TEACHERS' PREPAREDNESS IN THE IMPLEMENTATION OF INFORMATION AND COMMUNICATION TECHNOLOGY POLICY IN EDUCATION IN PUBLIC JUNIOR SCHOOLS IN KAJIADO NORTH SUB-COUNTY, KENYA

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DECLARATION

I declare that this dissertation is my original work achieved through own efforts and that it has not been presented elsewhere or to any academic institution for academic credit. All the information obtained from other sources has been dully acknowledged.

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DEDICATION

I dedicate this dissertation to my husband Dr. George Ndemo and our children – Joseph Bill Oburu, Ignatius Chrysologus Machini and Pauline Elizabeth Kerubo Moraa.

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I am sincerely grateful to Almighty God who has seen me this far in carrying out this study. I thank Him for granting me the strength and good health while I continue with the research.

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ABSTRACT

The study investigated teachers' preparedness to implement Information and Communication Technology (ICT) policy in public junior schools in Kajiado North Sub-County. It examined teachers' ICT expertise, sensitization and advocacy, policy implementation, challenges, and strategies for effective ICT integration in teaching and learning. The study was guided by the Technological Pedagogical Content Knowledge (TPACK) framework, which emphasizes the integration of technological, pedagogical, and content knowledge.

A convergent mixed-methods research design was employed, whereby quantitative and qualitative data were collected concurrently, analyzed separately, and integrated during interpretation. The target population comprised 12 administrators, 110 public junior school teachers, one Sub-County Education Officer, and one Sub-County Teachers Service Commission officer. Census, proportionate, and criterion sampling techniques were used to select participants and key informants based on their roles and relevance to the study. Data were collected using questionnaires and interview guides. Instrument validity was established through expert review, while reliability of the quantitative instrument and trustworthiness of qualitative data were ensured through appropriate procedures, including systematic coding and thematic analysis. Quantitative data were analyzed using descriptive statistics, including frequencies, percentages, and mean scores with the assistance of SPSS Version 20. Qualitative data were analyzed thematically through coding, categorization, development of themes, identification of relationships among themes, and interpretation.

The study adhered to ethical principles, including informed consent, confidentiality, privacy, voluntary participation, and the responsible use of collected information. Findings showed that most teachers possessed basic ICT knowledge, but this was inadequate for effective classroom integration of ICT hence affecting policy implementation. The study therefore recommended continuous and adequate ICT training for teachers and collaboration between national and local government authorities to enhance teachers' digital skills and support the transition to digital learning.

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ACRONYMS

APF	-	Africa Partnership Forum
CBC	-	Competency-Based Curriculum
CBE	-	Competency Based Education
DLP	-	Digital Literacy Programme
DoE	-	Department of Education
EFA	-	Education for All
ESP	-	Economic Stimulus Programme
EU	-	European Union
GDP	-	Gross Domestic Product
GoK	-	Government of Kenya
ICT	-	Information and Communications Technology
ICTA	-	ICT Authority
ITU	-	International Telecommunication Union
KDEAP	-	Kenya Digital Economy Acceleration Project
KICD	-	Kenya Institute of Curriculum Development
LCMS	-	Last Mile Connectivity of Schools
MoE	-	Ministry of Education
MDGs	-	Millennium Development Goals
OECD	-	Organisation for Economic Co-operation and Development
PCK	-	Pedagogical Content Knowledge
PCs	-	Personal Computers

PISA	-	Program for International Student Assessment
REA	-	Kenya Power and the Rural Electrification Authority
REB	-	Rwanda Basic Education Board
SPSS	-	Statistical Package for the Social Sciences
SSA	-	Sub-Sahara Africa
TCK	-	Technological Content Knowledge
TPACK	-	Technological Pedagogical Content Knowledge
TSC	-	Teachers Service Commission
UK	-	United Kingdom
UNESCO	-	United Nations Educational, Scientific and Cultural Organization
UNICEF	-	United Nations Children's Fund
ZPD	-	Zone of Proximal Development

CHAPTER ONE

INTRODUCTION

1.1 Background to the Problem

Education is widely recognized as an important instrument for social, economic and human development because it equips individuals with knowledge, skills, values and competencies required for participation in society and the economy (UNESCO, 2020). Contemporary education systems have consequently shifted from approaches that emphasize the acquisition and recall of factual knowledge towards approaches that promote the development and application of competencies (UNESCO, 2021; Hew & Brush, 2022). The shift is particularly evident in competency-based education (CBE), which emphasizes competencies such as critical thinking, communication, collaboration, creativity, problem-solving and digital literacy (Smith & Lee, 2022). The effective implementation of competency-based curricula therefore requires teachers who can employ learner-centred pedagogies and use appropriate digital technologies to support teaching, learning and assessment (Smith & Lee, 2022). Consequently, teacher preparedness has become an important consideration in determining whether curriculum reforms and digital education policies are translated into effective classroom practice (Hennessy et al., 2021).

Globally, information and communication technology (ICT) has increasingly become an important component of contemporary education systems (OECD, 2021). ICT can provide teachers and learners with access to digital content, interactive learning resources, virtual laboratories, online platforms and alternative forms of assessment (OECD, 2021). However, the availability of ICT does not automatically result in its meaningful integration into teaching and learning. Studies such as the Program for International Student Assessment (PISA), which measures ICT readiness in large-scale contexts, have emphasized the fact that teacher digital

preparedness is an issue of concern in many contexts, with some countries such as Singapore, Sweden, and the United States being ranked high in teacher digital preparedness, while others lag in achieving this due to various challenges (OECD, 2021). This emphasizes the fact that even in high-income economies, teacher confidence in the use of ICT plays an important role in the quality of digital pedagogy in achieving competency in learners (Li & Lalani, 2020; Zhao et al., 2021).

Evidence from different education systems indicates that effective ICT integration depends on teachers' knowledge and skills, confidence, attitudes, pedagogical competence and access to continuous professional development, as well as the availability of appropriate infrastructure and institutional support. For instance, research conducted recently on pedagogical readiness for digital innovation though the study does not appear to specify a particular geographical location or study site indicated that although many educators are appreciative of the potential offered by digital tools and resources, there are gaps in professional development and institutional support that hinder their readiness to adopt technology-enriched pedagogies (Yulin, Ning & Danso, 2025). Moreover, research on self-efficacy of teachers in terms of readiness to teach digital innovations such as artificial intelligence in Sri Lanka indicated that low self-efficacy due to low knowledge and negative emotions hindered the readiness of teachers to adopt digital innovations, although the environment is digital-friendly (Rajapakse, Ariyarathna, & Selvakan, 2024).

The United States study by Darling-Hammond, Flook, Cook-Harvey, Barron, and Osher (2021) revealed that the impact of professional training programs on teachers' digital literacy, ICT integration into teaching, and teaching confidence was profound. A study on Finland, by Sahlberg (2020) highlighted the significance of policy coherence, adequate infrastructure, and teachers' professional learning opportunities in supporting teachers to meet changing digital

needs. Thus, teacher preparedness and the school environment within which teachers work are important conditions for translating investments in ICT into actual classroom practice.

Across Sub-Sahara Africa (SSA), there is an ongoing digital transformation in education as part of CBEs in various countries, but teacher preparedness is an issue that keeps on emerging as a challenge. Studies on South Africa (Govender & Chetty, 2021; Makoelle, 2022; Graaff Reinet Advertiser, 2025), Ghana, (Agyeman & Asiedu, 2020), Rwanda, (AllAfrica, The New Times, 2025; Ministry of Education, Rwanda, 2025; Niyibizi et al., 2025), all demonstrate a general phenomenon in Africa, where though teachers may be inclined towards digital literacy, there is a need to ensure that competency-based curricula are effectively implemented, alongside teacher preparedness in facilitating 21st-century learning outcomes.

In Kenya, the integration of ICT into education is supported by national policy and curriculum reforms (Ministry of Education, Kenya, 2023). The Competency-Based Curriculum (CBC), subsequently implemented within the broader competency-based education framework, places emphasis on the development of digital literacy and the application of knowledge and skills in authentic contexts. The Government of Kenya has also established specific policy frameworks to support the use of ICT in education. *The Policy on Information and Communication Technology in Education and Training* (2021) provides a framework for mainstreaming ICT across education and training and emphasizes access to ICT infrastructure, connectivity, digital resources, teacher capacity development and the integration of ICT into teaching and learning. The policy recognizes that inadequate ICT infrastructure, limited connectivity and inadequate access to reliable electricity remain barriers to equitable access to and effective use of ICT in education (Ministry of Education, Kenya, 2021).

The policy direction is particularly relevant to Junior School, which was established as part of the implementation of the competency-based curriculum. Junior School teachers are therefore expected to support learners in developing competencies appropriate for a rapidly changing digital society. This expectation requires more than the physical provision of computers and other digital devices. Teachers need the knowledge and skills to select appropriate digital resources, operate ICT equipment, integrate digital resources into subject teaching, facilitate learner-centred activities and use technology to support assessment. The National Education Sector Strategic Plan 2023–2027 recognizes the importance of ICT in improving teaching and learning and includes interventions aimed at expanding ICT infrastructure and digital learning opportunities (Ministry of Education, Kenya, 2023).

DLP is not implemented by one institution alone. Responsibilities are divided among government agencies: the Ministry of Education provides policy guidelines, Kenya Institute of Curriculum Development (KICD) develops digital content, Teachers Service Commission (TSC) supports teacher training, ICT Authority (ICTA) handles learning devices and programme implementation coordination, while Kenya Power and the Rural Electrification Authority (REA) support school electrification other government agencies electricity and infrastructure, and Ministry of Industrialization establishes local assembly plants (ICT Authority, 2026). This coordinated and clearly defined approach was meant to improve inter-agency collaboration and enable the Digital Literacy Programme to be implemented with fewer challenges (ICT Authority, 2026).

Despite the policy commitment, the availability of the basic conditions required for ICT integration remains an important concern. ICT integration in Junior Schools requires functioning devices, appropriate digital infrastructure, connectivity, technical support and reliable electricity.

The importance of electricity cannot be overlooked because computers, interactive boards, network equipment and most other digital learning technologies depend on a reliable source of power. The national ICT-in-education policy itself identifies limited access to reliable electricity as one of the challenges affecting ICT access and use in education (Ministry of Education, Kenya, 2021). The Government's continuing investment in digital infrastructure also demonstrates that the infrastructure gap has not been completely resolved. For example, ICT Authority, (2026), reported that through the Ministry of Education 10,382 laptops and 10,382 interactive smart boards were being distributed to Junior Schools across all 47 counties under the Kenya Digital Economy Acceleration Project (KDEAP). The Kenya Yearbook reports 331,000 teachers trained on ICT integration, comprising 218,253 trained on CBC and 93,009 trained on ICT and device utilisation (Kenya Year Book). A Vision 2030 progress report similarly reports 218,253 teachers trained on CBC, of whom 93,009 were trained on ICT and device utilisation (Kenya Vision 2030). In contrast, ICT Authority currently reports over 91,000 teachers trained in ICT under the DLP (ICT Authority of Kenya, 2026)

The current infrastructure situation also demonstrates the uneven nature of digital access in Kenyan schools. The National Education Sector Strategic Plan reported that, using indicators including ICT expertise, ICT infrastructure, internet connectivity, teachers using ICT, computer laboratories, bandwidth and the number of computers, 76.5% of schools were integrating ICT in their programmes in 2022, compared with 63.3% in 2018. However, the Ministry reported marked regional differences, with some regions lagging considerably behind others (Ministry of Education, Kenya, 2021). Importantly, this national indicator should not be interpreted as meaning that 76.5% of Junior Schools were integrating ICT, since it is a broader school-level

indicator. This distinction underscores the need for current and disaggregated evidence specifically on Junior Schools.

The Government has also recognized the importance of reliable internet connectivity in enabling digital teaching and learning. Under the Last Mile Connectivity of Schools project, 363 public schools had been connected to sustainable internet by December 2025, benefiting more than 277,000 learners, while more than 4,400 teachers had begun integrating digital tools into classroom instruction and 405 teachers had received training on ICT use for learning. However, UNICEF reported that only an estimated 30% of Kenya's 23,400 public primary schools were online, illustrating the continuing digital connectivity gap (UNICEF, Kenya, 2026). Although these figures relate to public primary schools rather than Junior Schools specifically, they demonstrate the broader connectivity challenge within Kenya's basic education system and provide an important context for examining ICT integration at Junior School level.

The availability of ICT infrastructure is, however, only one component of effective ICT integration. Teacher preparedness is equally important. The Government has invested substantially in teacher capacity development, including training teachers in ICT integration. Kenya has trained approximately 62,364 Junior School teachers in ICT integration as of June 2026. However, this figure represents teachers trained to use ICT in teaching and learning and should not be equated with the number of teachers professionally trained to teach ICT as a subject. A separate, current national figure for JSS teachers specifically qualified to teach ICT could not be established from the available official statistics (Ministry of Education, Kenya, 2021). The existence of large-scale teacher training programmes suggests considerable policy and financial commitment towards developing teachers' digital competencies. Nevertheless, the number of teachers trained does not, by itself, establish whether teachers are adequately prepared

to integrate ICT meaningfully into teaching and learning. Training attendance does not necessarily demonstrate competence, confidence, frequency of ICT use, pedagogical application or the ability to overcome classroom-level constraints.

This distinction is important because teacher preparedness should be understood as more than basic computer literacy. For purposes of ICT integration, teacher preparedness encompasses teachers' knowledge in digital technologies, ICT technical skills, ICT pedagogical knowledge, confidence in using ICT aids in teaching and learning, attitudes and ability to select and apply digital resources appropriately in teaching and learning. A teacher may therefore have received ICT training or have access to a computer but still experience difficulties in using technology to facilitate learner-centred learning and teaching, collaboration, critical thinking, problem-solving and competency-based assessment. The current national emphasis on teacher training consequently creates an important empirical question: whether the investment in teacher capacity development is translating into actual ICT integration in teaching and learning in Junior School classrooms.

The Government's continued interventions also suggest that the relationship between ICT integration and infrastructure, teacher preparedness and classroom use remains unresolved. The Ministry of Education has identified the need to strengthen the use of ICT tools to improve teachers' access to online educational content and to support teaching quality in Junior School. A recent education sector assessment also identified the need for structured use of ICT tools and noted challenges relating to affordable connectivity, inadequate ICT equipment and alignment of technology-supported instruction with lesson planning and assessment (Ministry of Education Kenya, 2021). These concerns demonstrate that the presence of technology aids within schools does not necessarily guarantee meaningful use of ICT for pedagogy.

Empirical studies in Kenya similarly suggest that teacher preparedness and the availability of enabling conditions influence ICT use in teaching and learning. Studies conducted in different Kenyan contexts have reported challenges relating to teachers' ICT competence, professional development, attitudes, availability of digital devices, connectivity, electricity and technical support. Such findings are particularly relevant to Junior School because the transition to competency-based education has increased expectations that teachers will use learner-centred approaches and digital resources to develop learners' competencies. However, much of the available evidence either focuses on primary or secondary schools generally, examines the implementation of CBC broadly, or was conducted before Junior School became an established level within the current education structure. Consequently, findings from these studies cannot automatically be assumed to represent the current situation in Junior Schools.

The need for Junior School-specific evidence is further strengthened by the availability of new national data systems. The 2024 National School Census was designed as a complete enumeration of schools and learners and specifically includes Junior Schools. The census seeks to collect information on infrastructure, enrolment, employment and other characteristics in order to address existing data gaps and provide up-to-date information for education-sector planning (Ministry of Education, 2023). The availability of such a data framework demonstrates the importance attached to understanding the actual conditions under which Junior Schools operate. Nevertheless, national-level statistics alone may not explain how teachers experience and use ICT within particular local contexts.

Kajiado County provides an important context in which these issues can be examined. Evidence from studies conducted in Kajiado and its constituent areas indicates that ICT utilization is affected by infrastructure, electricity, internet connectivity and teacher knowledge.

For example, research in Kajiado North Sub-County has identified inadequate ICT tools, unreliable electricity, limited internet access and inadequate teacher knowledge of how to use ICT to enhance learning as among the challenges affecting ICT utilization (Wairiuko, 2014; Omare et al., 2018; Wakhu, 2013). These findings suggest that the existence of ICT policies and the provision of digital equipment do not necessarily translate into effective classroom ICT integration. However, there remains limited empirical evidence specifically examining the extent to which Junior School teachers are prepared to integrate ICT and how this preparedness relates to their actual use of ICT in teaching and learning.

The foregoing situation presents an important research problem. Kenya has established policies supporting ICT integration in education, introduced competency-based education, invested in ICT infrastructure and connectivity, and undertaken large-scale teacher capacity development. At the same time, the national policy continues to recognize challenges relating to infrastructure, connectivity and reliable electricity, while government programmes continue to provide additional digital devices and teacher training (Ministry of Education, Kenya, 2023). The coexistence of substantial investment and continuing implementation challenges raises an important question: to what extent are Junior School teachers prepared to translate these investments and policy expectations into actual ICT integration in teaching and learning?

The problem is therefore not simply whether ICT infrastructure exists or whether teachers have received ICT training. Rather, the critical issue is whether teacher preparedness is associated with the meaningful integration of ICT into classroom teaching and learning. This study therefore seeks to examine the teacher preparedness on ICT integration in teaching and learning in Junior Schools in Kajiado North Sub-County. The study focuses on teacher preparedness as the explanatory factor and ICT integration in teaching and learning as the

outcome, while ICT policy, infrastructure, electricity and connectivity provide the broader contextual conditions within which teachers operate. By examining these relationships at Junior School level, the study seeks to generate empirical evidence that can inform teacher professional development, ICT resource provision, school-level support and the implementation of Kenya's ICT-in-education and competency-based education policies.

