas the current research targeted public junior secondary schools.

Furthermore, while access to devices like computers or laptops is crucial for teachers to integrate technology in education, Liang et al. (2005) noted that many primary school teachers lacked access to such devices. This issue has persisted over time, as confirmed by other studies (Langat, 2015; Tonui et al., 2016; Mingaine, 2013), which underscore the need for stakeholders to prioritise ICT infrastructure to support effective technology integration in education.

Muinde and Mbataru (2019) and Piper et al. (2015) observe that students have relatively easy access to technological gadgets such as tablet PCs. The power supply in schools appeared to be dependable, which might be credited to the government's dedication and investment in digital learning in public primary schools across the country. However, since not all schools have a one-to-one ratio in terms of digital devices like tablet PCs, Heinrich, Aduana, and Martin (2020) recommend that instructors in such circumstances may adapt their approach by fostering peer collaborative learning as learners share the available gadgets. This argument supports Vygotsky's social constructivist approach, which emphasises collaboration rather than individual learning (Waweru, 2018). According to (Sang, Valcke, van Braak, & Tondeur, 2009), instructors in locations without suitable ICT equipment must use teaching approaches that foster collaboration and democracy in order to facilitate material sharing among students. This might be made feasible by educating instructors with the necessary technology integration skills to assess the learners' usage of technology and its application in education.

The introduction of computer courses in Kenyan teacher training colleges has significantly enhanced teachers' computer literacy (Omito, Kembo, & Ayere, 2019; Muinde & Mbataru, 2019). Teacher computer literacy is a critical factor in effectively incorporating technology into various subjects (Hwang et al., 2010; UNESCO, 2012). However, being computer literate does not necessarily mean that teachers will integrate technology into their teaching, as there are often gaps in its pedagogical application (Mwangi & Khatete, 2017; Wambiri & Ndani, 2016). After the implementation of the new curriculum, most teachers neither integrated ICT into their lessons nor attended in-service training. This aligns with other studies that found computer literacy training alone is insufficient for ensuring technology integration, as teachers need a deeper understanding of ICT's pedagogical uses (Omito et al., 2019; Ngeno et al., 2020; Sharples & Moldeus, 2014). Younger teachers demonstrated better technology integration skills than their older counterparts, confirming earlier research showing a negative correlation between age and technology proficiency (Harrison & Rainer, 1992, cited by Wambiri & Ndani, 2016). Nonetheless, Bebell *et al.* (2004) pointed out that age and work experience may not provide conclusive insights into teachers' technology use. A study exploring a range of technology applications in schools could offer a more comprehensive view of teachers' daily interactions with technology.

Wambiri and Ndani (2016) concluded that primary school teachers in Kenya held positive attitudes towards the use of various technologies, suggesting that with the necessary support, ICT implementation in schools could be successfully achieved. This aligns with findings indicating that teachers strongly believed ICT would not only aid in organising instruction but also benefit their students. Teachers' perception of technology's usefulness for learners is crucial as it encourages innovation and creativity in the classroom (Kalpana, 2014; KICD, 2017; Wang, 2008; Waweru, 2018). However, the view that technology is time-consuming can be linked to inadequate training on how to use ICT effectively in teaching, as noted in

earlier studies (Sharples & Moldeus, 2014). Due to insufficient preparation, such teachers often require assistance from computer technicians to integrate technology successfully. Heinrich et al. (2020) also noted that teachers' beliefs about the time and effort required for technology integration influence their perceptions of its ease of use and value for their students. Concerns about student safety while using the internet may stem from a lack of proper training for both teachers and students on safe usage practices.

Wambiri and Ndani (2016) also explored how age and gender affected perceptions of ICT usefulness. They found that teachers in their 40s perceived ICT as more beneficial compared to those in their 30s, which contrasts with previous studies suggesting younger teachers typically have a more favorable view (Wambiri & Ndani, 2016). This difference may be attributed to the sample composition in their study, as there were twice as many teachers in their 30s as in their 40s. However, Omito, Kembo, and Ayere (2004) caution against assuming younger teachers always have a higher perception of technology. Further investigation into how teachers of various ages perceive the usefulness of specific technologies in their professional tasks could provide deeper insights. Additionally, their analysis found no significant gender differences in teachers' perceived usefulness of technology.

The findings of Wambiri and Ndani align with those of Buliva (2018), who also observed no notable difference in teachers' perceptions of technology use based on gender. This implies that all teachers, regardless of gender, should be capable of excelling in the integration of technology. Furthermore, the results highlight the need for policymakers to develop strategies to equip both male and female teachers with the necessary skills for effective technology integration, as they share high perceptions but also face significant skill gaps. However, Venkatesh, Morris, Davis, and Davis (2003) pointed out that, due to socialization, men may view certain technologies as more useful if they enhance task efficiency.

The International Telecommunication Union's (ITU) Assessment Report (2023), which focused on broadband connectivity in public senior secondary schools in Kenya, recommends the provision of ICT connectivity, and basic ICT connection devices to lower levels of education. The framework foresees the design of a curriculum within a collaborative digital application to support flexible and self-paced learning, which requires appropriate investment in infrastructure. There is a need for an assessment of the status of ICT infrastructure in public junior secondary schools and how this impacts the implementation of CBC. This is the gap that the current study addresses.

### **2.3.3 Teacher Capacity and the Use of ICT in the Implementation of CBC**

Murithi and Yoo (2021) observed that while many teachers possess basic computer literacy, there is a significant barrier to integrating technology effectively due to a lack of pedagogical knowledge for its integration. Teachers implementing the new curriculum should regularly participate in professional development (PD) programs that extend beyond basic computer literacy to focus on technology integration across different subjects. In cases where there is an unavoidable shortage of devices, Murithi and Yoo (2021) suggest that teachers be trained to foster collaboration among students by encouraging them to share devices and work on tasks together as a team.

Research has shown that incorporating ICT in education fosters opportunities for learners to acquire 21st-century skills, but this is largely dependent on teachers' digital literacy (UNESCO, 2012). Studies on the capacity of primary school teachers in Kenya indicate that despite policy initiatives and financial investments in ICT, the integration of technology in classrooms remains minimal (Piper *et al.*, 2015). For example, Langat (2015) found that most teachers in his study on barriers to ICT implementation in Kenyan primary schools lacked computer literacy. Although teachers recognized the importance of technology in education, they attributed the lack of progress to insufficient government planning in providing in-

service training on using technology for teaching and learning. In a study by Abobo (2018), similar views were expressed, with two-thirds of the teachers reporting an inability to incorporate technology into Kiswahili language instruction. Additionally, Omolo et al. (2017) discovered that student-teachers began utilizing technology in Kiswahili teaching in classrooms after receiving guidance from their tutors. Both studies imply that after attending training sessions, teachers were more inclined to adopt technology in their teaching practices.

Other research indicates that even when teachers received training, it often centered on basic computer literacy skills, such as Microsoft Office and Excel, which did not adequately prepare them for integrating technology into classroom instruction (Mwangi & Khatete, 2017). Similarly, Wambiri and Ndani (2016) note that their examination of primary teacher training documents in Kenya revealed a gap in the pedagogical use of ICT. Muinde and Mbataru (2019) found that 85% of teachers in Machakos County had undergone ICT training provided by the Ministry of Education; however, 62.3% of them felt that the training was insufficient for teaching purposes. These findings align with Majumdar (2005), who observed that many teachers who received ICT training as part of professional development programs still lacked the confidence to integrate ICT into teaching and learning, as the training often focused solely on computer applications due to time constraints.

Omito *et al.* (2009) conducted a study in Homa Bay County to assess the computer skills of teachers in public primary schools. Using a cross-sectional survey design, data were collected from 362 teachers and 85 headteachers. The results revealed that few teachers had received government training, and Omito et al. (2019) argued that this was due to the expectation that trained teachers would train their peers. A similar conclusion was drawn by Ngeno *et al.* (2020) in Ainamoi sub-county, where professional development training did not reach all teachers. The research by Ngeno, Sang, and Chemosit (2020) is connected to a study by Sharples and Moldeus (2014), which explored teachers' perceptions of readiness for

technology adoption in public primary schools. This mixed-method case study covered multiple locations across Kenya, including Nairobi, Nakuru, Mandera, and Turkana, to compare the integration of technology in urban and rural settings. The findings revealed that only 8% of teachers felt sufficiently prepared to use technology in their daily teaching, although 78% of respondents considered computers easy to use. The study concluded that the gap between the perceived ease of use and actual classroom implementation was due to inadequate training in ICT integration.

According to the Union's International Telecommunication Assessment Report (2023), which focused on broadband connectivity in public senior secondary schools in Kenya, there 'was a scarcity of ICT skills among teachers' and the implication was that 'even in situations where the computer devices were few, they were not used optimally' (p. 44). The ICT skills gaps, according to ITU's report, can be resolved by having in-house and out-of-school training sessions for teachers. This assessment did not cover State actors, such as TSC, KEMI, KICD, KEPSHA, and KESSHA, who are critical in ensuring that ICT benefits are optimised. Whereas this report may be relevant to the current study, it does not focus on skills gaps in public junior secondary schools and the impact of these gaps in implementing CBC.

#### **2.3.4 Influence of Teachers' Perceptions on the Implementation of CBC in Public Schools**

Research on the influence of perception on the integration of ICT in education indicates that teachers' attitudes toward technology significantly impact their acceptance and subsequent application in the classroom (Wambiri & Ndani, 2016). They suggest that government efforts focused on providing devices may be ineffective unless teachers' attitudes and beliefs are also addressed.

In their study assessing teachers' beliefs, attitudes, self-efficacy, computer competency, and age, Wambiri and Ndani (2016) found that younger teachers generally held more positive

attitudes toward technology. They attribute this to the fact that younger teachers are more likely to have received technology training during their education. However, Bebell *et al.* (2004) caution that teachers' age and experience should be interpreted carefully about technology use in schools, as age-related differences may be minimal in certain applications if a comprehensive approach is used to evaluate technology usage.

Buliva (2018) also conducted research in Vihiga County, Western Kenya, exploring teachers' perceptions of ICT's usefulness in schools. The study, which used a convenience sample of teachers, examined gender differences in attitudes toward technology. An independent samples t-test showed no statistically significant difference in the perceptions of male and female teachers regarding the usefulness of computers. The study concluded that gender did not influence teachers' perceptions of ICT usefulness in the County. Technology can be leveraged in the classroom by engaging students in collaborative projects, creating digital content, and responding to academic tasks.