1.2 Statement to the Problem

The integration of ICT into teaching and learning has expanded through government investments in digital devices, connectivity, teacher training, and technology-supported education. However, teacher preparedness remains a challenge, with some teachers experiencing inadequate ICT skills, limited professional training, insufficient resources, unreliable connectivity, and inadequate institutional support. In Kajiado North Sub-County, public junior schools have benefited from ICT resources and training initiatives, yet concerns remain regarding teachers' competence, confidence, and readiness to effectively integrate ICT into classroom practice.

Ideally, teachers implementing the Competency-Based Curriculum (CBC) should possess adequate ICT expertise, professional training, and practical skills to use digital technologies effectively in teaching and learning. Effective ICT integration should provide learners with opportunities to develop digital literacy and essential 21st-century competencies such as critical thinking, problem-solving, creativity, collaboration, and communication.

Despite investments in ICT infrastructure and teacher capacity development, the extent of teachers' preparedness and implementation of ICT policy in education in public junior schools in Kajiado North Sub-County remains unclear. The specific gaps in teachers' ICT expertise, professional training, policy implementation, and the challenges affecting ICT integration have

not been sufficiently established. This gap may limit the effective realization of the ICT and digital literacy objectives of the CBC. The study therefore sought to investigate teachers' preparedness to implement ICT policy in teaching and learning in public junior schools in Kajiado North Sub-County.

1.3 Research Objectives

The study was guided by two sets of objectives: a general objective, which provided the overall direction of the study, and specific objectives, which outlined the key areas of investigation required to achieve the general objective.

1.3.1 General Objective

To investigate the readiness of teachers to implement ICT policy in teaching and learning in public junior schools in Kajiado North Sub-County.

1.3.2 Specific Objectives

1. To determine the ICT expertise possessed by teachers for implementing ICT policy in teaching and learning in public junior schools in Kajiado North Sub-County.
2. To establish whether public junior school teachers have received professional training on the use of ICT tools in teaching and learning in Kajiado North Sub-County.
3. To assess the extent to which ICT policy is implemented by teachers in public junior schools in Kajiado North Sub-County.
4. To identify the challenges faced by teachers in implementing ICT policy in teaching and learning in public junior schools in Kajiado North Sub-County.
5. To determine possible strategies for addressing the challenges faced by teachers in implementing ICT policy in teaching and learning in public junior schools in Kajiado North Sub-County.

1.4 Research Questions

The study was guided by the following research questions:

1. What ICT expertise did teachers have to implement ICT policy in teaching and learning in Kajiado North Sub-County?
2. Did the Public Primary school teachers receive ICT professional training in using ICT aides in teaching and learning in Kajiado North Sub-County?
3. To what extent was education ICT policy being implemented by public primary school teachers in Kajiado North Sub-County?
4. What challenges were teachers facing in implementing ICT policy in teaching and learning in Kajiado North Sub-County?
5. What were the possible solutions to the challenges experienced by teachers in implementing ICTpolicy in teaching and learning in Kajiado North Sub-County?

1.5 Significance of the Study

The study may be significant to various stakeholders in education, including the Ministry of Education, ICT and education policy implementers, curriculum developers, school administrators, teachers, learners, and researchers. The findings may provide useful information on teachers' preparedness and the implementation of ICT policy in teaching and learning in public junior schools in Kajiado North Sub-County.

The findings may provide the Ministry of Education (MOE), particularly the relevant ICT and education departments, with information that could inform the development, review, and implementation of strategies for improving ICT integration in public junior schools. The findings may also assist the Sub-County Education Office and other education officials in identifying

areas requiring additional teacher support, resources, professional development, and monitoring. Such information could contribute to efforts aimed at strengthening ICT integration and supporting the achievement of national educational development goals. This may lead to the promotion and re-orientation of education towards the achievement of the governments' vision 2030.

The findings may also assist the government and organizations involved in ICT in education to identify gaps in ICT infrastructure, connectivity, equipment, and teacher capacity development. This could inform decisions concerning the allocation of financial and material resources, particularly in schools that may experience limited access to ICT facilities and professional training. The findings may also contribute to the improvement of programmes aimed at promoting digital literacy and effective use of ICT in teaching and learning.

Moreover, curriculum developers and education planners may benefit from information on the ICT competencies required by teachers to effectively implement the Competency-Based Curriculum. The findings may inform the development of teaching and learning materials that support ICT-enabled content delivery, assessment, communication, instruction, and other classroom activities. They may also provide insights into areas where curriculum support materials and teacher guidelines could be strengthened.

Still, Heads of institutions and education supervisors may use the findings to identify areas in which teachers may require additional support, mentorship, supervision, and professional development. The findings may also assist school administrators in planning for the effective utilization of available ICT resources and identifying institutional factors that may facilitate or constrain ICT integration in teaching and learning.

Teachers may also benefit from greater awareness of their existing ICT competencies

and areas requiring further development. The findings may encourage teachers to reflect on their preparedness to use ICT tools in classroom instruction and may highlight opportunities for professional development. Improved ICT competencies could potentially enhance teachers' confidence in using digital technologies for content delivery, assessment, communication, collaboration, and other teaching and learning activities. The findings may also precipitate efficient use of tablets in teaching in their classrooms thereby enhancing teachers' motivation and self-esteem as they teach.

Learners may too, benefit indirectly from improved teacher preparedness and more effective integration of ICT into classroom activities. Where ICT is appropriately integrated into teaching and learning, learners may have increased opportunities to develop digital literacy, problem-solving, creativity, collaboration, communication, and other competencies associated with 21st-century learning. The findings may therefore contribute to discussions on how ICT-enabled teaching could support learners' preparedness for an increasingly technology-oriented society.

Teacher training institutions and organizations involved in professional development may use the findings to identify areas of ICT competency that require greater emphasis in pre-service and in-service teacher training. The findings may inform the design of training programmes that are responsive to teachers' practical needs and the technological demands of ICT integration in junior schools.

Finally, but not least, the study may contribute to the existing body of knowledge on teacher preparedness and ICT policy implementation in education. Researchers and scholars may use the findings as a reference point for further studies on ICT integration, teacher digital competencies, professional development, and technology-supported implementation of the

Competency-Based Curriculum. The study may also provide a basis for comparative studies in other counties, regions, school categories, or educational contexts.

Overall, the study may provide evidence that could assist education stakeholders in identifying gaps and opportunities related to teacher preparedness, professional development, ICT resources, and policy implementation. The findings may consequently contribute to ongoing efforts to strengthen the effective integration of ICT in teaching and learning in public junior schools.

1.6 Scope and Delimitation

The scope and delimitation of a study are important because they establish clear boundaries within which the research is conducted. The scope specifies the population, geographical area, variables, and key issues covered by the study, while delimitations identify the aspects that the researcher intentionally excludes in order to maintain a manageable and focused investigation. Clearly defining these boundaries helps to align the research objectives, questions, methodology, and interpretation of findings and enables readers to understand the context within which the findings should be considered (Creswell & Creswell, 2022; Cohen et al., 2018).

1.6.1 Scope of the Study

The study focused on the readiness of teachers to implement ICT policy in teaching and learning in public junior schools in Kajiado North Sub-County. The study specifically examined teachers' ICT expertise and competencies, professional training and capacity development in the use of ICT tools, the extent to which ICT policy was implemented in classroom teaching and learning, and the challenges encountered by teachers in implementing the policy. The study also explored possible strategies for addressing the challenges affecting

effective ICT policy implementation.

The primary participants in the study were teachers in public junior schools because they are directly responsible for implementing ICT policy in classroom teaching and learning. In addition, heads of institutions and Sub-County education officers served as key informants. Their inclusion was based on their supervisory and administrative responsibilities, which positioned them to provide information on teachers' preparedness, access to ICT resources, professional support, and implementation of ICT policy.

Geographically, the study was conducted in Kajiado North Sub-County, Kajiado County, Kenya. The area has a diverse population comprising members of the Maasai community and people from other parts of Kenya. Some communities in the area engage in pastoralism, which may involve mobility in search of water and pasture. These demographic and socio-economic characteristics provided an important contextual setting for examining ICT policy implementation in public junior schools.

The study was limited to public junior schools and did not include private schools, secondary schools, tertiary institutions, or other educational institutions. It concentrated on teachers' preparedness and ICT policy implementation rather than the broader effectiveness of the Competency-Based Curriculum. The study also focused on ICT-related aspects of teaching and learning and did not examine other factors affecting curriculum implementation unless they were directly related to ICT integration.

1.6.2 Delimitations of the Study

The study was deliberately delimited to public junior schools in Kajiado North Sub-County to make the investigation manageable and to maintain a clear focus on the implementation of ICT policy within the public education system. Teachers were selected as

the main respondents because of their direct role in using ICT in teaching and learning, while heads of institutions and Sub-County education officers were included as key informants because of their administrative, supervisory, and monitoring responsibilities.

The study was also delimited to five major areas: teachers' ICT expertise and competencies; professional ICT training and capacity development, including sensitization and advocacy; the extent of ICT policy implementation; challenges affecting ICT integration; and possible strategies for addressing those challenges.

Several practical constraints were anticipated within these delimitations. The study was confined to one sub-county, and therefore its findings may not be generalized to all public schools in Kenya without considering differences in geographical, demographic, socio-economic, and educational contexts. The study also relied partly on information provided by teachers and key informants, which may have been affected by respondents' perceptions, recall, or willingness to provide accurate information. In addition, differences in access to ICT infrastructure, electricity, internet connectivity, and other technological resources among schools may have influenced the implementation of ICT policy. The availability of respondents and the time allocated for data collection also constrained the breadth of the investigation.

These delimitations and practical constraints were considered when interpreting the findings. Nevertheless, the study was designed to obtain sufficiently relevant information from teachers and key education stakeholders to provide an informed assessment of teacher readiness and ICT policy implementation in public junior schools in Kajiado North Sub-County.

1.7 Assumptions of the Study

The study was guided by the following assumptions:

1. Teachers in public junior schools have varying levels of ICT knowledge, skills, and

experience that can be assessed through the study.

2. Teachers have had some exposure to ICT tools through professional training, government initiatives, or school-based experiences.
3. Teachers, heads of institutions, and Sub-County education officers would provide honest and accurate information regarding ICT preparedness, training, resources, and policy implementation.
4. The selected research instruments would adequately capture the key aspects of teacher preparedness and ICT policy implementation.
5. The availability and use of ICT resources, professional training, and teachers' ICT competencies may influence the implementation of ICT policy in teaching and learning.

1.8 Theoretical Framework

A theoretical framework is the structure of theories and concepts that guides a research study by providing a lens for understanding the phenomenon being investigated and explaining the relationships among relevant concepts. In other words, it provides the theoretical basis that helps a researcher interpret findings and connect the study to existing knowledge (Collins & Stockton, 2018). This study was anchored on the TPACK (Technological Pedagogical and Content Knowledge) framework of technology integration. TPACK was originally proposed by Mishra and Koehler (2006). It is a framework that explains what knowledge teachers need to integrate technology effectively into their teaching (Koehler, Mishra, & Cain, 2022). Teachers who are exposed and competent in using ICT tend to be creative, flexible, and adaptive, which is consistent with the TPACK view that effective technology integration is an outcome of the dynamic interplay of different knowledge domains (Voogt et al., 2021).

The TPACK model illustrates the connections between three types of knowledge:

technology knowledge (TK), pedagogical knowledge (PK), and content knowledge (CK) (Koehler et al., 2022). At the intersection of these three types of knowledge is the intuitive knowledge of how to deliver certain content using effective pedagogical practices with the aid of technology. The model consists of seven components. Technological knowledge (TK) is the knowledge of different technologies, from conventional technology such as chalkboards to modern technologies such as the internet, interactive whiteboards, learning management systems, and educational software. Content knowledge (CK) is the teacher's knowledge of the subject matter to be taught and the differences in knowledge structures between subjects. Pedagogical knowledge (PK) is the knowledge of teaching practices, classroom management, assessment techniques, lesson planning, and student learning (Koehler et al., 2022; Scherer, Siddiq, & Tondeur, 2020).

Pedagogical content knowledge (PCK) is knowledge about teaching particular subject matter well. It entails subject matter knowledge that is transformed into a form that is comprehensible to students by using effective teaching strategies (Nilsson & Karlsson, 2021). This knowledge is different for various content areas because it combines both pedagogical knowledge and subject matter knowledge with the aim of enhancing teaching practices. Technological content knowledge (TCK) entails knowledge about how technology can be used to develop new representations of subject matter and how it can shape the way students perceive concepts. Teachers need to be aware of how various technologies affect the content area being taught and how technology can be used to develop new learning experiences (Voogt et al., 2021). Technological knowledge is constantly changing and, therefore, more complex than basic computer literacy skills because it encompasses knowledge of communication, information processing, and problem-solving in technology-infused settings (Scherer et al., 2020).

Technological pedagogical content knowledge (TPACK) refers to the integrative knowledge base of teachers in the context of teaching specific content through appropriate pedagogical practices and technologies. TPACK focuses on the idea that the use of technology in the classroom should not only be about the tools but should be aligned with the overall learning goals, content, and learners' needs (Koehler et al., 2022). Similarly, research on models of TPACK development in teacher preparation programs has emphasized the importance of a structured approach to teaching, which includes modeling technology use, collaborative design, feedback, and subject-specific technology use in building teachers' technological pedagogical knowledge, which in turn enhances their overall TPACK (Scherer et al., 2020). Pedagogical modeling with a focus on subject-specific teaching has been found to be effective in building teachers' ability to use technology in a pedagogical as well as a content-specific manner.

Empirical research has validated the TPACK model, and various studies have supported the TPACK approach to understanding the use of technology in the classroom. Research on preservice teachers has revealed that they may have the potential to develop technological knowledge but may still have difficulties in integrating pedagogy and content through the use of technology due to their lack of pedagogical experience (Tondeur et al., 2021). Research has shown that preservice teachers may have inadequate pedagogical experience, which may affect the development of appropriate technology integration approaches in the classroom. Developing pedagogical content knowledge (PCK) has always been an essential factor in the development of appropriate technology integration practices in the classroom; hence, it should always be supported in the context of teacher education programs (Voogt et al., 2021).

1.8.1 Strengths of the TPACK Framework

One of the major strengths of the framework is that it enables educators to engage students through collaborative and technology-enhanced learning experiences, with an emphasis on meaningful pedagogical goals. It assists educators in moving beyond technology and thinking about how digital technology contributes to student understanding and learning outcomes (Koehler et al., 2022). Another strength of the TPACK framework is that it assists educators in overcoming challenges related to technology integration in teaching and learning. It does so by emphasizing the importance of aligning teaching goals, teaching strategies, and technology.

In addition, strength of the TPACK framework is that it encourages educators to engage in meaningful instruction planning. It encourages educators to begin with teaching goals, then move to teaching strategies, and finally to technology (Voogt et al., 2021). This increases the chances that technology integration in teaching and learning will be meaningful, efficient, and instructionally effective.

1.8.2 Weaknesses of the TPACK Framework

Despite the TPACK framework's numerous strengths, it also has some limitations. One major limitation is that the boundaries between the different knowledge domains are not clearly defined. As such, it is not clear how the different knowledge domains can be measured separately in research and practice (Scherer, Siddiq, & Tondeur, 2020). The blurring of boundaries between the knowledge domains is not necessarily a bad thing, as it can be rich and complex. However, it is particularly problematic when it comes to measuring the actual competence of the teacher in the different knowledge domains. This study seeks to address this limitation of the TPACK framework by operationalizing teacher preparedness using clear

indicators of teacher competence in the use of ICT, the application of technology in the classroom, and the application of technology in the subject area. Instead of using the TPACK framework as a mere theory, this study operationalizes the different knowledge domains as actual teacher practices such as lesson planning using technology, the application of technology in assessments, student engagement using technology, and technology application in the subject area.

Another limitation of TPACK is that it mainly centers on teachers' knowledge, but it does not consider other factors like availability of infrastructure, leadership, and policy, among others, that affect technology integration (Tondeur et al., 2021). In addition, it is not possible to integrate technology in a vacuum. Rather, it is affected by factors like the school environment and conditions of policy implementation. However, this research has managed to bridge the gap by using intervening variables like ICT policy, administrative support, funding, and professional development. In this case, it is clear that the research has managed to expand TPACK from just teachers' knowledge to include other factors that affect the practical application of ICT aides in teaching and learning.

1.8.3 Justification and Application of TPACK to the Study

The TPACK model is applicable to this research because it describes the knowledge that teachers need to effectively use ICT aids in the implementation of digital literacy policy. Pedagogical content knowledge (PCK) is one of the essential domains in this model that stresses the need for teachers to develop lessons according to how students can best understand subject matter. The effective integration of digital literacy, therefore, requires teachers to have deep subject knowledge and the ability to communicate this knowledge using a learner-centered

approach (Nilsson & Karlsson, 2021).

The model also identifies technological content knowledge (TCK), which illustrates how technology shapes the representation and understanding of subject matter. Teachers need to be aware of how various technologies affect the learning of specific subject concepts and select the technology that best supports the content being taught (Voogt et al., 2021). Lastly, technological pedagogical content knowledge (TPACK) highlights the dynamic interplay between technology, pedagogy, and content. In other words, integrating technology into teaching and learning is a dynamic process that influences not just teaching but also learning. Thus, it is a particular type of professional knowledge that teachers should develop to effectively integrate ICT in teaching and learning (Koehler et al., 2022). Thus, it is clear that preparedness is a critical aspect of effectively integrating digital literacy.

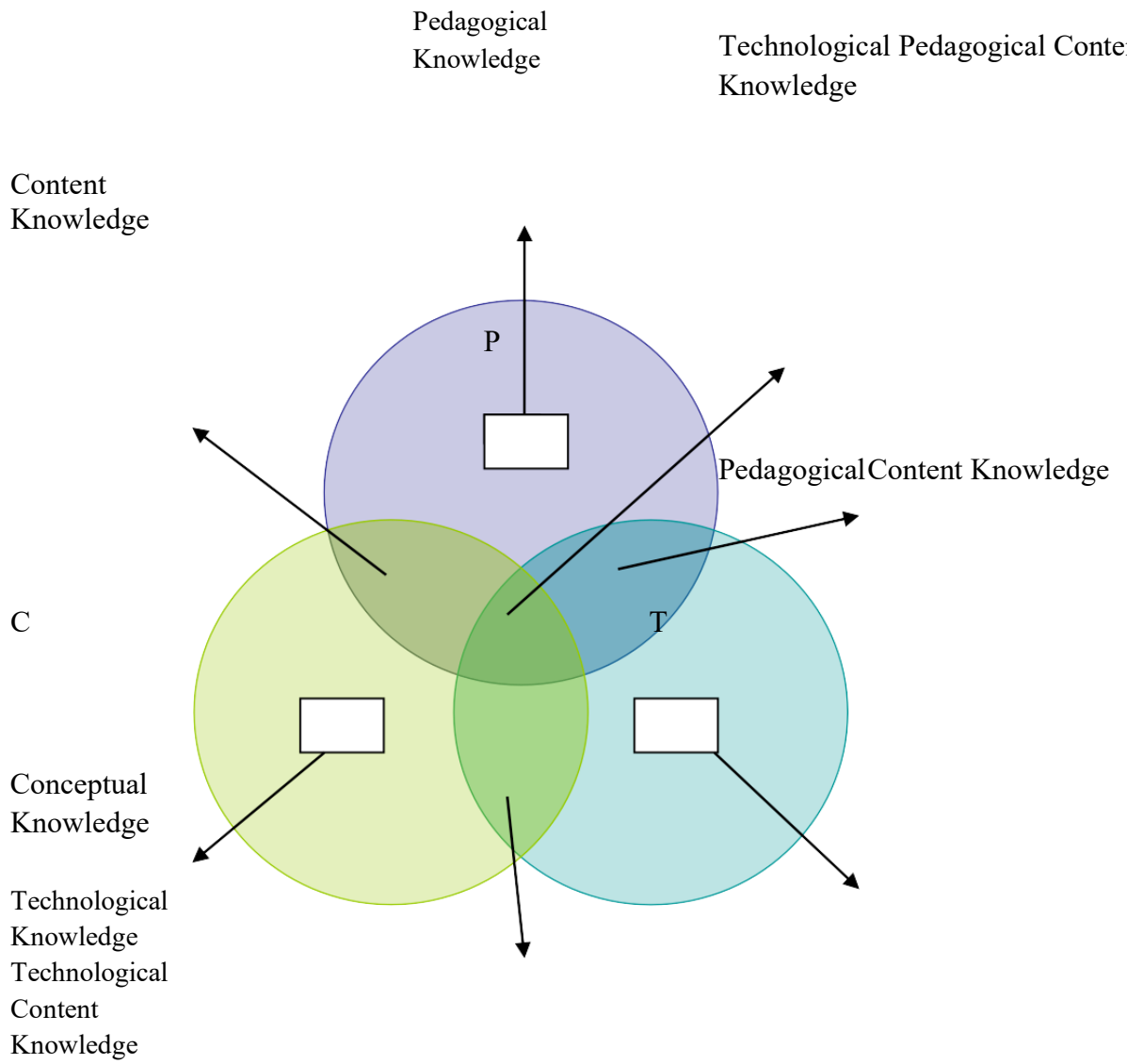

Pedagogical Knowledge
Technological Pedagogical Content Knowledge
Content Knowledge
P
Pedagogical Content Knowledge
C
T
Conceptual Knowledge
Technological Knowledge
Technological Content Knowledge

Figure 1: *Technological Pedagogical and Content Knowledge (TPACK) Framework and Its Key Knowledge Components (Koehler & Mishra, 2008)*

Figure 1 illustrates the relationship between technology, pedagogy, and content and provides a theoretical basis for examining how teachers integrate technology into their instructional practices. The framework brings together Technological Knowledge (TK), Pedagogical Knowledge (PK), and Content Knowledge (CK), as well as the interactions among them—PCK, TCK, TPK, and TPACK. In this study, the TPACK framework is therefore used to guide the discussion of teachers' knowledge and competencies in using technology to support teaching and learning (Mishra & Koehler, 2006; Koehler & Mishra, 2008).

However, several studies indicate that teachers' preparedness on ICT aids usage in teaching and learning are inadequate. Yusuf and Balogun (2011) noted that inadequate training and experience is one of the main reasons why teachers do not use technology in learning. Traditional instruction methods although ensure effective learning takes place, they hinder learners from acquiring the 21st century knowledge and skills. This makes the learner uncompetitive globally.

Agyei (2013), in a study conducted in Nigeria, found that there was a shortage of skilled human resources with the necessary competencies to use ICT-aided learning effectively. Similarly, Shamir-Inbal and Blau (2016), in their study conducted in Israel, established that teachers preferred using laptops rather than tablets in the classroom, largely due to the technical limitations associated with tablets. These findings among others trigger fear and anxiety especially in Africa asmost countries are investing so much in education technology. Based on the scholarly reviewed literature, the current study seeks to establish teachers' preparedness to implement information communication and education policy in teaching and learning to

enhance effective learning in Kajiado North Sub-County, Kenya.

1.9 Conceptual Framework

Jabareen (2009) considers a conceptual framework as a structured set of concepts and ideas that shows the key variables or factors in a study and explains the relationships among them. It provides a clear direction for the research by showing what the researcher intends to study and how the different concepts are connected. The findings of the study indicate that teacher preparedness is a critical factor in the effective implementation of the digital literacy policy through the integration of ICT tools in teaching and learning. Teachers are the main implementers of education programs in any nation, including digital literacy programs that seek to provide learners with 21st-century skills such as digital literacy, critical thinking, collaboration, and problem-solving (Koehler, Mishra & Cain, 2022). The level of preparedness that a teacher has in relation to digital literacy is most likely to affect the effectiveness of the implementation of the information communication and education policy in the classroom. Studies on the integration of instructional technology have found that the effective use of ICT in instruction is dependent on teacher pedagogical and technological knowledge rather than the availability of technology (Harris, Grandgenett & Hofer, 2021). Hence, the assumption of the study that teacher preparedness is essential for the effective implementation of ICT policy is supported by current studies on teacher preparedness and ICT integration.

1.9.1 Conceptual Model of Teachers' ICT Preparedness and ICT Policy Implementation in Public Junior Schools in Kajiado North Sub-County

This study used three sets of variables to explain teachers' preparedness to implement the information communication and education policy through ICT aides to enhance effective learning. The first variable is an independent variable, which is teacher preparedness. Teacher

preparedness is considered a prerequisite for effective and meaningful use of tablets and other ICT aides in learning environments. From a theoretical point of view, it is argued that "the essential components of effective teaching, such as goals, engagement, and experiences, must be mediated through teachers' technology integration capacity" (Mishra & Koehler, 2020). When teachers create learning experiences that intentionally integrate technology and pedagogy, they create conditions that encourage curiosity, engagement, and learning.

The dependent variable in this study will be digital literacy program policy. Government policies regarding the use of education technology in learning processes serve as a guideline or a standard for all teachers in a particular country or region. For example, Kenya has developed an ICT in Education Policy, which has digital literacy programs aimed at ensuring that in-service teachers are provided with specific ICT professional development, while pre-service teacher training institutions are required to incorporate digital teaching skills in their curriculum (Ministry of Education, Kenya, 2024). The purpose of such policies is to ensure that teachers are competent in using technology in support of student learning outcomes, which are competency-based.

Research has shown that today, when digital literacy program policies are clear, understandable, and are accompanied by specific teacher professional learning, teacher efficacy in using technology in learning is enhanced, resulting in better learning outcomes (Voogt et al., 2021). However, according to recent findings, computer and digital technologies have been found to be related to positive educational outcomes, such as learner engagement, conceptual understanding, and positive attitudes towards school when used thoughtfully by well-trained teachers (Lei & Zhao, 2023). This supports the idea presented by the constructivist learning theories, as effective learning is evidenced by the demonstration of learners' conceptual

understanding, retention of the concepts over a period, thinking skills, and the ability to apply the concepts to new situations (Darling-Hammond et al., 2022). The TPACK model also supports the idea presented above by stating that the intersection of technological, pedagogical, and content knowledge is a significant concept for the effective integration of technology for the improvement of learners' outcomes (Koehler et al., 2022).

Therefore, a teacher with the right knowledge and skills in education technology is likely to adopt a learner-centered approach, use electronic portfolios for evaluation (homework, classwork, tests, and other performance tasks), and have effective storage and retrieval of learner performance data (Puentedura, 2021). The teacher will also be able to create quality learning sequences, develop digital learning materials such as schemes of work and lesson plans, and integrate subject matter using suitable software and digital tools. This is linked to improved learning experiences and results if the teacher is able to align technology use with learning objectives and learner needs (Hew & Brush, 2022).

The intervening variables in the study are the ones that help to address the challenges of ineffective use of ICT aides in teaching and learning. These include: the effective implementation of education and technology policies in the country through the Ministry of Education; motivating teachers to develop personal interests in the use of ICT; promoting teachers' professional development; providing adequate funding for ICT; and promoting cooperation between school management and administration. Research into the integration of ICT in the system has noted that intervening variables play an essential role in influencing the process of ICT integration (Ertmer & Ottenbreit-Leftwich, 2019). The intervening variables in the study are those that act as support mechanisms against challenges of using ICT in instruction and learning.

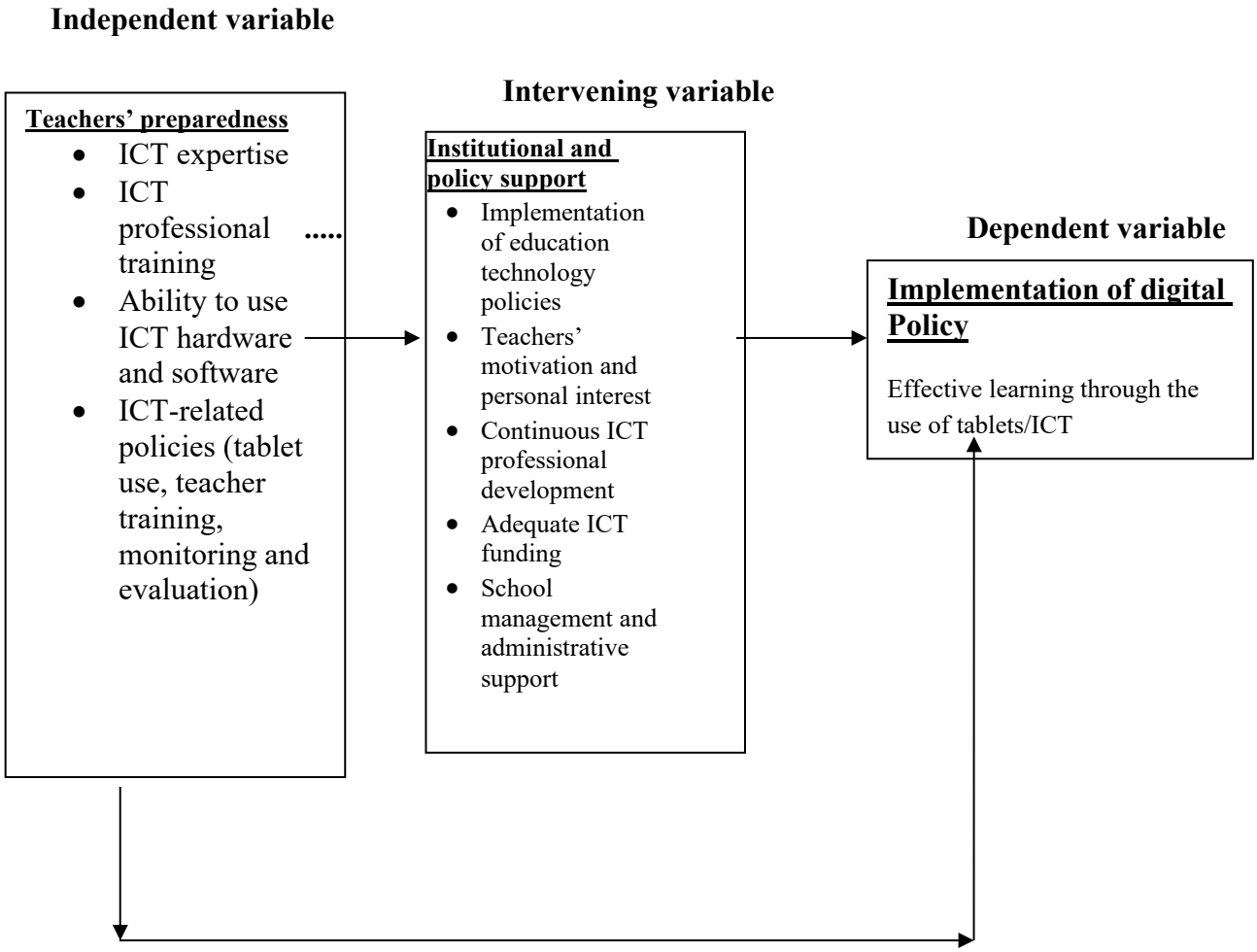


Figure 2: *Teachers' Knowledge Components in the Use of ICT Aids, Particularly Tablets, for Enhancing Effective Teaching and Learning*

The conceptual framework illustrates the relationship between teachers' preparedness to implement ICT policy and effective ICT integration in teaching and learning in public junior schools. Teachers' preparedness constitutes the independent variable, while effective implementation of ICT policy constitutes the dependent variable.

Teachers' preparedness is measured in terms of ICT expertise and competencies, ICT professional training, and the ability to use ICT hardware and software effectively. These factors

may influence teachers' capacity to implement ICT policy and integrate digital technologies, including tablets, into classroom teaching and learning.

The dependent variable, effective implementation of ICT policy, is reflected in the extent to which teachers use ICT and digital technologies, particularly tablets, to support teaching and learning activities. The relationship between teachers' preparedness and ICT policy implementation may be influenced by institutional and policy support, which constitute the intervening variables. These include the implementation of education technology policies, teachers' motivation and personal interest in ICT use, continuous ICT professional development, adequate funding for ICT programmes and resources, and school management and administrative support.

The framework therefore assumes that greater teacher preparedness may contribute to more effective implementation of ICT policy and integration of ICT in teaching and learning. However, the extent to which this relationship is realized may depend on the availability of appropriate institutional, administrative, financial, and policy support.

1.9.2 Operational Definition of Terms

Digital Literacy Ability to find, evaluates, utilize, share and create content using information technologies. It's being knowledgeable on how to use technology to interact with the world around you.

Tablet It is a form of a computer that typically is very thin, hand held, battery powered and its main interface is a glass touch screen which allows a wide variety of interaction without the use of a keyboard; designed specifically with a touch interface in mind.

TPack Technological Pedagogical and Content Knowledge

21st century skills Refers to a broad set of knowledge, skills, work habits, and character traits that are believed by educators, school reformers, college professors, employers, and others to be critically important to success in today's world.

Public School(s) School that is maintained at public expense for the education of the children of a community or district and that constitutes a part of a system of free public education commonly including primary and secondaryschools.

ICT Information Communication Technology (ICT)**,** it is a generic term used to describe a range of technology products that will store, retrieve, manipulate, transmit and analyze information electronically in digital form including the internet, broadcasting technologies and mobile phones. For purpose of this research the term ICT will be operationalized to imply laptops, desktops, tablets, projectors and other related peripheral devices for instance projectors and printers.

Pedagogy It is commonly defined as the science and art of education. It refers to the actual teaching skills a teacher uses to impart content knowledge related to a specific subject**.**

Peripheral Refers to any auxiliary or external device connected to a host computer andit expands the computer capability for instance printers, scanners, LCD projectors. In this study the term ICT tool has been used generally to includethe computer themselves, their peripherals or any other related facility.

Preparedness This is the state of being ready for something to happen, especially so for goodness (Advanced learners Dictionary, 2004). In this study, preparedness

means the prior skills and knowledge in ICT required by primary school teachers in order to implement ICT policy in instruction.

Junior School Refers to the level of basic education covering Grades 7–9. It follows primary education (Grades 1–6) and prepares learners for progression to senior school in accordance with Kenya's Competency-Based Curriculum (CBC) and the applicable education laws and policies.

Skill In this study, skill means the practical knowledge required by teachers in order to adopt ICT in instruction.

A software A program that instructs a computer to process a given data. Software's canbe categorized into open source and proprietary.

Training In this study, training means the process of acquiring professional development of a teacher in order for a teacher to handle ICT hardware.