In their study on the implementation of the laptop project in public primary schools, Muinde and Mbataru (2019) discovered that 68.5% of the teachers surveyed held a positive view of using laptops in teaching and learning. However, they also found that 39% of the teachers felt the time allocated for integrating technology was insufficient, with much of their lesson time spent setting up the devices. In such situations, teachers may resist the use of ICT in their teaching if they believe it requires too much time and effort to operate (Omwenga *et al.*, 2004). According to Purnomo, Imron, Wiyono, Sobri, and Dami (2024), establishing a digital-based school culture involves 'preparing the necessary technological resources, aligning the school vision, enhancing digital skills for learners, addressing challenges, and conducting follow-up evaluations,' along with 'digitalizing administrative processes, real-time monitoring of learning progress and teacher performance, and developing data management systems to improve decision-making speed and accuracy' (p. 12).

Heinrich *et al.* (2020) also highlighted the issue of time and ICT integration in their research on the effective use of tablets in rural Kenyan schools. Their mixed-method study, which included classroom observations, teacher interviews, student surveys, and focus groups, revealed that teachers often excluded students who were seen as slow learners during technology integration. Some teachers explained that limited lesson time made it difficult to support students struggling academically. The study suggests that teachers receive further professional development to enhance their ability to accommodate all learners, including those with disabilities, in a technology-based classroom environment.



## 2.4 Conceptual Framework

Independent variable – Teachers' use of ICT

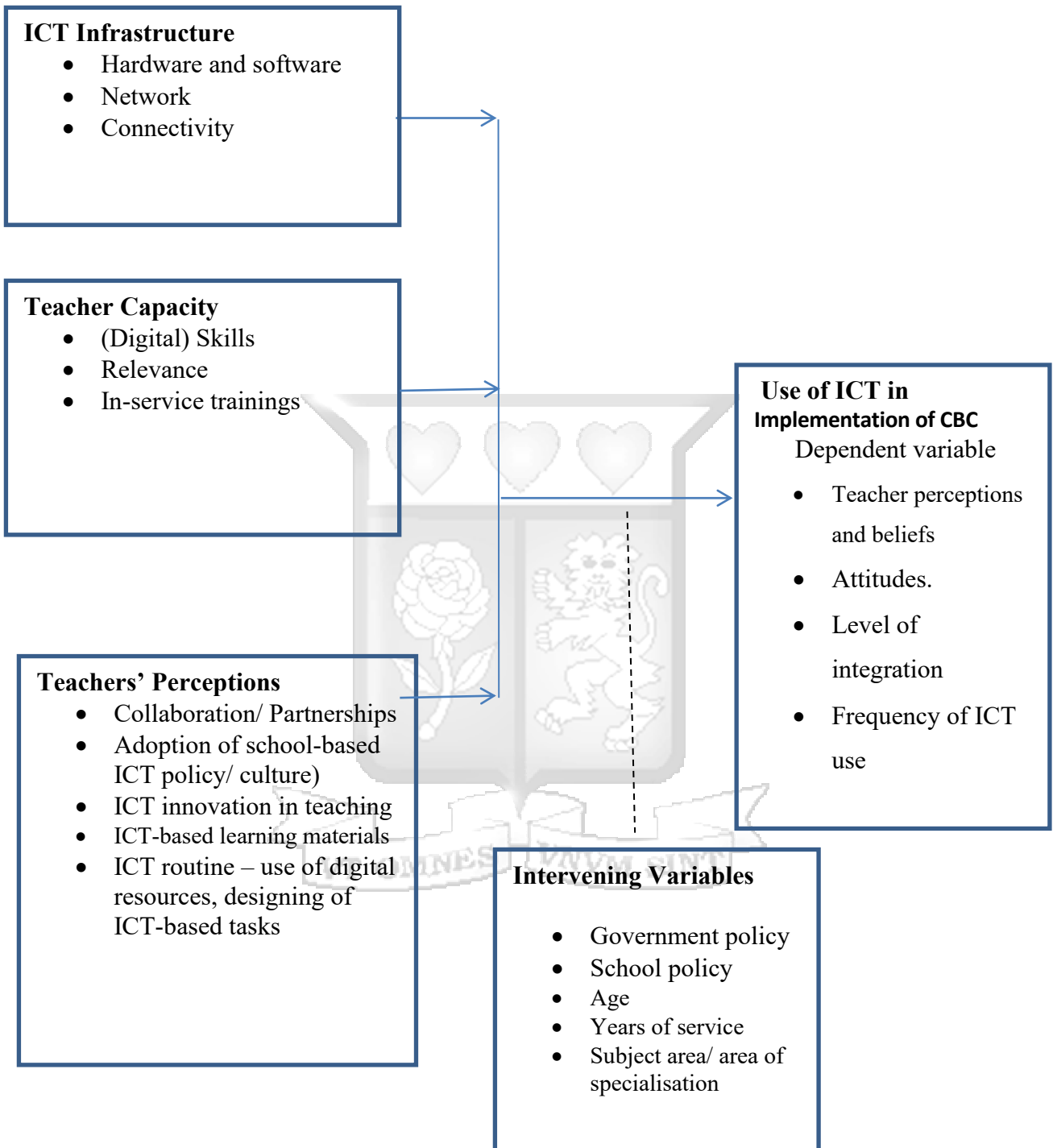


Figure 2.1: Conceptual Framework

**Table 2.1: Operationalization of variables**

<b>Objective</b>	<b>Variable description</b>	<b>Indicators</b>	<b>Measure ment Scale</b>	<b>Tools of Analysis</b>
Implementing Competency-based curriculum	Dependent	<ul style="list-style-type: none"> <li>- Teacher perceptions and beliefs</li> <li>- Level of integration frequency of use</li> </ul>	Ordinal	Mean, standard deviation
To determine the availability of digital infrastructure for implementation of CBC in public junior secondary schools in Kisumu West Sub- County in Kisumu County, Kenya	Independent	<ul style="list-style-type: none"> <li>- Hardware and software</li> <li>- Network availability</li> <li>- Reliability of internet connectivity</li> </ul>	Ordinal-Nominal	Descriptive- frequency and tables
To establish teacher capacity for ICT use in the implementation of CBC in public junior secondary schools in Kisumu West Sub-County in Kisumu County Kenya	Independent	<ul style="list-style-type: none"> <li>- Digital skills of teacher</li> <li>- Relevance of digital skills</li> <li>- In service trainings</li> </ul>	Ordinal	Descriptive- frequency, percentage and tables
To examine the influence of teacher perceptions on the use of ICT in the implementation of CBC in public junior secondary schools in Kisumu West Sub-county in Kisumu County	Independent	<ul style="list-style-type: none"> <li>- Adoption of ICT in teaching</li> <li>- ICT lessons</li> <li>- Access ratio</li> </ul>	Ordinal	Descriptive- frequency and tables Inferential- Ratio

## 2.5 Conclusion

In summary, the studies reviewed in this chapter identify inadequate or poor ICT infrastructure as one of the challenges in implementing CBC in public primary schools in Kenya. They do not discuss the nexus or connection of ICT infrastructure and the effective implementation of CBC. The studies cited in this chapter also focus on the correlation between teacher capacity and ICT implementation in public primary schools and not public junior secondary schools. The scholars whose works have been reviewed here also discuss the perceptions of teachers on use of ICT in the implementation of CBC in Primary schools and not JSS. Some of the studies reviewed are not representative enough in terms of sampling. Murithi and Yoo (2021), for instance, have recommended a repeat of this study (admitting that their conclusions may not be as accurate). ITU's report, which focuses on public (senior) secondary recommends further research on ICT infrastructure and teachers' ICT skills. Studies that relied on data from urban and peri-urban public schools may not be reflective of the realities in rural public schools. Knowledge gaps, therefore, exist in the studies reviewed in this chapter rationalising the need for the current study on teachers' use of ICT in the implementation of CBC in public junior secondary schools in Kisumu West Sub-County in Kisumu County,

## **Chapter 3: Research Methodology**

### **3.1 Introduction**

This chapter provides a description of research design that was adopted in the study, population and sampling procedures, data collection instruments, data analysis methods, validity and reliability tests and ethical considerations.

### **3.2 Research Design**

The study adopted a mixed methods research design as it synergised both qualitative and quantitative approaches. Using mixed methods enhanced the credibility of the research outcomes and reinforced the validity of its conclusions. This approach was preferred because the use of a quantitative or qualitative approach alone might have been inadequate to develop multiple perspectives or achieve a complete understanding of the research problem. Creswell and Plano Clark's (2011) typology of 'commonly employed designs' comprises six 'major mixed methods design.' However, for this study, the embedded design or explanatory concurrent design (Johnson and Christensen, 2017) was employed, as the researcher collected and analysed both types of data simultaneously. Statistical data were provided to buttress qualitative findings. This approach required limited time and resources and offered flexibility (Maxwell and Loomis, 2003). This design allows for 'merging, connecting or implanting the data that provide a solid insight of the research questions and objectives' (Creswell, 2014) as well as 'better explanation of thoughts' (Kothari, 2004; Slife, Williams & Williams, 1995).

### **3.3 Target Population and Sampling**

The study targeted teachers and head teachers from 73 public junior secondary schools in Kisumu West Sub County. A sample is a section of a population that has been selected for examination and analysis and from which inferences concerning a given targeted population are made and obtained (Kothari 2010). Kisumu West Sub-County has a total of seventy-three (73) public junior secondary schools. Staff establishment varies from one school to the other.

This study, therefore, targeted 150 teachers. Of the 150 teachers in the study area, this study used Yamane's (1967) formula to determine the effective sample size required to answer the study objectives.

$$n = \frac{N}{1+Ne^2}$$

Where n = required sample size

N = Total population

e = Margin of error (assuming 0.05)

$$= \frac{150}{1+1000(0.05)^2} = 109 \text{ teachers.}$$



**Table 3.1: Number of JSS teachers in Kisumu west Sub County**

NO	SCHOOL	M	F	T	NO	SCHOOL	M	F	T	NO	SCHOOL	M	F	T
1	ABOGE	1	1	2	25	LWALA KADAWA	2	2	4	49	KANYAMON	1	1	2
2	AGULU	0	2	2	26	MALIERA			0	50	ONGALO	2	0	2
3	AKINGILI	0	0	0	27	MARERA	1	1	2	51	ORINDE	1	1	2
4	ALARA	2	0	3	28	MASENO GIRLS	1	2	3	52	OTIENGO	2	1	3
5	ARUDE	0	2	2	29	MASENO MIXED	1	1	2	53	ROTA	1	0	1
6	BAR ANDINGO	1	1	2	30	MAWEMBE KODERO	2	0	2	54	SABAKO	2	0	2
7	BAR UNION	3	0	3	31	MBAKA OROMO	0	2	2	55	SABEMBE	1	1	2
8	BARA	2	0	2	32	MBOTO SUNRISE	0	0	0	56	SANGAWINYA	0	0	0
9	CHULAIMBO	0	2	2	33	MKENDWA	0	2	2	57	SIANDA	2	0	2
10	DVT OSIRI	1	2	3	34	NAWA	1	0	1	58	SIDIKA	0	0	0
11	DAGO KOKORE	1	1	2	35	NGEGE	1	0	1	59	SINYOLO	2	1	3
12	DWELE	1	1	2	36	NYADUONG	0	0	0	60	OLUOWA	2	2	4
13	ELUHOBE	2	0	2	37	NYAKONGO	3	1	4	61	ST. ALOYS OJOLA	2	1	3
14	ESIVALU	2	0	2	38	NYAKUNE	0	0	0	62	SUNGA J	0	2	2
15	GETA JNR	0	0	0	39	NYANGINJA	1	1	2	63	THIM BONDE	0	3	3
16	GOMBE KOKULO	1	1	2	40	NYAWARA	1	2	3	64	TIENGRE	2	1	3
17	GONGO	1	1	2	41	OBAMBO	2	1	3	65	ULALO	1	1	2
18	HUMA	1	1	2	42	OBEDE	0	2	2	66	URADI	0	2	2
19	KAWINO	2	1	3	43	OCHOK KADONGO	1	2	3	67	USARI	2	1	3
20	KIBWAYI	1	1	2	44	ODOWA	1	0	1	68	USOMA	0	2	2
21	KIREMBE	1	1	2	45	OGADA	1	2	3	69	WACHARA	2	0	2
22	OKORE OGONDA	2	1	3	46	OGAL	0	2	2	70	WANDERA PR	0	0	0
23	KUOYO	2	1	3	47	OGONGO	2	0	2	71	DAGO THIM	1	1	2
24	LISUKA	1	1	2	48	KANYAMEDHA	2	2	4	72	KODIAGA	0	2	2
										73	KOTETNI	3	1	4
											<b>TOTAL</b>			<b>150</b>

A simple random sampling (SRS) was used to select the 109 teachers to be interviewed. The SRS technique was used because it ensured that every teacher has an equal probability of being included in the sample, thereby eliminating selection bias. Simple random sampling ensures that every individual in the population has an equal chance of selection, leading to a sample that reflects the population's natural variability. Purposive sampling was used to select the 6 head-teachers who participated in the qualitative interviews. Both male and female teachers of different age categories were included in the sample.

### **3.4 Data Collection Methods**

This research aimed to collect both qualitative and quantitative data. The researcher made use of self-administered questionnaires that were administered to the teachers and recorded telephone interviews for headteachers.

#### **3.4.1 Questionnaire**

The questionnaire was constructed around the study's objectives. Section A provided background information on the respondents. Section B had questions covering both the independent and dependent variables. The first segment of Section B focused on ICT infrastructure, the second on teacher capacitation, the third on teacher's perception. The questions were closed-ended to facilitate effective and accurate data analysis.

A Likert scale was used to assess each aim. A digital survey was created within Kobo toolbox data collection software. A link to the electronic tool was then generated and shared via email or messenger application only to the eligible respondents. Upon receiving the link, the respondents filled the questionnaire and submitted their responses to a Kobo Collect server, hosted within a password-protected computer. The link was invalidated after two weeks. The researcher was convinced that the data provided during this period was adequate for the study.

### **3.4.2 Interviews**

The study also adopted the use of recorded telephone interviews with headteachers to understand the respondent's feelings, opinions, and attitudes toward the study. Data such as the ratio of computers to students and challenges in adopting ICT in CBC implementation were derived from these interviews. These questions were derived from the objectives of the study. This study adopted the use of the interviews of the mixed method approach, that assisted in collecting qualitative data. Using interviews complemented the quantitative findings and helped the researcher get an in-depth understanding of the study.

### **3.5 Data Analysis**

The use of the digital Kobo Toolbox ensured minimal data errors. The data collected through the electronic tool was exported to Microsoft Excel. Data cleaning and validation was done within Microsoft Excel. Quantitative and qualitative data analysis were carried out thematically and inferentially. A combination of empirical and ethnographic methods was used to analyze and interpret data. STATA version 17 was used for the analysis of quantitative data. The investigator intended to conduct both descriptive and inferential statistical analyses. The questionnaire consisted of continuous, nominal and ordinal variables. Measures of central tendency such as the mean, mode and median were used to summarize the quantitative data. To determine the spread of continuous variables, standard deviation was computed. Correlation analyses was conducted to determine the relationship between continuous variables. Regression analysis was also conducted to determine the relationship between independent and multi independent variables.

The data was analysed was analysed and presented in tables and figures. Qualitative data was collected summarised and coded accordingly. The coded qualitative data was entered into the Statistical Package for Social Sciences (SPSS) and analysed. Further, the qualitative was transcribed and organised into themes, categories and sub-categories and reported. All

quantitative data analyses were carried out using globally recognized statistical software (STATA version 17.0) to enhance data accuracy and quality. All quantitative statistical significance was reported at 95% confidence level.

### **3.6 Research Quality (Validity, Reliability and Objectivity of the Research)**

A pilot study was conducted to determine the validity of the instrument. The process of pre-testing the instrument was done in a neighboring Sub-County, Seme, outside the area of study but with similar conditions. The two schools selected for piloting were, therefore, not part of the schools sampled for the study. The respondents were purposively selected from experienced teachers who were asked to comment on the relevance of the content, clarity of the questions, and the time taken to complete the questionnaire designed for this study. Construct and content validity were ascertained by experts in the Department of Education, Strathmore University. Reliability of the instruments was calculated by test-retest method with a reliability index being calculated using Cronbach's alpha. A score of 0.7 and above showed the instrument as reliable.

### **3.7 Ethical Considerations**

Since the study is qualitative and quantitative in nature, the data was collected from both primary and secondary sources. The research complied with the rules established by the National Commission for Science and Technological Innovations (NACOSTI) and the Strathmore Ethical Review Board. The study also upheld anonymity and confidentiality. To increase anonymity, the respondents were not obliged to put their names on the form. The participation of all respondents involved was voluntary. Additionally, respondents had the freedom to select which questions to answer or even to decline to participate.

## Chapter 4: Presentation of Research Findings

### 4.1 Introduction

This chapter presents the findings of the study, focusing on the reliability of the instruments, demographic characteristics of respondents, item-by-item analysis of study variables, and the results of multivariate linear regression. The study employed a mixed-methods research design, combining quantitative and qualitative data collection techniques. Structured questionnaires and semi-structured interviews were used to gather data from teachers involved in ICT integration within the Competency-Based Curriculum (CBC) framework in public junior secondary schools in Kisumu West. The quantitative data were analysed using STATA version 17, while qualitative data were thematically analysed to provide deeper insights into teachers' experiences and perceptions.

This section contains the findings of the study, indicating the reliability results, respondent's demographic characteristics, item-by-item description of the study variables, and the results of the multivariate linear regression. The design and implementation of this study incorporated a systematic approach to the presentation of data gathered from public junior secondary schools in Kisumu West. Utilising a mixed-methods research design, both quantitative and qualitative data were collected through structured questionnaires and semi-structured interviews targeting teachers involved in ICT integration within the Competency-Based Curriculum (CBC) framework. The quantitative data, analysed using Statistical Package for Social Sciences (SPSS), revealed patterns regarding the frequency and nature of ICT usage among teachers, with specific emphasis on how their pedagogical practices were influenced by digital tools (Barajas *et al.*, 2024).

The integration of ICT in education has been widely recognised as a critical factor in enhancing teaching and learning outcomes (Pelgrum, 2001; UNESCO, 2011). However, the successful implementation of ICT in education depends on several factors, including

infrastructure, teacher preparedness, and digital perception (Bingimlas, 2009). This chapter explores these factors in the context of CBC implementation in Kenya, providing a comprehensive analysis of the challenges and opportunities faced by teachers.

#### 4.2 Reliability Results

The reliability of instruments used for measurement was assessed using Cronbach’s alpha. As shown in Table 4.1, all constructs had Cronbach’s alpha values above 0.7, indicating acceptable reliability (Nunnally, 1978).

The results indicate that the constructs measured had Cronbach’s alpha value above 0.7, which is the acceptable threshold; indicating that the scales used reliably measured the constructs of interest.

**Table 4.1: Data Reliability**

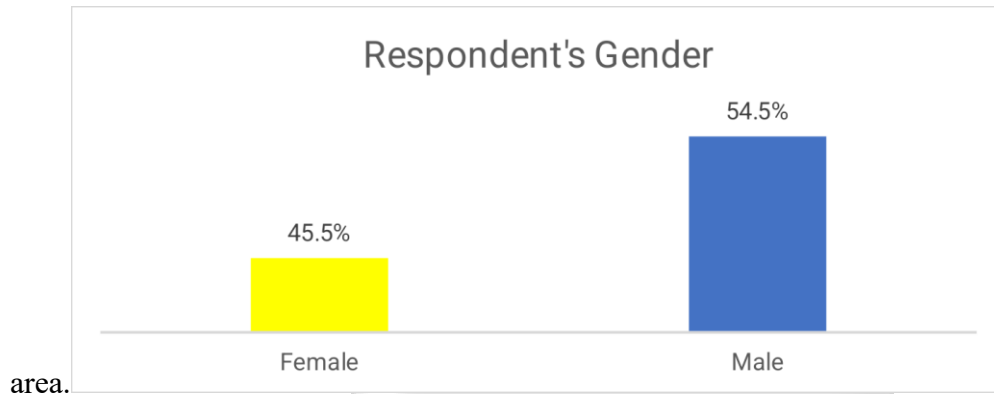
No.	Constructs	Number of items	Cronbach's Alpha Value
1.	<b>Infrastructure in Relation to Implementation of Competency-Based Curriculum</b>	5	0.90
2.	<b>Teacher Preparedness in the Use of ICT in the Implementation of CBC</b>	5	0.83
3.	<b>Impact of Digital perception on the Implementation of CBC in Public Schools</b>	5	0.80
4.	<b>Use of ICT in implementation of CBC</b>	5	0.85

The high-reliability scores suggest that the instruments consistently measured the intended constructs, providing a solid foundation for further analysis.