Digital Literacy Understanding how to use a digital tool (web browsers, search engines, email, text, blogs, etc.) and ability to evaluate its content while being aware of standard behavior expected in online environment.

CHAPTER TWO

REVIEW OF RELATED LITERATURE

2.1 Introduction

This chapter presents theories relevant to the study and reviews empirical studies conducted at global, regional, and local levels. The empirical literature focuses on studies related to the current research and is organized thematically in line with the research questions and objectives. The chapter also identifies gaps in the existing literature that the current study seeks to address.

2.2 Review of Theories Related to the Study

The study was guided by three complementary theories: Curriculum Implementation Theory, Cognitive Apprenticeship Theory and Socio-Cultural Theory. The use of the three theories is justified by the multifaceted nature of teachers' preparedness in the implementation of Information and Communication Technology (ICT) policy in public junior schools. Curriculum Implementation Theory provides the overall framework for understanding how policy intentions and curriculum requirements are translated into actual teaching and learning practices. ICT policy implementation requires teachers to understand policy expectations, possess the necessary competencies, access appropriate resources and receive institutional support. The theory is therefore useful in examining the extent to which teachers are prepared to translate ICT policy requirements into classroom practice.

Cognitive Apprenticeship Theory complements Curriculum Implementation Theory by explaining how teachers acquire and develop the practical knowledge and skills necessary for

effective ICT integration. The theory emphasizes learning through modelling, coaching, scaffolding, practice, reflection and gradual development of independent competence. In the context of this study, it provides a basis for examining the contribution of teacher training, mentorship, peer demonstration, practical experience and professional support to teachers' preparedness to use ICT in teaching and learning.

Socio-Cultural Theory provides a further dimension by recognizing that teachers' learning and professional practices are influenced by their social and institutional environments. ICT implementation occurs within a community comprising teachers, school administrators, learners, parents and other educational stakeholders. Collaboration, peer interaction, leadership support, access to technological resources and the culture of the school can therefore influence teachers' preparedness and their ability to implement ICT policy effectively.

The three theories are consequently complementary rather than competing. Curriculum Implementation Theory focuses on the translation of ICT policy into educational practice; Cognitive Apprenticeship Theory focuses on how teachers develop the competencies required for ICT implementation; and Socio-Cultural Theory focuses on the social and contextual conditions that shape teachers' learning and implementation practices. Collectively, the theories provide a comprehensive framework for examining teachers' preparedness in the implementation of ICT policy in public junior schools in Kajiado North Sub-County, Kenya.

2.2.1 Curriculum Implementation Theory

The study is anchored on the Curriculum Implementation Theory developed by Gross, Giacquinta and Bernstein (1971), which explains educational change in terms of the conditions that influence the ability of implementers to translate an innovation into practice. In the context

of this study, teachers are the principal classroom-level implementers of Information Communication and Technology (ICT) policy. Consequently, effective implementation depends not only on the existence of an ICT policy, but also on teachers' competence, attitudes and self-efficacy, training and sensitization, understanding of policy expectations, institutional support and availability of ICT resources. These dimensions are interrelated and collectively influence the extent to which ICT policy is translated into actual classroom practice.

2.2.1.1 Teacher competence

Teacher competence constitutes an important starting point in the implementation of ICT policy because teachers require appropriate technological and pedagogical knowledge and skills to transform policy intentions into classroom practice. Gross et al.'s implementation perspective suggests that implementers must possess adequate knowledge of an innovation before they can implement it effectively. In ICT-supported education, this implies that teachers should not only know how to operate digital devices but should also understand how to integrate them into teaching and learning.

Empirical evidence from Kenya supports this argument. Isaboke (2018), in a study of lower public primary school teachers in Nyamira County, examined teacher preparedness as a predictor of ICT integration in pedagogy. The study established that teacher training and ICT competency significantly influenced the integration of ICT into the teaching-learning process. The study therefore recommended capacity building through workshops and seminars. Similarly, Kiugu, Kibaara and Wachira (2019), in their study of public primary schools in Meru County, found that teachers were inadequately prepared for digital learning integration and that few had received appropriate training, particularly training incorporating pedagogical skills. They concluded that teachers require a strong foundation of knowledge and skills to use digital

learning resources effectively.

These findings demonstrate that possession of ICT devices does not necessarily translate into effective implementation. Rather, teachers require the technological and pedagogical competencies to use the available technologies meaningfully. Therefore, in the present study, teacher competence is conceptualized as teachers' ability to operate ICT devices, access and use digital learning resources, integrate ICT into lesson preparation and delivery, and apply ICT appropriately in assessment and learner engagement.

2.2.1.2 Teachers' attitudes and self-efficacy

Competence alone may not guarantee implementation. Teachers must also have positive attitudes towards ICT and confidence in their ability to use technology. This argument is consistent with Gross et al.'s focus on the implementer as a critical determinant of successful educational change. Teachers who perceive ICT as useful and who believe that they can successfully use it are more likely to incorporate it into their teaching practices. Wambiri and Ndani's study of Kenyan primary school teachers provides particularly strong evidence for this construct. The researchers examined teachers' beliefs, attitudes, computer self-efficacy and computer competence in relation to ICT teaching. They argued that providing computers and other infrastructure would not automatically result in ICT integration unless teachers' beliefs, attitudes, computer competence and self-efficacy were addressed.

This finding is significant for the present study because teachers may have access to tablets or other ICT devices but may fail to use them effectively if they lack confidence or perceive technology as difficult, irrelevant or disruptive to established teaching practices. Thus, teachers' attitudes and self-efficacy constitute an important dimension of preparedness, since they determine the extent to which teachers are willing and confident to experiment with,

adopt and sustain ICT-supported teaching practices.

2.2.1.3 Training and sensitization

Training and sensitization constitute another critical condition for successful implementation. According to Gross et al.'s implementation perspective, teachers require appropriate preparation and assistance to understand and implement an educational innovation. Training provides teachers with the knowledge and practical skills necessary to move from awareness of an innovation to its actual use.

The Kenyan evidence strongly supports this proposition. Kiugu et al. (2019) found that teachers in Meru County had not been adequately prepared for digital learning integration. Few teachers had received training, pedagogical skills were insufficiently addressed, and there was inadequate follow-up of trained and untrained teachers. The researchers recommended continuous professional development and more comprehensive training incorporating both content and pedagogy. Likewise, Isaboke (2018) found that teacher training significantly influenced ICT integration and recommended capacity building through workshops and seminars. Shikomera, Mulwa and Mwania (2023) similarly investigated ICT teacher training and integration in Kenyan public primary schools and reported concerns regarding inadequate ICT training, leading them to recommend additional training to improve ICT integration.

The implication is that training should not be viewed as a one-off activity preceding policy implementation. Rather, teachers require continuous professional development, practical training, refresher courses, peer support and follow-up. In the present study, training and sensitization will therefore be examined in terms of teachers' exposure to ICT training, frequency and adequacy of training, practical ICT-pedagogical preparation, awareness activities and continuing professional development.

2.2.1.4 Policy clarity

Policy clarity is important because teachers cannot effectively implement a policy whose objectives, expectations and procedures they do not understand. Gross et al.'s implementation perspective emphasizes the importance of implementers understanding the innovation they are expected to adopt. Translating this principle to ICT policy means that teachers should have a clear understanding of what the ICT policy requires, their specific responsibilities, and how ICT is expected to be incorporated into teaching and learning.

This dimension is particularly important in the Kenyan context because ICT implementation involves translating broad national policy intentions into specific classroom practices. The findings of Masingila et al. (2018/2019) demonstrate the importance of understanding what teachers are actually expected to do with technology. Their study of Kenyan public secondary schools examined ICT availability, teacher training, teachers' perspectives regarding the role of ICT and factors influencing ICT integration. The study found that although many teachers were implementing ICT in some form, relatively few were integrating it extensively into teaching and learning.

This distinction between using technology and integrating technology pedagogically is important to the present study. Teachers may possess ICT devices and occasionally use them without necessarily implementing the ICT policy in the manner intended. Consequently, policy clarity will be examined in terms of teachers' awareness of ICT policy objectives, understanding of implementation requirements, knowledge of their responsibilities and understanding of how ICT should support curriculum delivery.

2.2.1.5 Institutional support

Gross et al.'s theory further implies that successful implementation occurs within an

organizational environment. Teachers therefore require support from school leadership and other education stakeholders. Institutional support can include supervision, technical assistance, encouragement, provision of professional development opportunities, collaboration among teachers and administrative commitment to ICT integration.

The findings of Kiugu et al. (2019) are particularly relevant here. Their study found limited teamwork and collaboration among the Ministry of Education, Parent-Teacher Associations, Sub-County Directors of Education and head teachers in managing digital learning training and implementation. The researchers consequently recommended stronger continuous professional development and coordinated support. Masingila et al. similarly examined multiple factors affecting ICT integration in Kenyan public secondary schools rather than treating teacher behaviour as an isolated phenomenon. Their study illustrates that technology integration is influenced by the interaction between teacher-related and school-level factors.

Therefore, the present study will examine institutional support as the extent to which school leadership and education stakeholders facilitate ICT implementation through supervision, technical assistance, encouragement, collaboration, professional development and maintenance of ICT facilities. This is important because even a competent and motivated teacher may be unable to implement ICT policy effectively without an enabling school environment.

2.2.1.6 Availability of ICT resources

The availability and accessibility of ICT resources constitute another important condition for implementation. Although Gross et al.'s theory focuses strongly on the implementer and organizational conditions, its application to ICT policy necessarily requires consideration of whether teachers have the material means to implement the innovation. Kiugu, Kibaara and Wachira (2021) specifically examined the adequacy of resources for digital learning

implementation in public primary schools in Meru County. Their study investigated the preparedness of schools in terms of digital learning resources and highlighted resource-related challenges associated with implementation.

Wambiri and Ndani also cautioned that providing computers and infrastructure alone does not automatically produce ICT integration. This provides an important theoretical distinction for the current study: resources are necessary but not sufficient for implementation. ICT devices such as tablets, computers and projectors need to be accompanied by electricity, internet connectivity, digital content, maintenance and technical support.

Accordingly, this study will assess the availability, accessibility and functionality of ICT resources, including tablets and computers, internet connectivity, electricity, digital learning materials, ICT infrastructure and technical support. The study will establish whether the availability of these resources facilitates or constrains teachers' implementation of ICT policy.

2.2.1.7 ICT policy implementation

The preceding constructs ultimately converge on the actual implementation of ICT policy. Gross et al.'s theory provides the underlying logic that implementation is the outcome of conditions surrounding the implementers and the innovation. Thus, teachers' competence, attitudes and self-efficacy, training, policy clarity, institutional support and availability of resources are not independent considerations; rather, they interact to determine the extent to which ICT policy is translated into classroom practice.

This relationship is demonstrated by Masingila et al., whose study found that although teachers in Kenyan public secondary schools were using ICT to some extent, relatively few were fully integrating technology into teaching and learning. Similarly, Isaboke (2018) established a significant relationship between teacher training and ICT competency and ICT integration in

pedagogy. These findings suggest that the implementation of ICT policy should be assessed not merely by whether teachers have access to ICT or occasionally use digital devices, but by the extent, consistency and pedagogical appropriateness of ICT integration in teaching and learning. For the present study, ICT policy implementation will therefore be assessed through teachers' actual use of ICT devices and digital resources in lesson preparation, classroom instruction, learner engagement, assessment, communication and other curriculum-related activities.

2.2.2 Cognitive Apprenticeship Theory

The theory of Cognitive Apprenticeship was first proposed by Brown, Collins, and Duguid and can also be referred to as situated learning theory. Today, learning theorists agree that the theory is very valid and applicable, especially when learning takes place in a technology-rich environment, especially when complex cognitive and/or technology skills are taught (Collins, 2019; Schunk, 2020). This theory focuses on models of instruction, including modeling, coaching, scaffolding, articulation, reflection, and exploration.

Recent studies emphasize the importance of cognitive apprenticeship, which facilitates learning through interaction, cooperation, and the acquisition and sharing of knowledge, particularly within learning communities (Lave & Wenger, 2020). In the virtual learning environment, ICT tools are beneficial in the cognitive apprenticeship approach since they facilitate collaborative work environments, inter-personal feedback, as well as virtual mentoring, also referred to as tele-apprenticeships (Dennen & Burner, 2022). This allows the learner to access the expertise beyond geographical constraints, which is beneficial in environments with limited learning resources.

The theory identifies that skill acquisition follows from the learner going through three

different stages, the cognitive stage, where declarative knowledge is developed; the associative stage, where errors are addressed; and finally, the autonomous stage, where fluency and expertise are observed (Anderson, 2020). Coaching and scaffolding remain integral to all these stages for effective feedback to be provided to the learner before he/she becomes independent.

The approach of cognitive apprenticeship has several strengths: It strongly aligns with competence-based education and digital literacy goals. The theory underpins experiential hands-on learning and expands on learning-by-doing, mentoring, and guided practice, necessary for developing teachers' digital competencies under the framework of CBE (UNESCO, 2023). Again, the cognitive apprenticeship will promote collaborative learning and professional knowledge sharing while enabling teachers to learn ICT skills from peer mentoring, lesson demonstrations, and collaborative digital content creation.

Despite these strengths, there are significant limitations with the theory. Researchers in the modern day notice that much knowledge of experts is in forms that are usually not easy to articulate; this may make full explication of reasoning and strategies by mentors quite hard to achieve for learners (Schunk, 2020). This may limit effective knowledge transfer, particularly where teachers lack strong pedagogical training in ICT integration. In addition, the theory has a tendency to rely a great deal on modelling and observation, with limited attention to structured assessment mechanisms by which to determine whether meaningful learning has taken place (Dennen & Burner, 2022). In digitally diverse environments, free access to information can actually expose the learner to information inappropriate for local curricular needs, thereby weakening contextual relevance.

In this instance, the Cognitive Apprenticeship Theory can be considered, as this theory can assist in explaining the way teachers in public schools learn to develop digital literacy

competence through processes such as mentoring and social interactions. In relation to the teachers' preparedness to effectively implement the Information communication and education policy in the context of the CBE program in the Kajiado North Sub-County, the theory can also be applied, specifically through the learning processes observed through modelling with teachers possessing digital competence, and also teachers learning independently. Nevertheless, because this theory is greatly focused on modeling and has no clear and sufficient conceptualization of supportive factors such as adult learning, learning environment, and limitations, the theory cannot independently explain the teachers' preparedness. In deducing the application of the theory, therefore, the Cognitive Apprenticeship Theory can be applied, but not independently, and consideration must also be made of other theories addressing teachers' preparedness.

2.2.3 Socio-cultural Theory

Vygotsky's Socio-Cultural Theory of Learning, developed in 1978, revolves around the central assumption that human learning and cognitive development are socially constructed and culturally mediated. The theory is based on the assumptions that knowledge does not develop in the mind of an individual in isolation, but rather grows out of social interaction, language, and culture shared by individuals (Schunk, 2020). According to Vygotsky, learning can be characterized as a social contextualized process that leads development and shapes higher mental functions.

The basic tenet of the theory revolves around the following statement: cognitive development happens on two interrelated levels—one social, in which learning occurs under the guidance of the more knowledgeable other, be it a teacher, a peer, or a mentor, and the other individual, in which the social knowledge obtained is integrated into the learner's cognitive structure (Woolfolk, 2023).

The other important concept or base upon which the learning theory is built is the role of cultural tools that are given to human beings by society in the process of learning. According to Vygotsky, cultural tools like speech, writing, symbolization, or technological devices affect the ways humans think, reason, or solve problems (Illeris, 2021). The current cultural tool that mainly affects the learning processes of people is digital technology.

Another fundamental tenet of the theory is that learning is mediated by cultural tools, among them language and symbols. Vygotsky insisted that the ability for speech, writing, symbols, and technological artefacts provided by society are shaping the way people think, reason, and solve problems, according to Illeris (2021). Digital technologies represent one more cultural tool within contemporary contexts, considerably mediating learning and cognitive development.

One of the main concepts that the theory relies on is the Zone of Proximal Development (ZPD), which entails the zone between which an individual can accomplish something on their own and can be assisted by another knowledgeable person. Learning, according to the premise, can be maximized when the instruction offered revolves within this zone and scaffolding, which entails modelling, questioning, and giving feedback, is provided (Schunk, 2020). As the learners become proficient, the instruction or support is slowly relieved.

The theory's focus on social interaction, collaborative work, and guided learning is one of its most significant strengths, especially in competence-based and technology-rich learning situations. This emphasis on collaborative work, peer mentoring, discourse, and modeling is essential for learning and developing digital competency. The reference to tools as a mediator of learning is also close to the spirit of digital literacy programs, where ICTs are used as instruments for communicating, collaborating, and learning (UNESCO, 2023).

Though the theory has several strengths, it also has a number of drawbacks and limitations. First and foremost, the theory underplays the importance of the learners themselves and overplays the role of social supports; also, the aspect of ZPD does not use a standardized scale for measurement purposes and mostly explains the process of learning for children, and the process for adult learners and further aspects of autonomy and self-directed learning for teachers is not well explained under the theoretical model (Woolfolk, 2023).