#### 4.3 Demographic Information

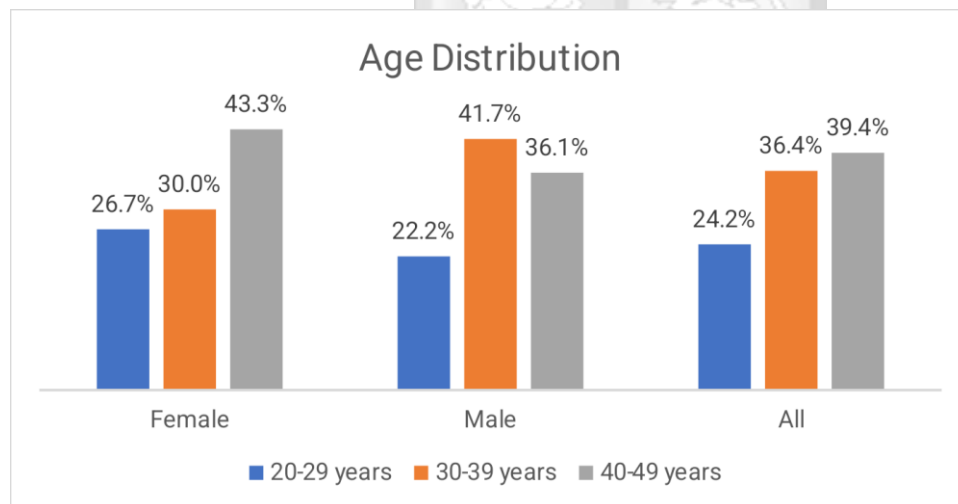
A total of 100 teachers participated in the study, representing a 92% response rate. Of these 54 (54.5%) were male and the rest 46 (45.45%) female as shown in figure 4.1 below. 9 questionnaires representing 8% of questionnaires distributed to the respondents were not completed. A 92% response rate facilitated the collection of adequate data reflecting

respondents' opinions. This aligns with Graham (2002), who asserted that a response rate exceeding 30% to 50% of the total sample size is sufficient for gathering data that can be generalized to represent the perspectives of the target population on the study's focus



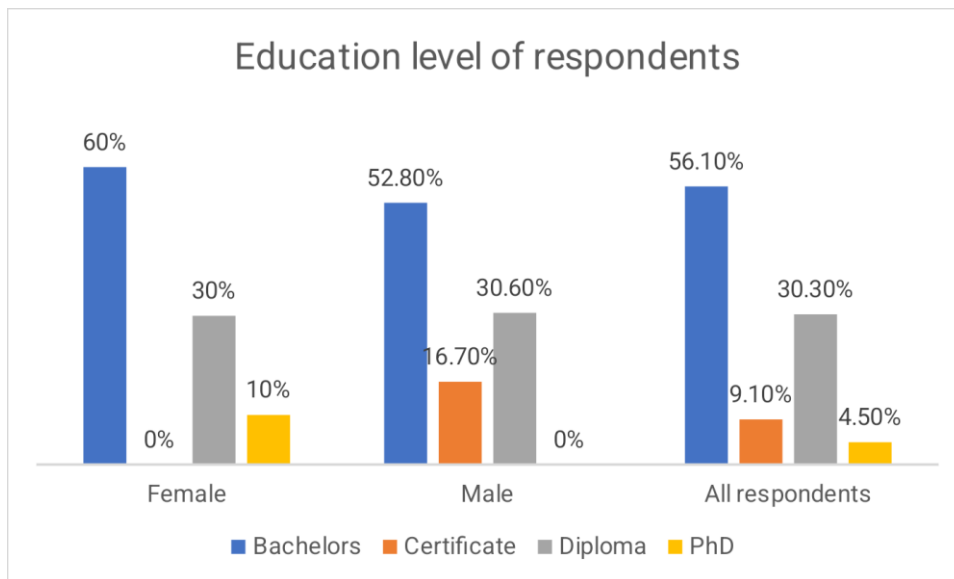
**Figure 4.1: Gender Distribution of Respondents**

The majority of the respondents were aged 40-49 years (39.4%) followed by those aged 30-39 (36.4%) and 20-29 years (24.2%), as shown in Figure 4.2.



**Figure 4.2: Age Distribution of respondents**

In terms of education level, 56.1% of the teachers held a Bachelor's degree, 30.3% had a Diploma, 9.1% had a Certificate, and less than 5% had advanced degrees (Master's or PhD). This distribution is consistent with findings from other studies in sub-Saharan Africa, where a significant proportion of teachers hold undergraduate qualifications (Unwin *et al.*, 2010).



**Figure 4.3: Education Level of Respondents**

Six participants were interviewed. Half of the respondents aged between 20-29 years and the other half aged 30-39 years. Five participants held a Bachelor's degree, and one had a Certificate in Primary Teacher Education. Teaching experience varied; four participants had served for five or fewer years and two had served for more than five years.

**Table 4.2: ICT Infrastructure in Relation to Implementation of Competency-Based Curriculum**

No.	Infrastructure in Relation to Implementation of Competency-Based Curriculum	Mean	SD
1.	The school has well equipped ICT lab for use by students	2.33	1.26
2.	All departments are equipped with computers	2.03	0.99
3.	The computers have all the relevant and necessary software that is modern and up-to-date	2.32	1.17
4.	The computers are interconnected via a computer network	2.09	1.19
5.	The computers are enough for all students	1.98	0.98

The results shown in Table 4.2 above indicate that the respondents disagreed that schools had well-equipped ICT laboratories for use by students (Mean = 2.33, SD = 1.26), that all departments were equipped with computers (Mean = 2.03, SD= 0.99), that the computers had all the relevant and necessary software that was modern and up to date, the computers were

interconnected via a computer network (Mean = 2.09, SD = 1.19), and that the computers were enough for all students (mean = 1.98, SD = 0.98).

**Table 4.3: Teacher Capacity for ICT Use in the Implementation of CBC**

No.	Teacher Capacity for ICT use in the Implementation of CBC	Mean	SD
1.	I have the necessary ICT skills required for teaching	3.8	1.08
2.	The Ministry of Education has facilitated my ICT training	2.73	1.31
3.	The school facilitates ICT training of teachers	2.83	1.22
4.	The training that I have received is relevant to my day-to-day teaching activities	3.17	1.33
5.	I have received at least one in-service training in the last one year	2.73	1.31

Similarly, the results from Table 4.3 show that teachers tended to be undecided on the provision of ICT training by the Ministry of Education (Mean = 2.73, SD = 1.31), and on schools facilitating their ICT training (Mean = 2.83, SD = 1.22). Many participants (aged between 30-39) indicated that the government did not adequately fund ICT training programs. In the last two years, the government had not initiated such training. Teachers were undecided on whether they had received at least one in-service training in the last one year (Mean = 2.73, SD = 1.31) and whether the training they had received was relevant to their day-to-day teaching activities (Mean = 3.17, SD = 1.33) as shown in Table 4.4.

**Table 4.4: Use of ICT in the Implementation of CBC**

No.	Use of ICT in the implementation of CBC	Mean	SD
1.	Teachers believe that ICT is the main driver of CBC	3.79	1.1
2.	Teachers have received relevant in-service training to enable the effective use of ICT in CBC	2.95	1.13
3.	The school has an ICT policy that supports integration in teaching and learning	2.92	1.21
4.	The school is adequately prepared to use ICT in its implementation of CBC.	2.89	1.24
5.	Public junior secondary schools in Kisumu West have embraced a school-based digital culture for the use of ICT in the implementation of CBC	2.76	1.25

Table 4.4 above shows that teachers agreed that ICT is the main driver of CBC (Mean = 3.79, SD=1.1). Teachers did not provide straightforward responses to this question; they were not

quite sure what ICT policy entailed. Based on their responses, it was difficult to tell whether or not public junior secondary schools in this area had ICT policies that supported integration in teaching and learning (Mean =2.92, SD =1.2). Similarly, teachers were undecided on whether or not schools were adequately prepared to use ICT in CBC implementation (Mean = 2.89, SD =1.24).

#### **4.4 Relationship between Teachers' Use of ICT and Teachers' Capacitation**

##### **4.4.1. Introduction**

The focus of the regression analysis was to demonstrate the relationship between teachers' use of ICT and their capacitation.

##### **4.4.2 Multivariate Regression Results**

Multivariable regression analysis was fitted to determine the association between dependent and independent variables. The linear regression model is presented below:

$$Y = \beta_0 + \beta_1X_1 + \beta_2X_2 + \beta_3X_3 + \beta_4X_4 + \varepsilon$$

Where Y is the teacher's use of ICT,  $\beta_0$  is constant and  $\varepsilon$  is the error term of the model.

X1 = Teacher's capacity

X2 = Teacher's age

X1 = Teacher's gender

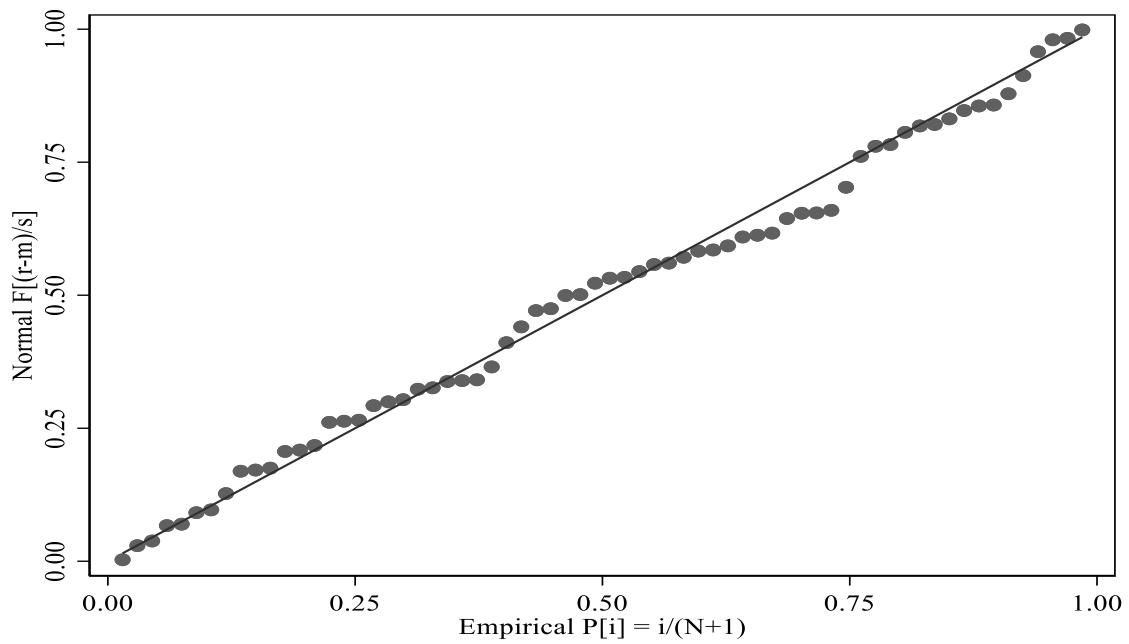
X2 = Teacher's education level

##### **4.4.3 Test of Assumptions of Regression Analysis**

Regression analysis can only be performed once the assumptions of normality, linearity, independence, and multicollinearity are not violated. Several tests were conducted as shown in the following subsections. A normality test was conducted to determine whether the sample data follows a normal distribution. A normal probability plot was constructed to show expected normal values against the actual (observed) normal values. A normally distributed data will be shown when actual values line up along the diagonal line joining the lower left to

the upper right.

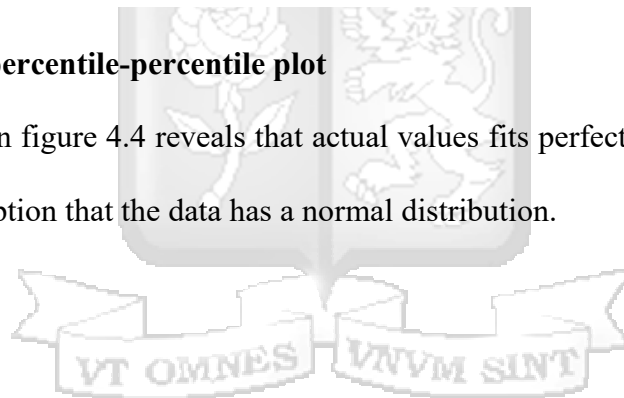
### Normal P-P Plot

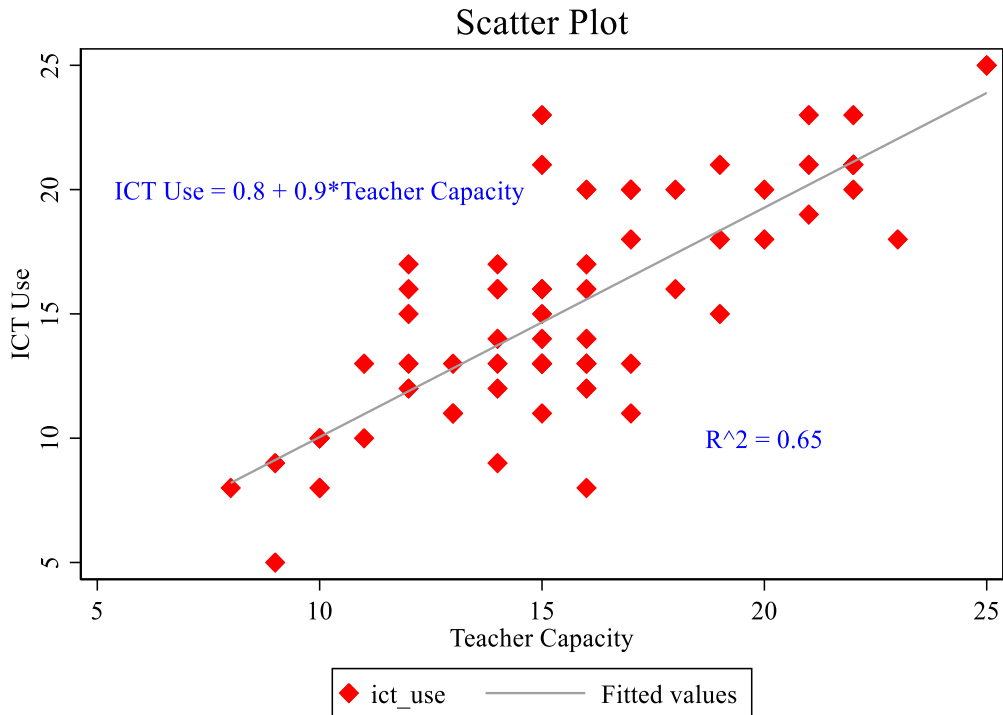


**Figure 4.4: Normal percentile-percentile plot**

The normal P-P plot in figure 4.4 reveals that actual values fits perfectly on the diagonal line confirming the assumption that the data has a normal distribution.

Scatter plot





**Figure 4.5: Scatter plot**

The associated linear regression equation is  $y = 0.8 + 0.9x$ .

The coefficient of determination,  $R^2 = 0.65$  indicates that a relatively average fit exists. The straight line through the data points indicates that a linear relationship exists.

**Table 4.5: Collinearity Test with ICT Use as Dependent Variable**

Independent Variable	Collinearity statistics	
	VIF	Tolerance
Teacher Capacity	1.21	0.83
Age		
30-39y	1.71	0.59
40-49y	1.68	0.60
Gender	1.17	0.86
Education Level		
Diploma	3.67	0.27
Bachelors	3.84	0.26
Masters/PhD	1.75	0.57

This study used the variance inflation factor (VIF) to help identify multicollinearity. Variance inflation factor is measured as  $1/1-R^2$ , and tolerance is measured as  $1/VIF$ . Very small tolerance values (less than .10) indicate that the multiple correlation with other variables is

high, suggesting the possibility of multicollinearity. The variance inflation factor provides a measure of how much the variance for a given regression coefficient is increased compared to if all predictors were uncorrelated (Abowitz & Toole, 2010). Large VIF shows that a given predictor is highly correlated with the remaining predictors. Santos (1999) suggests that VIF > 10 shows multicollinearity exists. Table shows the regression of the independent variables and the dependent variable. All the VIF values were found to be <5, which is the default VIF cut-off, and only independent variables with a VIF value < 5 can be included in the regression model. Additionally, all the tolerance values were found to be >0.1, indicating that the data set did not suffer from multicollinearity.

**Table 4.6: Model Summary**

Source	Sum of squares	Degrees of freedom	Mean sum of squares	Number of observations	=	66
				F (7, 58)	=	15.520
Model	928.673	7	132.668	Prob > F	=	0.000
Residual	495.645	58	8.546	R-squared	=	0.652
				Adj R-squared	=	0.610
<b>Total</b>	<b>1424.318</b>	<b>65</b>	<b>21.913</b>	<b>Root MSE</b>	=	<b>2.923</b>

Table 4.6 above displays the results of the model summary. The Fisher statistical probability (prob >F) from the table is 0.000, which is less than the set 5% significance level. The value indicates that the variables combined significantly predict the outcome and that the regression is a good fit for the data. The coefficient of determination is 0.652, indicating the predictors explain 65.2% of the total variance in the dependent variable.

**Table 4.7: Regression Summary**

Variable	Coefficient	P>t	[95% conf. interval]	
Teacher capacity	0.910	0.000	0.713	1.107
(Teacher capacity is only one of three independent variables. Were the other two i.e. availability of ICT infrastructure and impact of digital perception included in the multiple regression? The intervening variables in the conceptual framework are also not included in the regression e.g. years of experience).				
<b>Age category</b>				
20-29y	Reference			
30-39y	0.275	0.779	-1.682	2.232
40-49y	-0.073	0.939	-1.984	1.838
<b>Gender</b>				
Male	Reference			
Female	-0.754	0.338	-2.317	0.809
<b>Education level</b>				
Certificate	Reference			
Diploma	1.187	0.432	-1.817	4.191
Bachelors	0.765	0.592	-2.079	3.609
Masters/PhD	2.456	0.287	-2.118	7.031
Constant	0.393	0.798	-2.667	3.452

The prediction equation is  $Y = 0.393 + 0.910 \cdot \text{Teacher Capacity} + 0.275 \cdot \text{age category 30-39y} - 0.073 \cdot \text{age category 40-49y} - 0.754 \cdot \text{Female} + 1.187 \cdot \text{Diploma} + 0.765 \cdot \text{Bachelors} + 2.456 \cdot \text{Masters/PhD}$ .

Table 4.7 above shows the regression results. This study section evaluated the relationship between teacher's capacity and ICT use, adjusting for teacher demographic characteristics such as age, gender, and education level. The results show that there is a positive correlation between teacher capacity and ICT use in CBC implementation (Beta coefficient = 0.91, Confidence interval = 0.7-1.1). The corresponding p-value is 0.000 which is less than 5%, indicating that improved teacher capacity significantly enhances ICT use in CBC implementation in the public junior secondary schools.

#### 4.5 Qualitative Sample Description

This section presents the analysis of the qualitative component of the study. Data were collected through audio recordings until saturation (this needs to be well-explained given the sample size for key informant interviews) was reached, after which transcription and coding were conducted using NVIVO software (This should have been introduced in Chapter 3) . The findings are systematically presented in tabular format.

#### Key Themes Emerging from the Data

**Table 4.8: Perceived ICT Infrastructure on Implementation of Competency-Based Curriculum**

Quote/Citation	N	Summary	Meaning
<i>“There is no of computer labs with fewer computers in our school?”</i> <i>“We don’t have computer labs”</i> <i>“We have minimum equipment, mostly not working and not modern”</i> <i>“In our school, the renovation was done by Safaricom, and we have 70 computers though it’s not enough to serve all students and teacher”</i> <i>“We have very few computers that are rarely in use”</i>	8	Most schools have poor infrastructure that can fully support the implementation of ICT integration in CBC	Most schools from area under study haven’t fully integrated ICT in CBC curriculum

The implementation of the Competency-Based Curriculum (CBC) is predicated on the integration of digital resources and interactive pedagogies, necessitating a robust ICT infrastructure. The results in Table 4.8 indicate that respondents disagreed that schools had well-equipped ICT labs, sufficient computers, or up-to-date software. These findings align with previous studies highlighting the lack of adequate ICT infrastructure in many African schools (Hennessy et al., 2010).

Respondents consistently articulated concerns regarding the scarcity and functionality of available technology. For instance, one respondent explicitly stated, “There are no computer labs with fewer computers in our school,” highlighting the fundamental lack of dedicated

spaces for digital learning. This sentiment was echoed by another participant who simply reported, “We don’t have computer labs,” underscoring the stark reality of limited access.

Moreover, the quality and functionality of existing equipment were frequently questioned. Participants described experiencing “minimum equipment, mostly not working and not modern,” signifying a critical gap between the curriculum's technological demands and the available resources. While some schools reported intermittent improvements, such as renovations facilitated by external entities, as exemplified by the participant who stated, “In our school, the renovation was done by Safaricom, and we have 70 computers though it’s not enough to serve all students and teacher,” these instances were deemed insufficient to address the broader infrastructural deficits. Even when computers were present, their utilization was often limited, as evidenced by the comment, “We have very few computers that are rarely in use,” suggesting potential issues with maintenance, accessibility, or teacher proficiency in integrating technology into pedagogical practices.

These findings collectively indicate that the perceived inadequacy and dysfunctionality of ICT infrastructure significantly impede the effective implementation of the CBC. The reported lack of computer labs, insufficient functional devices, and inconsistent access create a digital divide, hindering the development of essential 21st-century skills among students. The reliance of the CBC on digital resources necessitates a critical examination of the existing infrastructure, as the current situation poses a substantial challenge to achieving the curriculum’s intended learning outcomes. This disparity not only restricts students' opportunities to engage in digital projects, research, and collaborative learning but also raises concerns about equity and access to quality education. Furthermore, the limited availability of functional technology impacts teachers' ability to effectively integrate digital tools into their teaching practices, potentially leading to frustration and discouragement. The need for a comprehensive and sustainable approach to investing in and maintaining ICT infrastructure is

paramount to ensure the successful and equitable implementation of the CBC.