From this perspective, socio-cultural theory offers a good foundation for understanding the factors that may influence teachers' preparedness for implementing the Information communication and education policy through the CBE approach. For example, in public schools across Kajiado North Sub-County, teachers may be able to build digital competency through collaborative support and mentoring by colleagues who are competent in ICT. However, since this theory does not satisfactorily capture crucial factors, such as individual learning aspects, on one hand, and institutional potential, individual agency, and the role of technology, on the other, it is not applicable for determining teachers' preparedness for implementing the Digital Literacy Policy. Thus, although it offers an excellent foundation for understanding factors that influence social learning, it must be considered in association with other theories.

2.3 Review of Related literature

This section reviewed scholarly literature that focuses on teacher's ICT expertise, ICT professional training for teachers and ICT use in learning. It also gives a summary in knowledge gap for the study.

2.3.1 Teachers' Expertise in Information and Communications Technology Aides

Learning has always been seen as a force for change and transformation in society. In the past, education has been seen as a way of instilling values, knowledge, and skills necessary for the active participation of citizens in various aspects of society (UNESCO, 2020). Education has been seen as a way of empowering people to succeed in diverse and plural societies, especially the poor and vulnerable, by enabling them to actively engage in various aspects of society. International development agendas have increasingly recognized the importance of equitable and inclusive quality education that not only enhances access but also enables the development of the necessary competencies for active engagement in society and the economy (UNESCO, 2021). The key change in the approach to education has been the adoption of the Competency Based Education (CBE) approach globally, which is designed to go beyond the traditional approach of memorization and instead focus on the development of competencies necessary for the 21st century, including critical thinking, collaboration, and digital literacy (Smith & Lee, 2022).

However, at the center of actualizing the results of CBE are teachers, who are deemed instrumental in determining the degree to which education innovations are actualized in the classroom setting. Conventional instructional strategies involve didactic approaches to teaching, where lecturing and recalling of knowledge are prominent features of teaching methods. However, with the advent of CBE, teachers are encouraged to adopt more learner-centered approaches to teaching (Smith & Lee, 2022). These changes in teaching strategies necessitate teachers to effectively use digital technologies in the classroom setting, encourage learner collaboration in solving problems, and continually assess learners' competency in knowledge rather than their ability to recall knowledge (Hew & Brush, 2022). Therefore, it is essential to understand teachers' preparedness in terms of knowledge, skills, attitudes, and professional

practices to actualize the implementation of digital literacy strategies in the classroom setting, as espoused in the CBE policy (Hennessy et al., 2021).

At the global level, Scherer, Howard, Tondeur, and Siddiq (2022), in their empirical study titled “An International Survey to Examine Teachers' Readiness and Expertise to Implement ICT to Deliver Learner-Centered Instruction within Competence-Oriented Curricula,” used a large sample to empirically examine the influence of readiness and expert teachers' technological and pedagogical content knowledge on effective instructional design in a digitally mediating educational setting. The researchers used a large sample of 2,186 teachers in Germany, Belgium, the US, and Singapore to conduct a quantitative study applying a cross-sectional survey approach, followed by a qualitative approach to use structural equation modeling (SEM) to understand relationships between ICT competence, specific instructional practices, and learner engagement. The results showed that "teachers' ICT pedagogical competence was significant in predicting effective learner-centered instruction $\beta=.42$, $p<.01$"; this is a fundamental aspect of CBE methodology. There was a limitation to the overall study in relying on teachers’ self-reported data, although this does not reflect the actual use of ICT competencies within a class setting, a factor to be addressed in a developing country scenario.

The OECD (2021), similarly explored teachers’ ICT competence in developing competence-based learning environments in OECD member and partner countries, including Australia, Canada, Chile, Mexico, and the United Kingdom. The focus of the study was on how teachers’ digital competence influenced the aspects of instructional sequencing, formative assessment, and learner autonomy-those viewed as key pillars of CBE. The study used secondary data from the Teaching and Learning International Survey (TALIS) and adopted a correlational research design with the application of multivariate regression analysis. The results showed that

teachers with higher ICT competencies were significantly more likely to adopt inquiry-based and project-based learning methods at a probability level of less than 0.05. Despite these results, the OECD study was essentially policy-oriented and did not sufficiently situate ICT competence within resource-limited schooling ecologies. Thus, it provided a fertile ground for localized studies.

In this respect, Adarkwah (2021) explored, from a continental perspective, teachers' ICT competence and pedagogical practices in Ghana, Nigeria, and South Africa, focusing on learner-centered and competence-based instructional approaches. This study followed a mixed-methods approach through survey questionnaires and interviews with basic education teachers. Quantitative data were analyzed using multiple regression analysis, while qualitative data were thematically analyzed. The findings indicated that the teachers' ICT competence significantly influenced instructional adaptability and learner engagement, at $R^2 = .38$, $p < .01$. However, the study found that many teachers continued to use traditional pedagogical approaches despite having basic ICT skills. Also, the study did not clearly relate the findings to CBE frameworks, therefore creating a conceptual gap which this study intends to fill.

In another study conducted across all of Africa, Tondeur et al. (2023) explored the predictors of effective ICT integration for learner-centered teaching approaches in six countries in Sub-Saharan Africa: Ghana, South Africa, and Zambia. This study concentrated on the teachers' training, beliefs in teaching, and ICT expertise as factors affecting competence-based teaching. In the course of the study, a mixed-methods research approach was applied. Thus, the study surveyed 1,024 teachers from the six mentioned countries. Afterwards, the quantitative collected data were subjected to logistic regression analysis. From the analysis, it was evident that teachers who undertook training in ICT pedagogical training were likely to offer

competence-based ICT instruction (Odds Ratio = 2.7, $p < .05$). There was, however, no evidence of differentiation of ICT inclusion in terms of different ICT aides, such as tablets, learning management systems, and assessment tools, which proved an omission in the methodology of the research.

At the national level in Kenya, Mwangi and Kihoro (2022) explored the relationship between teacher ICT competence and the implementation of the CBC in public junior schools in the nations of Nairobi, Kiambu, and Nakuru states. The research was specifically on the capability of teachers in utilizing ICT aides for learner-centered techniques, formative assessment, and the development of skills in learners. In this study, a convergent mixed-methods research approach was utilized, and questionnaires and interviews were conducted with 312 teachers. Quantitative research was conducted through Pearson correlation and multiple regressions, and the qualitative was done through theming. In this research, it was noted that the correlation coefficient was moderate and statistically significant for the relationship between teachers' ICT competence and effective CBC implementation ($r=.46$, $p < .01$). The area of the use of continuous professional development and mentorship was not adequately explored in this study. Further, the preparation levels of teachers to implement CBC using ICT aides across the country were evaluated through a national study conducted by the Kenya Institute of Curriculum Development (2023). The study aimed to investigate teachers' levels of preparedness to use ICT aides for teaching and assessment using all 47 counties as a study group.

Another study, conducted by Njoroge, Mutisya, and Limo (2024), on teachers' readiness to incorporate ICT aides in supporting CBC implementation in Kajiado County, Kenya, approached this research theme from a broader perspective at the county, rather than sub-county, level, i.e., dealing with aspects of teachers' proficiency, pedagogy, and learners' engagement.

This study collected data through questionnaires, interviews, and observations and then analyzed it using a concurrent mixed-methods approach, analysis of variance being employed for quantitative components, while thematic analysis was opted for qualitative components. The study's findings revealed significant differences based on teachers' experience in relation to ICT competence, $F(2,147)=6.31$, $p<0.01$, showing that younger teachers were more proficient in ICT, while this study does not focus on KC as a sub-county and does not touch upon any aspects of ICT mentoring programs, which are both context and scope-related gaps.

Although several studies have shown that teachers' ICT proficiency is a significant factor in influencing competence-based education in recent studies, there is a lot of lacunae in the application of certain ICT aides, professional development support, and contextualized application. In addition, little concurrent convergent mixed-methods study was used to measure teachers' self-reported ICT competence and instructional application. This study was therefore prompted to address these gaps in motivating teachers' expertise in ICT aides and CBE.

2.3.2 ICT Professional Training for Teachers

The move towards a knowledge-creation-based world economy in terms of digital services has emphasized the need to impart digital skills in learners. For instance, economies such as those of member countries of the Organisation for Economic Co-operation and Development (OECD) have emphasized the need for advanced digital skills in learners, as these have become important in achieving competitiveness in the world economy (OECD, 2021). Studies such as the Program for International Student Assessment (PISA), which measures ICT readiness in large-scale contexts, have emphasized the fact that teacher digital preparedness is an issue of concern in many contexts, with some countries such as Singapore, Sweden, and the United States being ranked high in teacher digital preparedness, while others lag in achieving

this due to various challenges (OECD, 2021). This emphasizes the fact that even in high-income economies, teacher confidence in the use of ICT plays an important role in the quality of digital pedagogy in achieving competency in learners (Li & Lalani, 2020; Zhao et al., 2021).

Moreover, empirical research at the global level supports the need for teacher preparation in terms of digital integration. In the case of Finland, Sahlberg (2020) noted that teachers showed high levels of digital competence and confidence in the use of ICT in their pedagogical practices, in line with the national digital strategy in the country. In this context, it was noted that the teachers in Finland were able to use the benefits of digital tools, such as the facilitation of collaboration, critical thinking, and problem-solving in their students, which are essential in the context of competency-based curricula. Moreover, it was noted that the teachers in Finland showed high levels of preparedness in the context of the use of ICT, despite the changing nature of technology, through the provision of professional development opportunities to the teachers in the country, which is essential in the context of the use of digital tools in the facilitation of the competencies of the students in the context of the curriculum in the country. Additionally, Finland's case highlighted the significance of policy coherence, adequate infrastructure, and teachers' professional learning opportunities in supporting teachers to meet changing digital needs. These studies emphasize that teacher preparation for digital literacy education is not just an issue of competence but also of confidence and an environment that supports teachers in translating policy into practice, which they can model for other countries.

In the context of New Zealand, for example, the latest data released by the OECD indicates that the total government expenditure on education for primary to tertiary levels currently sits at 5.1% of the country's GDP, well above the OECD average of 4.7% (OECD, 2025). This investment serves as the foundation for the further development of digital education

systems. Moreover, more recent research carried out to examine the digital competence of teachers in the country indicates that although there is engagement with digital tools to varying degrees, there are different practices when it comes to adoption levels ranging from basic to advanced pedagogical uses, further emphasizing the need for capacity development (Niu & Rajendran Niranjan, 2025). These factors demonstrate the global trend toward developing digital learning environments but also emphasize the need for teacher preparedness to effectively integrate technology to enhance competency-based learning.

Across SSA, there is an ongoing digital transformation in education as part of CBEs in various countries, but teacher preparedness is an issue that keeps on emerging as a challenge. For example, the OER4Schools teacher professional development program in South Africa focused on providing teachers with open educational resources and professional development opportunities on how teachers could pilot ICTs in teaching subjects (Govender & Chetty, 2021; Makoelle, 2022). Although there has been significant progress in digital transformation in education, national evaluation reports from various SSA countries continue to highlight teacher preparedness as an issue, citing teachers' lack of access to digital resources and professional support systems (Govender & Chetty, 2021).

Similarly, in Ghana, Agyeman & Asiedu (2020) conducted research on the digital competency of teachers in the country and their capacity to integrate ICT in teaching basic school students. The research findings revealed that despite the majority of the teachers acknowledging the significance of digital literacy in improving learning outcomes and preparing students adequately for the demands of the 21st century, their capacity to integrate ICT in teaching was significantly hampered by lack of access to digital devices, lack of reliable internet connectivity, and lack of professional support in enhancing their digital literacy skills. Most of

the teachers were quoted as saying they lacked confidence in planning technology-enhanced learning lessons and meaningful integration of digital literacy in competency-based learning. This highlights the point that teacher preparedness is not just about attitude; it also significantly depends on their capacity through professional support. In the African education system, where most of these systems are challenged by lack of resources, these issues are of paramount importance in enhancing the effectiveness of competency-based digital literacy programs in the region.

In Rwanda, strategic initiatives have been made to enhance digital literacy and integrate ICTs in the education sector. This is based on the country's vision 2020 and successive ICT strategic plans. Recently, the Rwanda Basic Education Board distributed 18,500 laptops, projectors, and screens to 101 selected schools in eight districts. This was part of the overall initiative to enhance the development of "smart classrooms" to support ICT and digital literacy in the country (All Africa, The New Times, 2025). This initiative followed other major ICT infrastructural developments in the country. For example, by 2023, Rwanda had increased the number of teachers using laptops to 16,517 compared to 4,823 teachers by 2017. This was part of the overall initiative to distribute more laptops to teachers as part of the One Laptop Per Teacher initiative. This initiative was expected to be scaled up further to more teachers (REB, 2023 cited in AllAfrica, 2024). Further, the One Laptop per Child program has distributed hundreds of thousands of laptops to primary schools, with the establishment of a smart classroom in many schools for the effective implementation of competency-based approaches and 21st-century learning strategies (Ministry of Education, Rwanda, 2025). Yet, the challenges faced with limited internet connectivity, a lack of practical training for teachers, and the use of ICTs in everyday teaching and learning demonstrate the need for teacher capacity development if the effective

implementation of digital literacy policies can be achieved for competency-based approaches.

Further, research undertaken to assess the ICT integration among pre-service teachers in Rwanda revealed the prospects and challenges of teacher preparedness in the implementation of digital literacy. The research revealed that the pre-service teachers showed positive attitudes towards the value of digital literacy. The pre-service teachers understood the value of ICT in facilitating learning. ICT, through digital literacy, offers access to various educational resources. It also offers the opportunity to develop interactive student-centered learning approaches, which are fundamental in competency-based education (Niyibizi et al., 2025). Despite the positive attitudes of the pre-service teachers, the research revealed the challenges the pre-service teachers encountered in the implementation of digital literacy. The pre-service teachers lacked access to ICT infrastructure, lack of exposure to ICT, and lack of access to the internet. The challenges the pre-service teachers encountered in the implementation of digital literacy revealed the challenges of teacher preparedness in the implementation of digital literacy. These impediments diminished their willingness to effectively assimilate digital technology into their teaching practices. The study demonstrates that teacher preparedness in digital literacy goes beyond mere motivation and attitude, but it requires substantial support, both professionally and institutionally, as well as technological support. This Rwandese experience, therefore, demonstrates a general phenomenon in East Africa, where though teachers may be inclined towards digital literacy, there is a need to ensure that competency-based curricula are effectively implemented, alongside teacher preparedness in facilitating 21st-century learning outcomes.

In Kenya, the implementation of the Competency-Based Curriculum (CBC) is a clear demonstration of a country's resolve to ensure that its learners are equipped with critical skills that are essential in the 21st century, including digital literacy. National initiatives, such as the

Digital Master Plan 2022-2032 and the digital literacy project, are aimed at ensuring that there are gadgets, connectivity, and a framework for integrating ICT in teaching and learning (Ministry of Education, Kenya, 2023). However, studies indicate that teachers are not adequately prepared to ensure that there is a smooth translation of information communication and education policy into practice. Murithi and Yoo (2021) conducted a study on teachers' use of ICT in implementing the CBC in Kenyan public junior schools. Findings indicated that although teachers received basic computer literacy training, a majority of them felt that ICT training was inadequate, and there was inadequate infrastructure.

The Kenyan government has continued to make impressive investments in ICT infrastructure and digital literacy programs geared towards the transformation of the teaching and learning process in public schools. Key to this is the Digital Literacy Programme (DLP), also referred to as the DigiSchool Programme, geared towards the integration of technology in basic and higher education through the provision of digital literacy and devices to learners and teachers, and the enhancement of ICT literacy in the classrooms (Ministry of Education & ICT Authority, 2023; UNESCO, 2023). As part of the DLP, over 75,000 teachers in public junior schools have been trained to be ready to adopt the digital teaching and learning process, with the aim of enhancing the digital literacy levels of the country and the implementation of the Competency-Based Curriculum (CBC) in the country using technology integration. This is a massive capacity-building program, marking a move from the initial focus on laptops to the development of a new ecosystem of digital learning that goes beyond the provision of laptops and other digital tools to teachers and learners (ICT Authority, 2025)

For instance, research conducted recently on pedagogical readiness for digital innovation [though the study does not appear to specify a particular geographical location or study site]

indicated that although many educators are appreciative of the potential offered by digital tools and resources, there are gaps in professional development and institutional support that hinder their readiness to adopt technology-enriched pedagogies (Yulin, Ning & Danso, 2025). Moreover, research on self-efficacy of teachers in terms of readiness to teach digital innovations such as artificial intelligence in Sri Lanka indicated that low self-efficacy due to low knowledge and negative emotions hindered the readiness of teachers to adopt digital innovations, although the environment is digital-friendly (Rajapakse, Ariyarathna, & Selvakan, 2024).

The United States study by Darling-Hammond, Flook, Cook-Harvey, Barron, and Osher (2021) revealed that the impact of professional training programs on teachers' digital literacy, ICT integration into teaching, and teaching confidence was profound. It revealed that "when professional development programs are carefully designed to align with the goals of competency-based education, teachers are better able to create technology-enriched instruction, facilitate interactive learning, and measure students' mastery of key competencies." It is, however, interesting to note that the study revealed that it is not possible for teachers to effectively apply the skills they have learned from training programs without adequate ICT infrastructure. It revealed that "in schools where infrastructure was limited, teachers struggled to apply the skills they had learned from training programs because they had insufficient devices, internet connectivity, or technical support." This reveals that it is not possible for digital literacy to be successfully integrated into CBE without adequate ICT infrastructure.