**Table 4.9: Perception on teachers Preparedness in the Use of ICT in the Implementation of CBC**

Quote/Citation	N	Summary	Meaning
<p><i>“In our school we have minimal access to ICT resources, thus we are not very prepared”</i></p> <p><i>“Not all teachers are trained in ICT, very few can be considered proficient, majority are at basic level”</i></p> <p><i>“Minimal government training of ICT to teachers, since I joined the school, we have only been trained once.”</i></p> <p><i>“The school does not offer ICT training at all”</i></p> <p><i>“Teachers have minimal or no skill at all since there are no ICT infrastructure”</i></p>	8	<p>Inadequate skills by trainers to handle ICT</p> <p>Lack of basic infrastructure to support ICT implementation</p>	Teachers have minimal skills and know-how of ICT related issues

The successful integration of ICT into the Competency-Based Curriculum (CBC) relies heavily on the preparedness of teachers to effectively utilize digital tools and resources. However, the data gathered from participating schools reveals a pervasive perception of inadequate teacher readiness. Participants consistently expressed concerns regarding their ability to leverage ICT for pedagogical purposes. As one teacher articulated, “In our school we have minimal access to ICT resources, thus we are not very prepared,” highlighting the direct correlation between infrastructural limitations and teacher confidence. This sentiment was further reinforced by the observation that “Not all teachers are trained in ICT, very few can be considered proficient, the majority are at basic level,” indicating a significant gap in teacher competency.

The perceived lack of preparedness is further compounded by the infrequent and inconsistent provision of ICT training. Participants reported a dearth of opportunities for professional development, with one teacher noting, “Minimal government training of ICT to teachers, since I joined the school, we have only been trained once.” In some instances, schools were

reported to offer no ICT training at all, as evidenced by the statement, “The school does not offer ICT training at all,” demonstrating a critical failure to equip teachers with the necessary skills. This lack of training, coupled with the previously discussed infrastructural deficits, results in a situation where “Teachers have minimal or no skill at all since there are no ICT infrastructure.”

The cumulative effect of limited access, inadequate training, and low proficiency is a significant impediment to the effective implementation of the CBC.

The findings suggest that teachers perceive themselves as underprepared to integrate ICT into their teaching practices, which in turn hinders the realisation of the curriculum's intended technological integration. This lack of preparedness not only affects the quality of instruction but also limits students' opportunities to develop essential 21st-century skills. Addressing this issue necessitates a concerted effort to provide teachers with access to robust ICT resources and comprehensive training programs, thereby ensuring their readiness to effectively utilize technology in the delivery of the CBC.

**Table 4.10: Perception on the Influence of ICT on the Implementation of CBC in Public Schools**

Quote/Citation	N	Summary	Meaning
<i>“I rarely use ICT in my preparation and delivery content.”</i> <i>“In our school, we have not integrated ICT into teaching, so I don’t use it”</i> <i>“We don’t use very much in terms of teaching and learning”</i> <i>“Yes, in our school, we have integrated ICT and thus we use it”</i> <i>“We don’t use it very much, but we are trying”</i>	5	Very usage of ICT in teaching Not using ICT at all	The teachers haven’t fully conceptualized the use of ICT in their various schools

The intended integration of ICT into the Competency-Based Curriculum (CBC) aims to transform teaching and learning practices. However, the perceived impact of ICT in public schools presents a complex and varied landscape. Participants' responses reveal a significant

disparity in the extent to which technology is being utilized in pedagogical practices. For instance, several teachers reported a near-total absence of ICT integration, with one stating, “I rarely use ICT in my preparation and delivery content.” This sentiment was echoed by another participant who indicated, “In our school, we have not integrated ICT into teaching, so I don’t use it,” and further reinforced by the general observation, “We don’t use very much in terms of teaching and learning.” These statements collectively highlight a substantial disconnect between the curriculum’s technological aspirations and the actual practices observed in many classrooms.

Conversely, a minority of participants reported successful integration of ICT, as evidenced by the comment, “Yes, in our school, we have integrated ICT and thus we use it.” However, this positive perception was not widespread, and many schools appear to be in a transitional phase. As one teacher noted, “We don’t use it very much, but we are trying,” indicating a nascent effort to incorporate ICT into teaching and learning. This variability underscores the challenges associated with implementing technology-driven curricula in diverse school settings.

The findings suggest that the perceived impact of ICT on CBC implementation is far from uniform. The range of responses, from complete non-utilisation to tentative integration, reveals a substantial gap between the curriculum's intended technological emphasis and the realities of pedagogical practice. This gap can be attributed to several factors, including the previously discussed issues of inadequate infrastructure and teacher preparedness. The disparity in ICT integration raises concerns about the equitable delivery of the CBC and the extent to which students are developing essential 21st-century skills. Addressing this issue requires a concerted effort to provide schools with the necessary resources, training, and support to effectively integrate ICT into teaching and learning, thereby ensuring the successful implementation of the curriculum.

**Table 4.11: Perception on the Use of ICT in the Implementation of CBC**

<b>Quote/Citation</b>	<b>N</b>	<b>Summary</b>	<b>Meaning</b>
<i>“We are poorly prepared in ICT aspects, very few schools are well equipped”</i> <i>“We are not prepared at all”</i> <i>“Not very much prepared in use of ICT to implement CBC curriculum”</i> <i>“Schools have not embraced ICT due to lack of resources like computers and laptops”</i>	5	Limited use of ICT Absence of resources Not prepared at all	Most participants have shown lack of preparedness in the implementation of ICT in CBC

A critical examination of the Competency-Based Curriculum's (CBC) implementation reveals a consistent narrative: educators perceive themselves as significantly underprepared for the effective utilization of ICT. This perceived inadequacy, a recurring theme throughout participant responses, underscores a systemic challenge in integrating technology into pedagogical practices. One participant bluntly stated, “We are poorly prepared in ICT aspects, very few schools are well equipped,” highlighting the pervasive nature of this concern. This sentiment was not isolated; responses such as, “We are not prepared at all,” and “Not very much prepared in use of ICT to implement CBC curriculum,” further solidified the perception of a widespread lack of readiness.

The root cause of this perceived unpreparedness is inextricably linked to the scarcity of essential resources, notably computers and laptops. Participants consistently cited this deficiency as a major obstacle to ICT integration. As articulated by one educator, “Schools have not embraced ICT due to lack of resources like computers and laptops,” the direct correlation between resource availability and technology adoption is undeniable. This deficiency, however, transcends mere hardware limitations, encompassing a broader lack of ICT integration within school systems.

Consequently, the consistent perception of inadequate preparedness for ICT utilization in the CBC presents a formidable impediment to the effective deployment of technology-driven

pedagogical practices. The systemic lack of resources and insufficient integration creates a challenging environment for educators attempting to implement the curriculum's technological components. This perceived lack of readiness not only affects the quality of instruction but also limits students' opportunities to develop essential digital skills. Addressing this issue necessitates a comprehensive approach that includes providing schools with adequate resources, fostering a culture of ICT integration, and offering ongoing professional development to educators. By addressing these challenges, public schools can better leverage ICT to enhance the implementation of the CBC and ensure equitable access to quality education

**Table 4.12: Views on Internet Connectivity in Public Junior Secondary Schools**

<b>Quote/Citation</b>	<b>N</b>	<b>Summary</b>	<b>Meaning</b>
<i>“No internet connectivity, very weak Wi-Fi within the school”</i> <i>“We don’t have internet in our school”</i> <i>“There is no internet connection in our school”</i> <i>“Network not stable, Wi-Fi on and off”</i> <i>“We have internet connectivity though not very strong”</i> <i>“We have no internet connection at all; thus, it is difficult to use ICT”</i>	6	Absence of internet connectivity Weak network	Absence of strong internet connectivity in majority of the schools under the study

The contemporary educational landscape, particularly within the framework of the Competency-Based Curriculum (CBC), necessitates robust internet connectivity to facilitate digitally enhanced learning experiences. However, the findings of this study reveal a stark reality: internet connectivity within participating schools is severely compromised. A prevailing sentiment among respondents is the complete absence of internet access. Participants reported, “No internet connectivity, very weak Wi-Fi within the school,” “We don’t have internet in our school,” and “There is no internet connection in our school,” illustrating a systemic deficiency.

Even in instances where connectivity was reported, its reliability was consistently questioned. Participants described experiencing “Network not stable, Wi-Fi on and off,” and “We have internet connectivity though not very strong,” indicating a persistent challenge in maintaining a consistent and functional connection. This instability severely limits the potential for effective ICT integration, as one respondent articulated, “We have no internet connection at all; thus, it is difficult to use ICT.”

The consistent reports of absent or unreliable internet connectivity highlight a critical impediment to the implementation of the CBC. The lack of stable internet access restricts students' and teachers' ability to utilize online resources, engage in digital learning activities, and access up-to-date information. This deficiency not only affects the quality of instruction but also limits the development of essential digital literacy skills. The pervasive lack of reliable internet connectivity underscores the need for a concerted effort to improve infrastructure and ensure equitable access to digital resources within public schools. Addressing this challenge is crucial for the successful integration of ICT in the CBC and the realization of its intended learning outcomes.

The qualitative findings corroborate the quantitative results, revealing a systemic pattern of obstacles to the successful integration of ICT in the Competency-Based Curriculum. These obstacles, including teacher preparedness shortfalls, infrastructural deficiencies, internet connectivity issues, and resource scarcity, significantly impede the realization of technology-enhanced learning environments in the studied schools. These findings highlight significant challenges in ICT infrastructure, teacher preparedness, and policy implementation. These challenges are consistent with those identified in other developing countries (Farrell & Isaacs, 2007). However, the positive perception of ICT's impact on CBC implementation suggests that with adequate support, teachers are willing to embrace digital tools in their teaching practices.

## Chapter 5: Discussion

### 5.1 Introduction

The use of ICT in implementing CBC in public junior secondary schools' entails infusing digital instruments such as computers, tablets, mobile phones, projectors, and the internet into teaching and learning activities, opening room for innovative teaching techniques, improved learner involvement, and access to a variety of learning resources. There are nine learning areas in the junior secondary school curriculum: English, Kiswahili, Mathematics, Integrated Science, Pre-Technical Studies, Agriculture, Social Studies, Religious Education and Creative Arts and Sports. (This information would be useful in the introduction). The discussion of the results of this study is underpinned by the principles of constructivist learning theory (Elliott *et al.*, 2000) and the Technology Acceptance Model (TAM) (Davis, 1989). Arguments and counterarguments have been advanced to demonstrate the suitability of the tenets of the two theoretical models in analysing the primary and secondary data of this research. For the purposes of comparative analysis, references have been made to existing scholarly works. This review of relevant literature is crucial in supporting scholarly arguments. This discussion focuses on the status of infrastructure, teacher capacity, and the existence of a digital perceptions that is facilitative of learners' active involvement in generating knowledge and prior interaction with new information on ICT platforms.