The paper by Dzidzornu et al. (2025) reports on a cross-sectional study that assessed digital literacy competency among student teachers in Ghana with reference to the UNESCO ICT Competency Framework for Teachers (ICT-CFT). The results showed that though student teachers were at a foundational level of ICT skills, most of the teachers were not confident in

using these ICT skills pedagogically to support the CBE outcomes. Other barriers included inadequate infrastructure, unreliable internet access, and a lack of application-oriented training that tends to indicate that development in digital literacy needs to move beyond foundational skills toward pedagogical use in competence-focused curricula.

ICT integration by teachers in broader global research also speaks to the complex interplay between teachers' beliefs, access to technology, and pedagogical practice. A recent global model in ICT integration showed that personal factors, such as access to ICT resources, professional support, and pedagogical beliefs, greatly affected how teachers integrated ICT into instruction. Although not specific to a single country, this indicates that teacher beliefs about ICT and supportive conditions are of crucial importance for the effective adoption of ICT aides in competence-based learning environments.

Shayo and Mnyanyi (2023) conducted a study on the integration of ICT use in teacher education from a competency-based perspective in Tanzania Mainland. By using a mixed approach with a sample of 177 participants consisting of teacher trainees and tutors, the authors concluded that access to ICT resources and training could greatly influence the overall integration of ICT into teaching and learning processes. It was noted that while participants recognized the benefits of ICT use, there existed some disconnects related to the overall pedagogical application of ICT instruments. This is to highlight the fact that access to ICT resources and training can greatly influence the capacity level of someone involved in ICT use in a teaching and learning process.

Kalinga (2024) explored the technological literacy of the teachers in the integration of ICT in public secondary schools in Tanzania, from the perspective of the role played by the teachers' competencies in the implementation of the competence-based curriculum policy. The

major findings of the study revealed that despite some teachers' knowledge of the national policy in ICT in education, as well as the policy on ICT in Tanzanian education, the majority, or about 85%, did not utilize ICT tools as the teachers applied their knowledge in the classroom as pedagogical tools, relying on simple ICT tools such as smartphones and laptops.

Opicho et al. (2025) examined how the digital literacy skills of teachers in Westlands Sub-County, Nairobi, were related to the implementation of CBC through a descriptive survey design with 61 teachers. From an inferential point of view, the χ^2 test indicated a statistically significant association between digital literacy and CBC implementation: $\chi^2=32.050$, $p<.001$. This suggests that those with more developed digital literacy were more effective in adopting digital tools aligned with competency-based instructional goals. This finding underscores the need for ongoing professional development focused on ICT practices supporting learner-centered activities at the heart of CBE rather than limited training aimed at basic digital skills alone.

In a mixed-methods study conducted by Omar, Warfa, and Karienye (2025), teachers' digital literacy was measured against the integration of ICT into teaching in Garissa Township, Kenya. The results showed that when the teachers' digital literacy improved, it was positively related to the integration of ICT. Therefore, improved digital competence among the teachers underpins effective uses of digital aides in classrooms. However, differentiated training on ICT and professional learning communities beyond the training showed gaps that point to the relevance of sustained and context-responsive professional development initiatives in strengthening digital pedagogies.

Kairo, Njagi, and Kamweru (2021) undertook a study in Meru South Sub-County with the aim of evaluating teacher ICT preparedness for the implementation of the CBC curriculum. The study revealed that the majority of teachers were not adequately exposed to digital tools and

lacked the necessary training in terms of technology. The authors suggested that the teachers be provided with in-service training and technical support staff for better teacher preparedness and successful CBE curriculum implementation.

A study conducted in Baringo County revealed that the success of the digital literacy project implementation was influenced by factors related to the school leadership and support, while the teacher's ICT competence was the core factor for the successful integration of ICT in the classroom for the CBE curriculum implementation. In addition, the study conducted in Kiambu District revealed that the teachers' attitude towards ICT, resource availability, and training levels were factors that influenced teacher preparedness for the digital literacy project, although the study revealed training gaps for the successful integration of ICT for the CBE curriculum implementation. Further, in a study by Hennessy, Onguko, and Harrison (2021), the implementation of CBC in Bomet East Sub-County was evaluated, and it was found that teacher preparation, training, and planning played a pivotal role in determining the success of competency-based education outcomes. The importance of incorporating digital literacy skills in teacher readiness frameworks was emphasized in this study.

Most importantly, research that examines broader CBC teacher preparedness in Kenya reveals themes that are relevant for digital literacy implementation. For example, research that examined teacher preparedness in Kiambu Sub-County revealed that although many teachers were exposed to training that focused on CBC, there were challenges with digital and assessment skills. This shows that overall preparedness, apart from general teacher preparedness, is important for effective curriculum implementation (Hennessy et al., 2021). In addition, research that examined CBC implementation in Bomet East Sub-County revealed that teacher preparedness, training, and planning are significant predictors of effective CBC implementation.

In Kajiado County, a study on the integration of ICTs emphasizes basic challenges that are directly linked to teacher preparedness for the implementation of digital literacy policies. In a study that evaluated factors that affect the integration of ICTs in resource planning in secondary schools in Mashuuru District, it was established that teachers generally had moderately positive attitudes towards ICTs, acknowledging that ICTs can save time, simplify lesson planning, and improve efficiency in school work. However, the same study identified a lack of training opportunities on sophisticated digital technology, indicating that although teachers may value the potential of ICTs, their levels of competence and preparedness for in-depth use in teaching and learning skills are still low (Asibah, Obae, & Mbeche, 2021). This indicates that mere teacher attitudes are not enough, and there is a need for professional development and capacity building of teachers to enable them to apply ICTs meaningfully in teaching and learning skills that are fundamental in the implementation of digital literacy policies within the framework of competency-based education.

Supporting this, more recent research aimed at evaluating the challenges to the utilization of ICT tools in the public secondary schools in Kajiado North Sub County found that lack of ICT tools, lack of power/electricity, lack of enough internet access, and lack of teacher knowledge of how to use ICT to enhance the learning process were among the major challenges to the utilization of ICT tools (Maranga, 2024). This finding further emphasizes the point that teacher preparedness, which is more than attitude but also includes competence and utilization of ICT to enhance the learning process, is a barrier to the realization of the digital literacy and modern pedagogical approaches embedded in the CBE.

Therefore, these studies show that gaps exist at several levels. Globally and on the

African continent, teachers tend to have basic skills in the use of ICTs, and even professional learning rarely translates into pedagogical competence for CBE. The majority of teachers are not able to integrate ICT tools into classroom practices meaningfully because of a lack of infrastructure, limited ongoing professional development, and persistent disconnects between policy frameworks and actual classroom practice. These findings highlight a need for sustained, pedagogically oriented training programmes, institutional support systems, and policies enabling both pre-service and in-service teachers to develop the ICT competencies necessary for competence-oriented teaching.

Lack of preparedness among teachers, inadequate in-service training, and infrastructural barriers remain some of the challenges encountered in the effective integration process, as evidenced by the presence of policy guidelines in Kenya. This presents a significant gap for further research, as very little is known about the impact of specific aspects of teacher preparedness on the effective implementation of information communication and education policy guidelines in public schools across Kenya, especially with regard to CBE policy guidelines (Ministry of Education, Kenya, 2023; Hennessy et al., 2021). This study was undertaken as a way of bridging the gap in the Kajiado North Sub County.

2.3.3 Education ICT Policy

Several countries have increased their investments in digital learning infrastructure and technology as part of a broader strategy to enhance education systems and develop learners to achieve 21st century competencies. For example, in the United States of America, K-12 schools spent around $30 billion on educational technology in 2024 (EdWeek, 2025). Such investments in education technology involve the purchase of devices, software, digital media, etc., to enhance teachers' ability to use ICT in the classroom (EdWeek, 2025). However, McKinsey (2024) and

EdWeek, (2025) concur that investment in educational technology does not necessarily lead to improved student learning outcomes unless teachers are adequately prepared to integrate technology effectively into their pedagogy. Moreover, the recent educational data shows that the government's expenditure on education has been strong, with total expenditure rising by 3.8 % in the 2024-25 financial year compared with the previous year, and secondary education seeing an 8.5 % increase in expenditure (UK Department for Education, 2025). Although these figures are not solely for digital technology, they do indicate the continued investment capacity that can support digital initiatives and teacher development for e-learning and ICT integration. In addition, it has been found that approximately 70 % of secondary schools now have a digital strategy, and 44 % of teachers' reports suggest the use of sophisticated digital tools, including AI, for planning and teaching, which indicates a growing focus on developing teachers' digital skills in addition to infrastructure development (Bushnell, 2025).

Viberg, Cukurova, Feldman-Maggor, Alexandron, Shirai, Kanemune, and Kizilcec (2023) researched the following determinants: teacher trust, ICT competence, and AI use in classrooms in the United States, Israel, Japan, Norway, Sweden, and Brazil. In a cross-sectional survey design, data were gathered from 1,248 teachers and subjected to SEM analysis. The results indicated that teacher self-efficacy was the strongest predictor of ICT use and learner-centered practices, as showed by a β-value of 0.45 at a significance level of $p < 0.01$. That is, the more confident teachers are in their own abilities, the more technology-integrated the pedagogy. Digital competence significantly predicted engagement with ICT use and learner-centered instructional strategies at a β-value of 0.38 and a significance level of $p < 0.05$, indicating that the technological proficiency of teachers increases CBE and innovative learning methods application. However, this study confirmed the existence of competence-classroom application

mediation by trust in technology, drawing attention to the psychological dimension in the diffusion of technology. However, it did not investigate institutional factors bound by context, like infrastructure disparities, policy enforcement, or administrative support that might moderate the association between teacher competence and ICT use in developing country educational contexts. It also relied on self-report measures, which limit verification of actual classroom practices, leaving open questions regarding real-time instructional implementation.

Ruijia, Andersson, & Brown (2025) carried out a study to explore the adoption and integration of ICTs within the realm of early childhood education and primary education in Sweden, the United States, and Israel, through a meta-analysis of existing empirical research undertaken on the topic. The study is basing its research methods on existing experimental and quasi-experiment studies, whose results have been computed for establishing value for technology integration as a measure of its impact on learning outcomes. From the analysis, it is emanating a moderate positive influence of ICTs on learning outcomes ($d = 0.42$, $p < 0.01$), affirming the significance of technology integration in augmenting, to a considerable extent, learners' engagement, cognitive development, and interactive learning environments. Consequently, the study posited a positive influence of implementing ICT-interventionist policies, coupled with training programs for teachers, in generating a powerful foundation for learners' centered pedagogical approaches, as espoused within the concept of competence-based education. This validates the thesis that pedagogical innovation is best achieved when technology infrastructure is nurtured concurrently. In spite of these positive results, the meta-analysis also noted that longitudinal research on teacher adoption of ICT, while consistent from a short-term perspective, shows limited longitudinal effects, suggesting that while instructional gains can be seen in the short term, long-term consistency of teacher ICT-pedagogy is unknown.

In addition, studies were predominantly from high-income countries, yet another gap in terms of contextualization in low-income countries, where educational systems are significantly different.

Kumar and Kumar (2024) investigated the implementation of ICT policy at both the primary and secondary school levels in India. In this mixed-method study, the authors surveyed 320 teachers and conducted semi-structured interviews with 20 administrators in various schools. Quantitative data, analyzed using multiple regression, yielded an R-squared value of 0.41 and a p-value of less than 0.01. The qualitative data were analyzed thematically. Results indicated that ICT policy contributed to increasing teachers' digital pedagogical competencies, while simultaneously enhancing project-based learning that aligns well with CBE principles. A lack of follow-on mentoring and continuous professional development was highlighted as one gap.

Goktas et al. (2023) investigated the barriers to and facilitators of the integration of ICT in Turkish teacher training programs. The survey was conducted among 280 pre-service teachers and 45 teacher educators, and focus groups were also conducted. Quantitative data was analyzed using logistic regression: OR=2.3; $p < 0.05$. The study reported that although a supportive policy had provided infrastructure and training in ICT adoption, teachers' use was limited. There was a call for policy-aligned in-service training in learner-centered approaches.

In a study focusing on the influence of national policies on teachers' readiness for CBE-oriented practices in secondary schools in Ethiopia, Abdi, Tesfaye, and Belay (2023) used a concurrent mixed-method design with 210 teachers and 12 school ICT coordinators as participants. In this study, analysis of variance (ANOVA), $F(2, 207) = 5.12$, $p < .01$, and multiple regressions, $R^2 = 0.36$, $p < .05$, were conducted on quantitative data, while thematic data analysis was carried out on the findings. Generally, it was established that policy awareness and teachers' development influenced the use of ICT in CBE, though infrastructure was a limitation in

implementing this concept.

In the study done by Omutange (2025), the research focused on the integration of ICT within Technical Vocational Education and Training (TVET) institutions in Kenya. A stratified sample of 80 instructors and 400 students was selected. Quantitative findings were analyzed through the use of multiple regression results ($R^2 = 0.37$, $p < 0.05$). The results indicated that despite the effectiveness of ICT policy promoting its adoption, the instructors lacked skill to facilitate elements of constructivist learning approaches associated with CBE.

Kiarie and Ondigi (2025) explored ICT integration in secondary schools across three counties: Nairobi, Kiambu, and Machakos, through the concurrent mixed-method approach, where quantitative data collected through surveys from 210 teachers and qualitative interviews from 15 school administrators were analyzed through ANOVA analysis. The investigation found that the level of ICT integration between schools in the three different counties showed a statistically significant difference ($F(2, 207)$, $p < .01$), 5.21. The research established that although ICT policies are in place in schools, integration, as a concept, is still superficial and procedural. ICT is primarily used to execute elementary and procedural tasks, like presentation and administration. This intolerance amongst ICT usage and involvement in interactive learning practices that promote Competency-Based Education (CBE) reveals a bigger divide as it demonstrates that ICT policies, although in place, still fall short of integrating ICT strategically, as promoted by CBE. The interview component revealed that ICT integration in many of these schools was seen as more procedural, rather than innovative, and ICT practice.

In all these contexts, the role of ICT policy is to promote the competencies of the teacher regarding delivering CBE-aligned instruction, and the gaps here are infrastructural, developmental, mentoring, and post-policy implementation. Evidence from all the developed

countries, African countries, and Kenya shows the importance of incorporating teacher self-efficacy with ICT policy. Addressing the gap in the current study is a significant adjustment required for CBE effectiveness.

2.3.4 ICT Policy Implementation in Education

Education programs are most effectively carried out if they are informed and directed by clear and consistent ICT policies that address competency, learner-centricity, and ICT usage. In that regard, international efforts such as the SABER ICT Policy Framework by the World Bank provide policymakers with tools to measure the effectiveness of ICT integration in various education systems around the world. For instance, the SABER framework highlights critical areas that must be considered in ICT integration in education systems, which include vision and planning, infrastructure, teacher skills, learning resources, EMIS, monitoring and evaluation, equity, inclusion, and safety (World Bank, 2020). Even as the SABER framework addresses the intent of ICT policy, the core implementation is still unclear and poses the problem of how a given policy affects competency-based education (CBE) in particular. In that regard, education systems must ensure that they have implementation monitoring mechanisms, such as auditing ICT usage in classrooms, adherence to policy guidelines, and the effects of ICT usage on learner-centricity in the classroom (World Bank, 2020).

For instance, in recent years, South Africa has continued to invest significantly in the adoption of ICT in education; however, research reveals that the country still faces challenges in fully exploiting the adoption of ICT in education. According to the Department of Basic Education, between 2022 and 2024, the department acquired 30,818 ICT devices for teachers, provided training for 388,738 teachers aimed at improving their digital literacy skills, and provided connectivity for 535,633 learners. However, research reveals that only 60 percent of

schools in South Africa have been using available ICT as a primary means of curriculum delivery, indicating that a significant number of schools have not been able to exploit the adoption of ICT in education (Graaff Reinet Advertiser, 2025). In addition, rural and under-resourced schools continue to experience challenges with electricity, connectivity, and infrastructure, which can hinder teacher efficacy and teacher confidence in using ICTs for pedagogy. All these aspects indicate a mixed readiness for teacher preparedness for digital pedagogy, and it is evident that teacher preparedness should be complemented with appropriate resources to bridge the gap.

In this respect, new international collaborations have seen the country's digital education landscape grow in terms of reach. A case example is the Last Mile Connectivity of Schools (LCMS) project, which has seen 363 public junior schools in Kenya achieve sustainable internet connectivity with the support of the European Union, in partnership with UNICEF and the ICT Authority. As of December 2025, the project has seen over 277,000 learners access internet connectivity, which has enabled them to access virtual laboratories, digital content, and online learning platforms that align with the CBC curriculum requirements. In addition, the project has seen over 4,400 teachers receive training in the use of technology, with 405 of them receiving specialized training in the use of Information and Communications Technology in the classroom, thus improving their capacity to integrate ICT in the teaching of various subjects (EU Delegation, 2026). Even with this success, the LCMS project indicates that only 30% of the 23,400 public junior schools in Kenya have achieved internet connectivity, thus the need to urgently address the equity gap in internet connectivity to ensure the uptake of comprehensive digital literacy in the country (EU Delegation, 2026).