As shown in the results highlighted in the previous section of this chapter, many public junior secondary schools in Kisumu West Sub-County did not have enough ICT resources to implement CBC effectively. Studies from various educational contexts demonstrate that while teachers often recognize the potential benefits of ICT, practical challenges such as inadequate training and access overshadow their ability to implement these tools effectively (Dullah *et al.*, 2024). The current study builds upon these insights, revealing that teacher preparedness significantly impacts the effective incorporation of ICT in the CBC framework

(Mokganya *et al.*, 2024). Thus, the significance of these findings extends beyond mere statistical outputs; they underscore an urgent need for robust initiatives aimed at enhancing ICT proficiency among educators (Syukriet *et al.*, 2024).

Infrastructurally speaking, there is a need for a significant investment in this area. Passive absorption of knowledge, a learning habit contested by Elliott *et al.* (2000), appeared to be the norm in most PJSS in this sub-county. Unreliable and/ or absence of internet connectivity negatively impacted access to online libraries and databases for research, educational videos and multimedia presentations, e-books and digital texts, and limited opportunities for collaborative learning activities by way of interactive whiteboards.

Public junior secondary school teachers were not sufficiently capacitated in ICT use. While most teachers acknowledged the potential of ICT to enhance learning outcomes, obstacles such as inadequate training and insufficient access to technological resources emerged as significant barriers (Opoku-Afriyie *et al.*, 2024). These challenges resonate with findings from other educational settings, where teachers often cite similar issues while navigating the integration of ICT into their curricula (Irungu *et al.*, 2024). Moreover, the thematic analysis of qualitative data revealed that teachers expressed a lack of confidence in their ability to utilize ICT effectively in their instructional design, corroborating the conclusions of past research that emphasizes the crucial role of professional development in fostering educators' technological proficiency (Dullah *et al.*, 2024). The implications of these findings are profound, suggesting that a more structured approach to teacher training could enhance not only confidence but also implementation strategies that leverage ICT for improved educational outcomes (Mokganya *et al.*, 2024).

The Ministry of Education and relevant state agencies, like the Teachers Service Commission, had not facilitated in-service training on the use of ICT for onboarding junior

secondary school teachers. Most teachers relied on the skills they had acquired in the higher institutions of learning (colleges and universities). These were largely general ICT skills; they did not match the pedagogical needs of these schools. The integration of Information and Communication Technology (ICT) into the Competency-Based Curriculum (CBC) framework represents a critical shift in educational practices within public junior secondary schools in Kenya. Findings from the study illustrate that despite the recognition of the potential benefits of ICT, teachers face substantial challenges in its effective implementation. Predominantly, obstacles such as inadequate training in ICT use and a lack of technological resources were identified, with many teachers expressing feelings of insecurity regarding their ability to integrate these tools into instructional practices (Barajas et al., 2024). This sentiment is compounded by the limited availability of infrastructure, such as reliable internet access and functional equipment, which significantly hinders the constructive use of ICT in classrooms (Ainoutdinova *et al.*, 2022).

In many public junior secondary schools, some learning areas were taught by primary school teachers. These teachers were ill-prepared to teach junior secondary school teachers. Though a number of them had pursued further education, none of them had been retooled to handle learners at this level. These complicated transitional challenges. Besides, there were hardly any digital cultures necessary to sustain ICT use in implementing CBC in junior secondary schools in Kisumu West Sub-County.

Public junior secondary schools in Kisumu West Sub-County sampled for this study did not have a digital culture. Perceptions of teachers negatively impacted on the use of ICT in the implementation of CBC in public junior secondary schools in Kisumu West Sub-County in Kisumu County. Many teachers did not believe that the government was keen on resourcing ICT-integrated teaching and learning public junior secondary schools. They attributed this to the Ministry of Education's reluctance to funding ICT infrastructure and in-service training

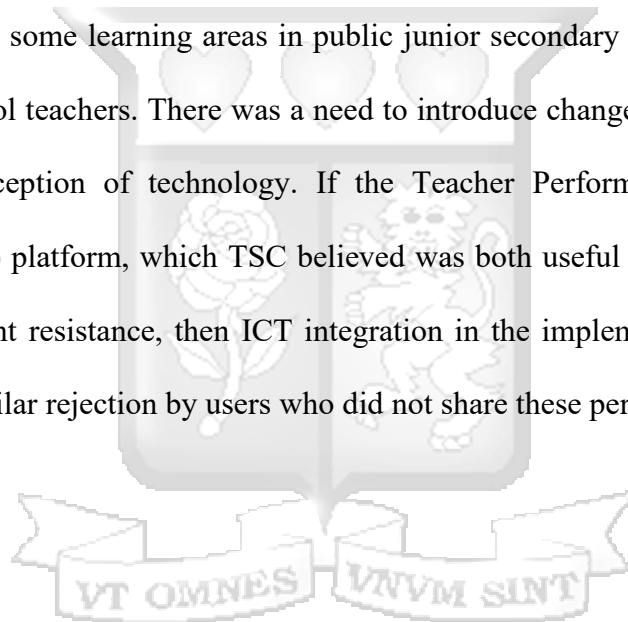
programmes. They, nonetheless, argued that there was an urgent for introduction of digital literacy lessons as digital competence required more ICT resources in public junior secondary schools. Whereas teachers admitted to using ICT in their lessons, albeit occasionally, most of them relied on resources such as phones, tablets, and laptops.

Many (This needs to be qualified) public junior secondary schools in this area did not offer literacy lessons on ICT. This was attributed to limited access to ICT resources in these schools. Consequently, teachers' and learners' use of ICT resources was irregular. Whereas government policies support the integration of ICT in education systems as observed by Wambiri and Ndani (2016), most teachers in public junior secondary in Kisumu West Sub-county were not sure whether their schools had ICT policies. Yet ICT is a critical pillar in CBC implementation. This indicated that these did not appreciate the centrality of policy formulation in laying a proper foundation for ICT integration in curriculum implementation. There was very limited investment in sensitizing PJSS teachers on the significance of ICT in implementing CBC. There was, nonetheless, a consensus that ICT was pivotal in the effective implementation of CBC.

Moreover, the qualitative analysis revealed that teachers reported feeling overwhelmed by the rapid pace of technological advancement, which diverts focus from pedagogical approaches to purely technical concerns (Irungu *et al.*, 2024). These barriers resonate with previous studies highlighting that the integration of ICT into education is frequently marred by both extrinsic and intrinsic factors that prevent successful adoption in resource-limited settings (Dullah *et al.*, 2024). The implications of these findings are profound; they suggest that without targeted professional development and a structured approach to resource allocation, the ambitious goals of the CBC may remain unattainable (Mokganya *et al.*, 2024). Furthermore, addressing these challenges through strategic policy development could

enhance not only teacher competency but also student engagement with the curriculum, ultimately leading to improved learning outcomes (Syukri *et al.*, 2024).

According to the Technology Acceptance Model (TAM), proposed by Davis (1989), two main factors influence whether users accept an ICT resource: (i) 'its perceived usefulness' and (ii) 'its perceived ease of use.' The HOIs that were interviewed during this study raised concerns about senior teachers, largely from the primary school section, who still relied on cybercafes to fill in and submit critical professional documents such as performance appraisal tools. This category of teachers believed that it was difficult to fill in such crucial documents online. Unfortunately, some learning areas in public junior secondary schools were assigned to these primary school teachers. There was a need to introduce change management training to enhance user perception of technology. If the Teacher Performance, Appraisal, and Development (TPAD) platform, which TSC believed was both useful and user-friendly, still encountered significant resistance, then ICT integration in the implementation of CBC was also likely to face similar rejection by users who did not share these perceptions.



## Chapter 6: Conclusion and Recommendations

### 6.1 Summary of Findings

The findings of this dissertation emphasise the critical role that Information and Communication Technology (ICT) plays in facilitating the implementation of the Competency-Based Curriculum (CBC) in public junior secondary schools in Kenya. Comprehensive analysis revealed that while teachers acknowledge the potential of ICT to enrich teaching and learning processes, many face significant challenges including inadequate training, limited access to resources, and insufficient institutional support (Barajas *et al.*, 2024). Addressing the research problem, this study highlighted the existing gap between the intended use of ICT in the curriculum and its actual implementation in the classroom, ultimately demonstrating that teachers' confidence and skills in utilizing technology can markedly influence student engagement and learning outcomes (Ainoutdinova *et al.*, 2022).

This study focused on teachers' use of ICT in the implementation of a Competency-Based Curriculum. To determine whether or not ICT resources were utilised in the implementation of the new curriculum in public junior secondary schools in Kenya; this sought to establish the availability of ICT infrastructure in these schools, whether or not junior secondary school teachers were capacitated to infuse ICT resources into teaching and learning and examine the existence of digital culture(s) necessary for sustaining the mainstreaming of ICT in curriculum implementation. This chapter provides a summary of the findings established, the conclusions drawn, and recommendations that can be auctioned to enhance the utilisation of ICT resources in the implementation of the new curriculum in public junior secondary schools in the country.

The three objectives of this study were: (i) to determine the availability of ICT infrastructure for implementation of CBC in public junior secondary schools in Kisumu West Sub-County in Kisumu County, Kenya, (ii) to establish teacher capacity for ICT use in the implementation

of CBC in public junior secondary schools in Kisumu West Sub-County in Kisumu County Kenya, and (iii) to examine the influence of teachers perceptions on the use of ICT in the implementation of CBC in public junior secondary schools in Kisumu West Sub-county in Kisumu County.

Schools did not have adequate ICT infrastructure for the implementation of a Competency-Based Curriculum. Data from the interviews conducted and the questionnaires administered demonstrated that the ICT infrastructure available in public junior secondary schools in Kisumu West Sub-County was not adequate for the effective implementation of CBC. ICT laboratories were not adequately equipped. From the observations made during this study, some schools did have an operational ICT laboratory. Many academic departments did not have functional computers. Whereas these computers were available in some departments, they neither had relevant nor updated software necessary for use by teachers in the implementation of the new curriculum. These computers were not interconnected; they were used as isolated ICT resources and a few teachers relied on individual internet connectivity.

Public junior secondary school teachers' knowledge, skills, and dispositions necessary for planning and delivering effective ICT-based instruction in implementing CBC were insufficient. Most of the teachers in public junior secondary schools in Kisumu West Sub-County had hardly undergone in-service training on the use of ICT in the implementation of CBC. From the interviews conducted during this study, teachers who indicated that they had participated in ICT training referred to the knowledge and skills acquired in higher institutions of learning. Some of these skills were not relevant to their day-to-day teaching activities. The Ministry of Education had not allocated resources for in-service training; public junior secondary schools were financially constrained and unable to facilitate this kind of training.

Majority of the teachers interviewed indicated that limited progress had been realised in the implementation of CBC in Kisumu West Sub-County. Many of them observed that the government was not committed to implementing CBC. Intervening variables such as age, experience and level of education influenced the perception of teachers in various ways. Teachers who had worked for long appeared reluctant to use ICT in implementing CBC, junior teachers, who were largely digitally literate, appreciated the need for ICT integration in the implementation of CBC; however, they were pessimistic about its effectiveness. Relatively younger teachers, who had benefited from ICT integration, particularly university graduates, believed ICT integration was key to implementing CBC in public junior secondary schools.