The government of Kenya has over the years enhanced the development of its ICT policy

guidelines to facilitate the country's development and education, starting with the National ICT Policy in 2006, which had the vision of creating "a prosperous ICT-driven Kenyan society" and improving the well-being of the population through the provision of reliable ICT services (Digital Watch Observatory, 2026). As much as the 2006 policy was the foundation of the country's digital inclusion, the subsequent policies have been tailored to address the education sector, with a major focus on the capacity development of teachers and the incorporation of digital literacy in the curriculum. The Policy on ICT in Education and Training (2021) formulated an overall policy framework for the mainstreaming of ICT in schools, with the main objective of improving the capacity of teachers, enhancing the incorporation of ICT in the curriculum, and improving access to digital resources to enable the acquisition of 21st-century skills by learners (Republic of Kenya, 2021). It provided a strategic framework established by the Ministry of Education to separate educational technology guidelines from the broader national ICT policy. In addition to this, the National Digital Master Plan 2022-2032 has the objective of promoting the application of digital transformation in schools through the provision of ICT infrastructure, connectivity, and training of teachers on a large scale.

In this regard, Viberg et al. (2023) carried out an extensive study with 1,248 teachers in six countries, viz., the US, Sweden, and Japan, exploring the relationship between teachers' self-efficacy, digital competence, and ICT integration through structural equation modeling (SEM). Their results revealed that teacher self-efficacy (beta) = .45, $p < .01$) and digital competence (beta) = .38, $p < .05$) were significant predictors of ICT adoption and application of learner-centered, CBE-aligned learning strategies. In this study, it was revealed how, despite national

policy on the provision of ICT in an educational setup, teachers were hampered by the lack of in-service courses, leading to a significant gap that could be filled through in-service training, mentoring, and networking among teachers.

In South Africa, a study published by Frontiers in Education (2025) adopted a qualitative case study approach to assess the implementation of ICT policy, particularly in rural and disadvantaged learning institutions. Among other control variables, the study interviewed teachers and administrators from the sample class institutions. According to the study, the teachers encountered various challenges regarding the implementation of ICT policy. Though the ICT policy emphasized teacher training and the provision of necessary infrastructure, the gap was evident. The gap, which is related to the lack of the implementation of the policy, can be addressed through the implementation of training programs for teachers, thereby increasing the chances of CBE-oriented ICT application rather than mere exposure to technology, which the students might not understand (Frontiers in Education, 2025).

In Ghana, Asare et al. (2023) used a mixed approach combining document analysis of national ICT policy frameworks with interviews of 48 teacher educators to examine the policy-in-practice nexus. The study found that despite an extensive policy framework on ICT, there were issues of non-uniform policy implementation, resulting in insufficient access to digital resources, professional development, and practice. The policy-in-practice nexus gap: this gap can be bridged by ensuring policy is not implemented in a way that is entirely theoretical by putting in place support structures for policy implementation, such as monitoring resource allocation, mentoring teachers, and matching ICT resources to CBE competency requirements.

In Uganda, Mukhula et al. (2021) examined the effect of the implementation of ICT policy on teachers' readiness in utilizing technology through a survey of 232 secondary school

teachers in Uganda. The results revealed a moderate and positive correlation between the policy implementation level and teachers' readiness to integrate technology into the classrooms, $r = .50$, $p < .01$. The gap, in this case, indicates that even when effective policy frameworks are in place, the readiness of the teachers was the main driving force behind the effective integration of the technology into the classrooms and should be of critical importance for schools that use a CBE approach.

In Kenya, study results were obtained from the research by Omutange (2025) to investigate the use of ICT among 80 TVET instructors and 400 students through a mixed method approach. By employing multiple regression analysis ($R^2 = .37$, $p < .05$), it was found that despite the policies guiding the integration of ICT in the country and institutions being effective for its adoption, teachers' ICT literacy was inadequate to facilitate effective effective learner-centered and CBE-based pedagogical practices. The mitigation strategies identified include the need for a policy-driven approach to continuous professional development among teachers to enhance the adoption of ICTs and the use of the CBE-based approach as a pedagogical practice (Omutange, 2025).

A study conducted by Mwangi and Khatete (2024) aimed to evaluate ICT policy implementation and usage within public junior schools across Kenya, for which the authors conducted a mixed-methods approach involving 278 teachers and 375 learners, and 30 schools for data collection. Data analysis showed that "ANOVA results showed that although teachers reported that policies ensured the availability of devices and training for learners and teachers respectively, teachers' use of ICT was found to be basic and not related to CBE." The core problems faced were found to include "lack of follow-up support, disconnection between policy and practice, and an absence of monitoring systems at the school level." This indicates that to

bridge such gaps, it's essential to encourage teachers to review and use such ICT policies for effective and learner-centric approaches (Mwangi & Khatete, 2024).

In both developed and African countries, ICT policies play a crucial role in providing needed guidelines for the integration of educational technology in the classroom. However, there are various gaps in ensuring that teachers are well-prepared, various resources are made available, mentoring is carried out, policy enforcement is made effective, and the curriculum is well-aligned in order to ensure that ICT policies do not only exist on paper but play a vital role in supporting CBE-based teaching and learning processes in the classroom as pointed out by the present study in Kajiado North Sub-county, Kenya.

2.3.5 ICT Challenges

Despite the various benefits associated with utilizing technology for learning, several studies have identified that various challenges are likely to affect or prevent teachers from using ICT for promoting learning within the classroom. Moreover, globally, various studies have identified that factors such as teacher preparation, resource availability, and policy support play a key role in influencing the success achieved through integrating ICT within a CBE learning context. The study conducted by Nkosi and Dlamini (2022) focused on exploring barriers facing educators within four different high schools where 16 educators were targeted for a qualitative study through a semi-structured interview and thematic analysis. The study revealed that various factors, such as insufficient funding, lack of access to computer rooms, and training, are likely to affect educators in delivering learning through a CBE context, where policies were intended but not implemented, thus posing a gap between policy and practice.

Likewise, another mixed research method was employed by Ioannou and Papadopoulos (2021) with a sample of 120 teachers from different European nations such as Greece, Italy,

Spain, and Portugal. The purpose of the investigation was to examine the factors influencing ICT adoption within learning settings. From the analysis of questionnaires and interviews conducted on teachers and the use of a regression analysis method, the outcome was consistent with the assertion of limited time to develop new learning skills, usage of outdated ICT equipment, too many students within a classroom, insufficient computers per student, and insufficient technical and pedagogical support as they significantly influenced teacher self-confidence and competency in utilizing ICT ($\beta = .42$, $p < .05$). The study revealed a link between teacher collaboration and mentoring as a fundamental tool for ICT implementation within CBE settings. The gap noted was the limited connection between ICT policy guidelines and teacher support through constructive mentoring and collaborative professional development activities.

With regard to the African context, Olayemi et al. (2023) explored ICT integration in Nigerian secondary schools among 200 teachers via a cross-sectional survey. By applying factor analysis and Pearson correlation, it was revealed that systemic factors, such as school infrastructure, lagging education software, ICT integration in school strategic plans, and lack of confidence, inhibit the integration of ICT in CBE-oriented teaching practices ($r = .53$, $p < .01$). By highlighting the significance of effective policy implementation, teacher development, and ICT-instructional alignment, this literature bridges the gaps that existed in Nigerian ICT policies, which were highly conceptual and neglect classroom integration.

In the East African context, Mugisha et al. (2020) conducted a study in the state of Rwanda, using a mixed-methods approach to investigate the use of ICT in the context of primary school teachers. The findings of the study, which were based on 95 teachers, used regression analysis to investigate the predictor factors for using ICT in learner-centered classrooms. The findings of the study revealed that teacher training, teacher confidence, and access to digital

resources were significant factors in incorporating ICT in CBE-aligned instructional practice. Ideally, even though there were ICT policy guidelines in the state of Rwanda, there were evident gaps in the context of teacher training and support, and the availability of ICT, implying that there was the need to reinforce policy and develop support systems at the school level.

In Kenya, Nyaga and Wanjiru (2022) conducted a study to establish teachers' preparedness in integrating ICT-supported CBE in public junior schools in the country. Using a convergent mixed design methodology, quantitative data were collected from 210 teachers, while qualitative data were obtained from 12 administrators of the participating schools. Descriptive analysis and multiple regression results revealed a significant prediction of ICT integration success by teachers' ICT preparedness, availability of resources, and training regularity, at an R^2 value of .36, significant at .01. The mitigation strategies included extensive in-service training, use of ICT aides, and policy review through a participatory approach to converge it to CBE objectives.

Similarly, Wekesa et al., (2021) explored policy implementations on ICT adoption for CBEs in public junior schools across Nakuru County, Kenya. Questionnaires and observations were carried out among 180 teachers, showing that a lack of teacher preparation, inadequate time allocated for teaching, and school infrastructure were viabilities that inhibit adoption. Inferential statistics were also computed, showing a significant relationship between teacher understanding and a successful learning activity for CBE ($t = 178, 3.45, p < .01$). It was recommended that ICT policies needed operationalization within each school, suggesting that teachers need continuous training and mentoring, plus provision of resources for better teacher understanding and adoption of CBEs.

Lastly, in the North Rift region of Kenya, a study by Omondi & Karanja (2021)

sought to investigate the challenges facing the adoption of ICT in public junior schools. With the use of descriptive surveys among 150 teachers in the region, it established that funding constraints, the absence of a computer room, the absence of a structured classroom for ICT use, as well as the absence of access to ICT manuals negatively affected the implementation of the CBE curriculum. Furthermore, the use of inferential statistics to analyze the study established significant differences in the implementation of ICT based on the availability of resources (ANOVA) ($F(2, 147) = 6.72$, $p < .01$). According to the study, the gap can be closed through the establishment of infrastructure to support ICT use in schools and the alignment of ICT tools to the competency-based curriculum.

Synthesis: As such, the integration of ICT within the global, continental, and local sphere remains a necessity for the implementation of CBE. This is due to existing gaps that remain a challenge to the full integration of ICT within the education sector. Among such gaps are those related to the readiness of the teachers, which require the provision of proper training, the provision of resources, training of the teachers, reviewing of the policies, as well as the integration of ICT within the learning outcomes of the CBE as a strategy for closing the gaps identified within the literature.

The study addresses these gaps by examining teachers' preparedness and capacity to integrate ICT, particularly tablets, in the implementation of Competency-Based Education (CBE) at the Junior School level. Specifically, the study assesses teachers' ICT expertise, professional training, and ability to use ICT hardware and software in teaching and learning. It also examines the adequacy of ICT resources and the extent to which relevant education technology policies support the effective use of ICT in Junior Schools. In addition, the study considers institutional factors such as ICT funding, school management support, continuous teacher professional

development, and teachers' motivation to use ICT. By examining these factors in relation to effective learning, the study provides evidence on the specific areas requiring intervention to strengthen teachers' readiness and facilitate effective ICT integration in CBE. The findings may therefore inform teacher training, resource provision, policy implementation, and school-level strategies for improving the use of tablets and other ICT tools in Junior School education.

2.4 Summary of the Literature Review and Knowledge Gap

The review of the existing literature revealed that considerable research has been conducted on the use of Information and Communication Technology (ICT) aids in the learning process at global, regional, and local levels. The findings from these studies demonstrate that the effective integration and implementation of educational technologies in learning are influenced by a range of contextual, institutional, technological, and pedagogical factors. Collectively, the reviewed studies provide valuable insights into the opportunities and challenges associated with the use of ICT in education, while also highlighting areas that warrant further investigation. Globally, studies have revealed that inadequate teacher expertise in the use of ICT aids remains a significant challenge to the effective integration of educational technology in teaching and learning. Information and Communication Technology (ICT) has increasingly become a priority in education systems worldwide, with many countries making substantial investments in educational technologies to enhance the quality and effectiveness of learning. However, limited teacher competence and proficiency in utilizing ICT aids can undermine these investments and constitute a major barrier to the successful implementation and integration of technology in education. Kenya is among the countries that have prioritized the integration of Information and Communication Technology (ICT) into the education system as part of efforts to prepare its citizens for the knowledge and information era. This initiative is intended to equip learners with

the competencies and skills necessary to participate effectively in an increasingly digital and globally competitive environment. In this context, the effective implementation of the Digital Literacy Programme (DLP) depends largely on the preparedness and competence of teachers to integrate digital technologies into teaching and learning. Therefore, this study sought to establish the extent to which teachers are prepared to implement the Digital Literacy Programme policy in enhancing effective learning in public junior schools in Kajiado North Sub-County.

At the regional level, studies reviewed have revealed that teachers' knowledge, skills, and attitudes towards the use of ICT aids remain significant challenges to the effective integration of technology in teaching and learning. Inadequate knowledge and skills, coupled with negative or hesitant attitudes towards ICT use, may limit teachers' ability and willingness to effectively incorporate digital technologies into the learning process. Some African countries, including Egypt and South Africa, embraced educational technology earlier than countries such as Kenya. However, despite their relatively longer experience with the integration of ICT in education, these countries have continued to encounter challenges in achieving the effective and sustainable use of ICT aids in teaching and learning. In Egypt, the government has implemented initiatives aimed at providing teachers with professional development and training in ICT, with the objective of enhancing their knowledge, skills, and competencies for the effective integration and use of ICT in teaching and learning. Several studies reviewed in the literature indicate that the effective integration and use of Information and Communication Technology (ICT) in teaching and learning remains a significant challenge. Despite the increasing emphasis on educational technology, various factors continue to hinder its effective utilization in learning environments. Teacher expertise, failure of ICT professional development and training follow-ups have been pointed out as major contributory factors. This study was to find out whether these challenges are

also being experienced in public junior schools in Kenya particularly in Kajiado North Sub-County

In Kenya, most of the studies conducted on the use of Information and Communication Technology (ICT) aids in teaching and learning have primarily focused on administrative and infrastructural challenges. However, comparatively limited attention has been given to teacher-related factors, particularly teachers' preparedness, knowledge, skills, and attitudes towards the effective integration of ICT in the learning process. Despite the growing body of research on the integration of Information and Communication Technology (ICT) in education in Kenya, limited research has been conducted on teachers' preparedness to implement ICT and educational technology policies to enhance effective teaching and learning in public junior schools in Kajiado North Sub-County. This gap in the existing literature underscores the need for further investigation into the extent to which teachers are adequately prepared, in terms of knowledge, skills, attitudes, and competencies, to effectively implement these policies in the learning process. The current study sought to establish teachers' preparedness to implement digital literacy program in learning to enhance effective learning in public junior schools in Kajiado North Sub County. The study therefore sought to examine teachers' preparedness for the integration and use of ICT, particularly tablets, in teaching and learning in public Junior Schools in Kajiado North Sub-County, Kenya. Specifically, the study investigated teachers' ICT knowledge and expertise, access to and use of ICT resources, professional training and support, and the influence of relevant ICT policies and school management support on effective ICT integration. The study further sought to establish whether the challenges identified in other African countries, particularly inadequate teacher expertise, insufficient professional development, and limited follow-up support, are also experienced by teachers in Junior Schools

in Kajiado North Sub-County.

CHAPTER THREE

RESEARCH DESIGN AND METHODOLOGY

3.1 Introduction

This chapter presents the methodology that was employed in conducting the study. It describes the research design, target population, sample size, and sampling procedures that were used. It also presents how data were collected and analyzed to answer the research questions. In addition, the chapter describes the research instruments and their administration and explains how the validity and reliability of the research instruments were ensured. Finally, it presents the procedures that were followed in analyzing the collected data.

3.2 Research Design

The study employed a convergent mixed methods design (also called a convergent parallel mixed-methods design). Others call it concurrent convergent mixed methods design Tashakkori and Teddlie (2009). Creswell and Plano Clark (2011) describe the "convergent parallel design" as a major mixed-methods design. In this design, quantitative and qualitative data are collected independently, analyzed separately, and then brought together for comparison and interpretation. Creswell and Plano Clark (2018) use the term "convergent design" and explain that quantitative and qualitative data are collected and analyzed separately before the results are merged or compared. Tashakkori and Teddlie (2009) and later mixed-methods scholars have also used "concurrent" terminology. Recent literature notes that the convergent design was formerly referred to as a concurrent design. Important point to note is that "concurrent" describes the timing of the quantitative and qualitative strands, while "convergent" describes the overall mixed-methods design and its integration of the findings. The tendency

towards the use of *concurrent convergent*, in this study shows that the strands were conducted concurrently within a convergent design. Creswell and Creswell (2023) explain that a convergent mixed-methods design involves the collection of quantitative and qualitative data during the same phase of a study, followed by separate analysis of the two datasets and subsequent integration or comparison of the findings. The design enables researchers to obtain a more comprehensive understanding of a research problem by examining areas of convergence, divergence, and complementarity between quantitative and qualitative findings.

A mixed methods research design combines quantitative and qualitative approaches to capitalize on the strengths of both methods and provide a more comprehensive understanding of the research problem (Creswell, 2023). The approach enables the researcher to broaden the scope and depth of the study by using different techniques for data collection and analysis (Creswell & Plano Clark, 2025; Johnson & Onwuegbuzie, 2004). In this study, quantitative and qualitative data were collected and analyzed separately and subsequently integrated at the interpretation stage to compare and substantiate the findings. The convergent mixed methods design was appropriate for the study because it enabled the researcher to examine teachers' preparedness and experiences in the use of tablets for teaching and learning in public Junior Schools.

The study employed a convergent mixed methods design, incorporating a cross-sectional survey design for the quantitative component and a phenomenological design for the qualitative component. The cross-sectional survey design was appropriate because it enabled the researcher to collect data on teachers' current practices, experiences, and preparedness regarding the use of tablets in teaching and learning at a particular point in time. According to Ogula (2006), survey designs are useful for describing existing practices, conditions, needs, and the performance of specific programmes. Similarly, Bless, Higson-Smith, and Sithole (2013) noted that survey

designs can provide an accurate account of a particular situation, phenomenon, or group. The phenomenological design complemented the survey component by providing an in-depth understanding of teachers' lived experiences regarding the use of tablets in teaching and learning.