## **6.2 Conclusion**

Infrastructurally, many public junior secondary schools in Kisumu West Sub-County did not have enough ICT resources to effectively implement CBC. Public junior secondary school teachers were not sufficiently capacitated on ICT use. The Ministry of Education and relevant state agencies, like the Teachers Service Commission, had not facilitated in-service training on the use of ICT for on boarding junior secondary school teachers. Most teachers were relying on the skills they had acquired in the higher institutions of learning (colleges and universities). These were largely general ICT skills; they did not match the pedagogical needs of these schools. Besides, there were hardly any digital cultures necessary for sustaining the use of ICT in implementing CBC in junior secondary schools in Kisumu West Sub-County.

Public junior secondary schools in Kisumu West Sub-County that were sampled for this study did not have a digital culture. Whereas teachers admitted to using ICT in their lessons, albeit occasionally, most of them relied on their resources such as phones, tablets, and laptops. Many public junior secondary schools in this area did not offer literacy lessons on ICT. This was attributed to limited access to ICT resources in these schools. Consequently,

teachers' and learners' use of ICT resources was irregular and access to diverse learning materials was restricted. Most teachers in these institutions were not sure whether their schools had ICT policies. Digital divide and disparities in access to technology were some of the serious challenges in the implementation of CBC in public junior secondary schools in Kenya. There was, nonetheless, a consensus that ICT was pivotal in the effective implementation of CBC in public junior secondary schools in the country and in preparing learners for the digital world.

### **6.3 Recommendations**

Based on the findings and conclusions drawn from this research, concerted efforts are required to address the ICT infrastructure, teacher capacity gaps and perceptions. The following recommendations are proposed:

- i. To improve ICT infrastructure, the Ministry of Education should allocate adequate funds to public junior secondary schools for procuring and maintaining ICT resources including interactive devices, computers and tablets. The Ministry, in conjunction with relevant state agencies, can mobilise resources from non-state actors to improve ICT facilities.
- ii. Although the Ministry, through the Teachers Service Commission, has initiated in-service training programmes for general on boarding, there is a need for special public junior secondary school teacher training on ICT integration in the implementation of CBC to equip teachers with necessary skills and knowledge for effective use of ICT resources in teaching practices.
- iii. To engrain digital culture, promote positive perceptions towards ICT use in implementing CBC and address emerging concerns such as screen time and distractions; heads of public junior secondary schools should be sensitised to introduce school-based ICT policies to guide the integration of ICT tools in teaching

and learning. The Ministry, in collaboration with other government agencies, should enhance internet connectivity and access to virtual learning materials and platforms. Well-equipped laboratories should be constructed in public junior secondary schools to facilitate ICT-integrated teaching and learning in all subject areas. School administrators and heads of institutions should be sensitised on the need for integrating ICT in implementing CBC. Teachers who display exceptional skills in the use of ICT in implementing CBC should be incentivized. In absence of adequate ICT resources that can facilitate digital competence, focus should be shifted to digital literacy.

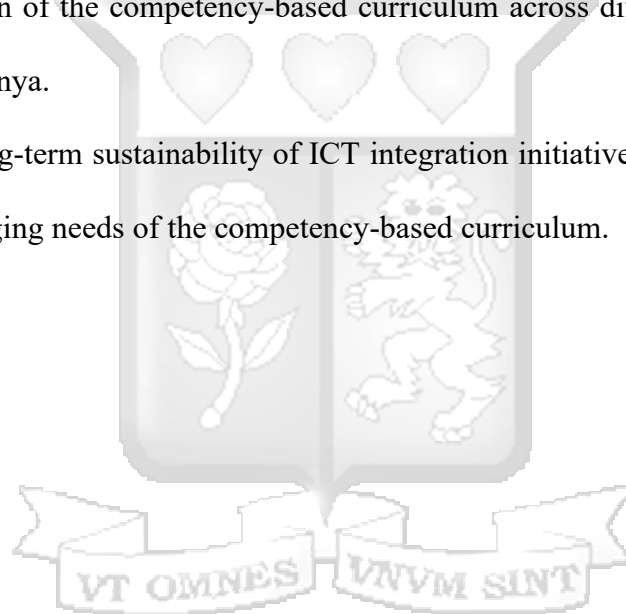
- iv. To achieve CBC goals more efficiently and promote in-depth comprehension across the nine learning areas, teachers should hold interactive sessions with learners to enable them to internalise these school-based ICT policies. Mentorship and peer-learning opportunities can be initiated to promote exchange of best ICT practices. These practices for ICT use in implementing CBC should be included in both pre-service and in-service teacher training curricula in colleges and universities.

#### **6.4 Suggestions for Further Research**

One of the emerging challenges of ICT integration in implementing CBC in public junior secondary schools is digital divide. It may be fruitful to evaluate the impact of digital divide on learning outcomes and effective implementation of the curriculum in general. Another interesting area is subject-specific approaches to ICT integration in public junior secondary schools in Kenya. It is necessary to examine how these strategies can be domesticated to enhance flexibility in learning pace. The implications of these findings are profound, suggesting that enhancing teachers' ICT competencies is paramount not only for the successful enactment of the CBC but also for fostering, as suggested by Opuku-Afriyie *et al.* (2024), a conducive learning environment that embraces modern educational practices. To

strengthen the results of this study and enrich research-backed data that can inform better implementation of Competency-Based Curriculum in Kenya and other countries, the following areas are suggested for future research:

- i. Explore the impact of ICT integration on learning outcomes and the development of 21<sup>st</sup>-century skills within the purview of the Competency-Based Curriculum.
- ii. Examine the role of school administrative support in facilitating the effective use of ICT in implementing the Competency-Based Curriculum.
- iii. Undertake a comparative analysis of ICT use and teacher capacity in the implementation of the competency-based curriculum across different sub-counties or counties in Kenya.
- iv. Assess the long-term sustainability of ICT integration initiatives and their conformity with the emerging needs of the competency-based curriculum.



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# Appendices

## Appendix A: Originality Report

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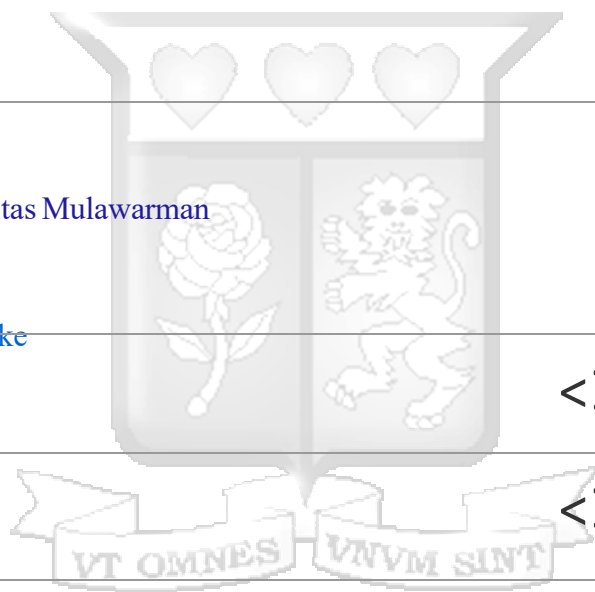
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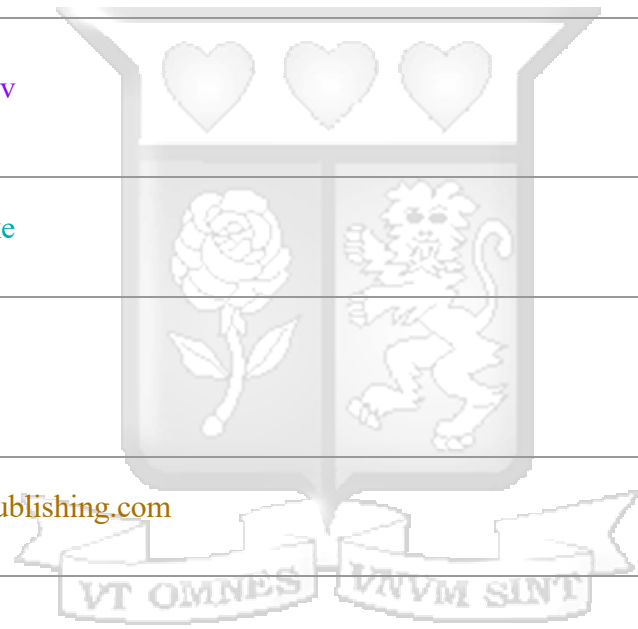
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## Appendix B: Strathmore ERB License



11<sup>th</sup>December2024

Mrs. Mwita Faith,  
[faith.mwita@strathmore.edu](mailto:faith.mwita@strathmore.edu)

Dear Mrs. Mwita,  
**RE:Teachers' Use of ICT in Implementing Competency-Based Curriculum  
inPublic Junior Secondary Schools**

This is to inform you that SU-ISERC has reviewed and **approved** your above **SU-masters** proposal. Your application reference number is **SU-ISERC2395/24**. The approval period is from **11<sup>th</sup> December 2024 to 10<sup>th</sup> December 2025**.







This approval is subject to compliance with the following requirements:

- i. Only approved documents including (informed consents, study instruments, MTA) will be used.
- ii. All changes including (amendments, deviations, and violations) are submitted for review and approval by SU-ISERC.
- iii. Death and life-threatening problems and serious adverse events or unexpected adverse events whether related or unrelated to the study must be reported to SU-ISERC within 72 hours of notification.
- iv. Any changes anticipated or otherwise that may increase the risks or affected safety or welfare of study participants and others or affect the integrity of the research must be reported to SU- ISERC within 72 hours.
- v. Clearance for the export of biological specimens must be obtained from relevant institutions.
- vi. Submission of a request for renewal of approval at least 60 days prior to the expiry of the approval period. Attach a comprehensive progress report to support the renewal.
- vii. Submission of an executive summary report within 90 days of completion of the study to SU- ISERC.

Before commencing your study, you will be expected to obtain a research license from National Commission for Science, Technology, and Innovation (NACOSTI) <https://research-portal.nacosti.go.ke/>and obtain other clearances needed.

Yours sincerely,

## Appendix C: NACOSTI License

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<p><b>This is to Certify that Ms., FAITH ROBI MWITA of Strathmore University, has been licensed to conduct research as per the provision of the Science, Technology and Innovation Act, 2013 (Rev.2014) in Kisumu on the topic: TEACHERS' USE OF ICT IN IMPLEMENTING COMPETENCY BASED CURRICULUM IN PUBLIC JUNIOR SECONDARY SCHOOL IN KISUMU WEST SUB-COUNTY for the period ending : 07/October/2025.</b></p>	
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