The cross-sectional survey design is also appropriate for collecting data from different components of a large population at a single point in time and within a relatively short period (Mugenda & Mugenda, 2019). It enables the researcher to describe the existing characteristics, practices, and experiences of a study population without manipulating the variables. In this study, the cross-sectional survey design was used to examine teachers' current practices and preparedness in the use of ICT tools, particularly tablets, for teaching and learning in selected public Junior Schools. The study included teachers of both genders to obtain a balanced representation of their experiences and practices regarding ICT integration.

The qualitative component of the study employed a phenomenological research design. Phenomenology is a naturalistic approach that seeks to understand the meanings individuals attach to a particular phenomenon based on their lived experiences. It emphasizes participants' conscious experiences and perceptions of the phenomenon under investigation. Ogula, Ogoti, and Maithya (2025) explain that naturalistic research focuses on studying phenomena as they naturally occur in their real-world settings, with the aim of developing an understanding of the phenomena under investigation. In this study, the phenomenological design was used to explore teachers' lived experiences, perceptions, and challenges regarding the use of ICT tools, particularly tablets, in teaching and learning in public Junior Schools.

According to Creswell (2023), phenomenological research focuses on individuals' lived experiences and the meanings they attach to a particular phenomenon. It seeks to understand the

structures of conscious experience by examining how individuals perceive, interpret, and respond to a phenomenon and the effects associated with those experiences. In this study, the phenomenological design was used to obtain in-depth information on teachers' experiences in using ICT tools, particularly tablets, in their classrooms and the meanings they attached to those experiences. The design also guided the collection of qualitative data from school principals and the Sub-County Education Officer, who provided complementary perspectives based on their roles in supporting, monitoring, and supervising the integration of ICT in teaching and learning.

3.3 Location of the Study Area

The study was conducted in Kajiado North Sub-County, Kajiado County, Kenya. Kajiado North is located in the northern part of Kajiado County and borders Nairobi and Kiambu counties. The Sub-County comprises five wards, namely Ngong, Oloolua, Olkeri, Nkaimurunya, and Ongata Rongai. The major urban centres in the area include Ngong and Ongata Rongai. The Sub-County was selected as the study area because of its concentration of public Junior Schools and its proximity to Nairobi, which provides an appropriate context for examining the integration and use of ICT, particularly tablets, in teaching and learning (County Government of Kajiado 2019). Kajiado North Sub-County records the highest population among the sub-counties in Kajiado County, accounting for approximately 27% of the county's population. According to the 2019 Kenya Population and Housing Census, the sub-county had a population of 306,596, comprising 150,675 males, 155,908 females, and 13 intersex persons.

The relatively high population in Kajiado North can be attributed to factors such as migration, urbanization, industrialization, and natural population growth. Its proximity to Nairobi City, Kenya's capital, has contributed to rapid urban development and increased population concentration. Major urban centres in and around the sub-county include Ongata Rongai, Ngong,

and Kiserian. These areas have experienced considerable growth associated with residential development, commercial activities, and industrialization. Kajiado North borders Nairobi and Kiambu counties and is highly cosmopolitan, with residents from diverse ethnic communities across Kenya (County Government of Kajiado 2019). The sub-county covers approximately 110.6 km² and, given its relatively high population density and rapid urban development, provides an appropriate setting for examining the integration and use of ICT in Junior School teaching and learning.

3.4 Target Population

The target population comprised 123 public Junior School teachers, 14 head teachers, one Teachers Service Commission (TSC) officer, and one County Education Officer in Kajiado North Sub-County, Kajiado County. The head teachers, TSC officer, and County Education Officer were included because of their supervisory and administrative roles in the implementation and monitoring of teaching and learning programmes. Public Junior Schools were selected because they are government-supported institutions and beneficiaries of government ICT initiatives, including digital learning programmes. The study was therefore conducted in public Junior Schools in Kajiado North Sub-County, Kajiado County.

3.4.1 Sample and Sampling Procedures

The study employed both probability and non-probability sampling techniques to select participants. Probability sampling was used to select Junior School teachers, giving each teacher an equal opportunity to participate in the study and enhancing the representativeness and generalizability of the findings (Mugenda & Mugenda, 2019). The teachers were selected from public Junior Schools offering education in Grades 7–9, which constituted the target group

experiencing the phenomenon under investigation. Purposive sampling was used to select key informants who possessed relevant knowledge and experience regarding the integration and use of ICT in Junior Schools. These included head teachers, the Teachers Service Commission officer, and the County Education Officer, who were selected because of their supervisory, administrative, and policy-related roles in ICT implementation.

The sample size was determined with consideration of the purpose of the study, the characteristics of the target population, and the need to obtain reliable and representative data. Cohen, Manion, and Morrison (2011) observe that there is no universally prescribed sample size, as the appropriate size depends on the purpose of the study and the nature of the population. Wiersma (2009) similarly emphasizes that a sample should be sufficiently large to support the validity and reliability of the findings. According to Creswell and Creswell (2023), a representative sample is one that is selected from the target population using an appropriate sampling procedure and is sufficiently large to support generalization of the findings to the broader population. In this study, 30% (percent) of the targeted teacher population was selected to provide an adequate sample for the quantitative component, while key informants were purposively selected based on their relevance to the study and their ability to provide pertinent information. This was consistent with Stutely's (2014) recommendation that a sample comprising approximately 30 percent of the target population may be appropriate for a study.

The use of both probability and purposive sampling was appropriate because the target population comprised heterogeneous groups. Probability sampling enabled the study to obtain representative information from teachers, while purposive sampling facilitated the selection of education administrators and supervisors who could provide in-depth perspectives based on their direct or indirect experience with ICT integration in junior schools.

3.4.2 Sampling of Public Junior schools

A census sampling technique was used to select public Junior Schools in Kajiado North Sub-County. There are fourteen public junior schools in sub-county. The study targeted all 14 public Junior Schools. However, 12 schools participated in the main study, while two schools were selected for piloting the research instruments and were therefore excluded from the final study sample. The census approach was appropriate because it enabled the researcher to cover the entire accessible population of public Junior Schools and obtain comprehensive information on the integration and use of ICT, particularly tablets, in teaching and learning. This approach also enhanced the coverage of the study and provided an adequate basis for understanding ICT practices across public Junior Schools in the study area.

3.4.3 Sampling of Public Junior School Teachers

The study targeted four hundred and eleven (411) teachers. The technique of proportionate stratified sampling was employed. When compared to the total population, the sample size of the stratum in this sampling approach is proportionate to the number of people in the stratum. In this technique, the number of participants to be picked is determined by the population in a given stratum. This means that the fewer the population in a stratum, the lesser the sample. For instance, one of the junior school had a total number of 46 teachers. Thus the total number of the sampled teachers in that particular school was 30/100 X 46 =13 teachers. The school was treated as a stratum

In this study, schools were treated as strata to ensure that teachers were sampled proportionately from each school, given that the number of teachers varied across the schools. Within each stratum, a research assistant, who was blinded to the identification of the teachers, randomly selected numbered slips of paper until the required 30% sample was attained. This

sampling approach was consistent with Mugenda and Mugenda's (2019) recommendation that, where feasible, descriptive studies may use a sample comprising approximately 30% of the target population. Based on this criterion, the study selected a total of one hundred and twenty-three (123) teachers for the quantitative component.

3.4.4 Sampling Public Junior Head Teachers

The study included all 14 head teachers from the public Junior Schools in Kajiado North Sub-County through an inclusion approach. The head teachers were included because of their administrative and supervisory roles in the implementation of education programmes within their respective schools. As the direct supervisors of teaching and learning activities, they also oversee the integration and use of ICT tools in their schools. Their participation provided relevant information on teachers' preparedness to implement digital learning programmes and use ICT tools, particularly tablets, in teaching and learning. Thus, all 14 head teachers participated in the study.

3.4.5 Sampling of Education Sub County Officer and TSC Officer

Judgmental, or purposive sampling was used to select key informants with relevant expertise and responsibilities in the implementation and supervision of education programmes. This technique allows the researcher to deliberately select information-rich participants who are considered knowledgeable about the research problem and capable of providing in-depth information relevant to the study objectives (Patton, 2015, Patton, 2018). In this study, the technique was appropriate for selecting education officers who had professional responsibilities and experience in the implementation and supervision of ICT integration in Junior Schools. The study included the Sub-County Education Officer and the Sub-County Teachers Service

Commission (TSC) officer, who participated in interviews. Their knowledge and experience enabled them to provide relevant information on the implementation of the digital learning programme and the measures in place to support effective ICT use in teaching and learning. The interviews sought to obtain information on the implementation of the programme and the measures in place to support the effective integration and use of ICT tools, particularly tablets, in teaching and learning in Kajiado North Sub-County.

3.5 Description of Data Collection Instruments

Data collection instruments are tools used by researchers to obtain information from participants for purposes of addressing the research questions and objectives. The selection of data collection instruments should be guided by the research approach, design, research questions, and type of data required (Creswell & Creswell, 2023). In this study, questionnaires and interview guides were used as the main data collection instruments. The questionnaire was administered to Junior School teachers to collect quantitative data on their preparedness and use of ICT, particularly tablets, in teaching and learning. Interview guides were used to obtain qualitative information from head teachers and education officers concerning teachers' preparedness, ICT implementation, professional development, policy support, resources, and challenges affecting ICT integration. The use of both instruments was consistent with the convergent mixed methods design, which enabled the researcher to obtain complementary quantitative and qualitative evidence and integrate the findings during interpretation.

The questionnaire consisted of structured items designed to obtain information on teachers' ICT knowledge and skills, professional training, ability to use ICT hardware and software, access to ICT resources, policy implementation, and institutional support. The

questionnaire mainly comprised closed-ended items, with appropriate response scales, to facilitate quantitative analysis and comparison of responses across participants.

The interview guides contained semi-structured questions that enabled the researcher to obtain detailed information from participants with supervisory and administrative responsibilities. The interviews focused on teachers' preparedness, ICT professional development, availability of resources, implementation of digital learning policies, school management support, and challenges affecting the use of tablets and other ICT tools in teaching and learning.

The use of questionnaires and interview guides enabled the researcher to collect data from different categories of participants and to compare and integrate the findings during interpretation, thereby providing a more comprehensive understanding of ICT integration in Junior Schools. The two instruments are described in detail in the following sections.

3.5.1 Questionnaire for Teachers

A questionnaire is one of the most widely used data collection instruments in social science research because it enables researchers to collect standardized information from respondents in a systematic manner (Salkind, 2007). It consists of a set of written questions developed by the researcher and administered to respondents to obtain information relevant to the study objectives. Questionnaires are effective instruments for collecting structured data that can be systematically analyzed using appropriate statistical techniques (Beto et al., 2025). Questionnaires may contain both closed-ended and open-ended items. Closed-ended items provide respondents with a predetermined set of response options from which to select the most appropriate answer, while open-ended items allow respondents to provide responses in their own words.

The questionnaire was appropriate for this study because it provided standardized questions and uniform procedures for collecting data from a relatively large number of Junior School teachers. It was also economical in terms of time and cost and facilitated the systematic organization, analysis, and comparison of responses. In addition, questionnaires enabled the researcher to collect standardized information from a relatively large number of respondents in an efficient and time-effective manner (O'Brien et al., 2024).

A questionnaire was administered to teachers in public Junior Schools in Kajiado North Sub-County. The questionnaire comprised both closed-ended and open-ended items organized into six sections. Section A collected demographic information about the respondents. Section B focused on teachers' ICT expertise and their ability to use ICT tools, particularly tablets, in teaching and learning. Respondents were asked to rate their level of expertise in using graphics and image-editing software; troubleshooting common ICT-related problems; using the Internet effectively and efficiently to search for information; evaluating the reliability and credibility of online sources of information; and understanding ethical and legal issues surrounding access to and use of digital information. The level of expertise was rated on a five-point scale ranging from Excellent, Very Good, Good, Fair, to Poor.

Section C sought information on teachers' ICT professional training, including the type, level, duration, relevance, and competencies acquired through ICT-related training. It also examined teachers' exposure to educational software, school-level initiatives supporting the use of ICT in teaching and learning, and areas in which teachers would prefer further training. Teachers were first asked whether they had received training in the use of ICT in teaching and learning. Those who indicated that they had received training were asked to specify where they had obtained the training, including a commercial college, school-organized training, a Teacher

Training College (TTC) or university, self-training, or other sources. They were also asked to indicate the level of training received, such as computer packages, certificate, diploma, degree, or other forms of training. The respondents were further asked to indicate the duration of their ICT training, with the options of several weeks, some months, one year, or more than one year. They were also asked to rate the relevance of the ICT training in equipping them with knowledge and skills for lesson planning, lesson delivery, classroom monitoring, evaluation, and other teaching and learning activities using ICT tools. The relevance of the training was rated as Very Relevant, Relevant, Slightly Relevant, or Not Relevant.

Teachers were also asked to rate their level of competence in selected ICT skills. These skills included connecting computer cables to electricity and switching a computer on and off; opening, closing, saving, and renaming files; searching online for educational reference materials; using the Internet to communicate with other teachers, parents, and pupils on matters related to teaching and learning; scanning for viruses and troubleshooting basic faults; using word-processing software such as Microsoft Word to prepare lesson notes and examinations; using spreadsheet software such as Microsoft Excel to perform arithmetic calculations and plot graphs; using database software such as Microsoft Access to store pupils' personal and performance records; and using software for classroom presentations. These ICT competencies were rated on a five-point scale of Expert, Advanced, Proficient, Basic, and Limited. The section further sought to establish whether teachers had used educational software during the teaching and learning process. Teachers who had used educational software were asked to name the software and indicate how frequently they used it. The frequency of use was measured using the categories Always, Often, Sometimes, Seldom, and Never.

Teachers were also asked to evaluate the contribution of the knowledge of educational

software acquired through training to their personal improvement and professional development as teachers. Their responses were rated as Very Positive, Positive, Indifferent, Negative, or Very Negative. In addition, teachers were asked to specify other initiatives undertaken by their schools to promote the use of ICT aids in teaching and learning. Finally, respondents were asked to indicate the areas in which they would prefer greater emphasis if given an opportunity to attend a similar ICT training course in the future. The areas included pedagogical use of ICT, repeating the same course previously undertaken, programming, use of operating systems, use of specific software, multimedia, telecommunication, acquisition of specialized ICT skills such as website development, and other areas specified by the respondents.

Section D examined the implementation of ICT-related policies in Junior Schools, with particular focus on the occasions and purposes for which teachers used ICT aids in classroom teaching and learning. Teachers were asked to indicate how frequently they used ICT aids for various teaching and learning activities, including teaching specific subject content; teaching learners ICT-related skills; finding and accessing information and educational materials online; preparing lessons; making class presentations; giving instructions to learners; monitoring and evaluating learners' progress and performance; and preparing class reports. The frequency of ICT aid usage for these activities was rated on a five-point scale of Very Often, Often, Sometimes, Seldom, and Never.

Section E addressed the challenges teachers experienced in using ICT tools in teaching and learning, with particular attention to the institutional policies, support mechanisms, and structures available to facilitate the effective use of tablets and other ICT tools in Junior Schools. Teachers were asked to indicate **Yes** or **No** to establish whether the following strategies, policies, and support mechanisms existed in their schools. The items examined whether the school had a

specific policy requiring teachers to undertake ICT professional development training; a policy providing for follow-up and mentorship on the use of tablets in teaching and learning; a school-based written statement on the use of tablets in learning; and a policy guiding the use of tablets in teaching and learning in specific subjects. The section also examined whether schools held regular discussions with teachers on the pedagogical use of tablets; had a specific policy or programme to prepare pupils for responsible behaviour when handling tablets; scheduled time for teachers to meet, share experiences, monitor and evaluate practices, and prepare instructional materials and teaching approaches; and had an official policy statement promoting innovation in teaching and learning within the school. For each of these items, teachers indicated **Yes** where the strategy, policy, or support mechanism existed in their school and **No,** where it did not.

Section F obtained information on institutional support and other factors influencing teachers' preparedness to integrate ICT aids into teaching and learning. The section focused on the challenges that teachers experienced when using ICT aids, particularly tablets, in the learning process. Teachers were asked to indicate **Yes** or **No** to establish whether they experienced the following challenges: lack of technical support; inadequate time within the school schedule to use ICT aids; lack of knowledge and skills on how to make full use of tablets in the teaching and learning process; inadequate educational software covering different subject content; and insufficient tablets for learners. Teachers were also given an opportunity to identify other challenges they experienced in using ICT aids in teaching and learning that were not included among the listed challenges. Finally, teachers were asked to provide recommendations on measures that could be adopted to increase their preparedness and capacity to use ICT aids effectively in teaching and learning in public primary schools in Kajiado North Sub-County.

The questionnaire used for data collection from teachers is presented in **Appendix I** of

the dissertation.

3.5.2 Interview Guide for Head Teachers, Chief Education Officer and TSC Sub- County Chief Officer

An interview guide was used as another data collection instrument in the study. Semi-structured interviews are useful for exploring participants' experiences, understandings, opinions, and perspectives on a particular issue, while allowing the researcher flexibility to probe and obtain more detailed information (Wakelin et al., 2024). Knott et al. (2022), state that in-depth interviews allow participants to explain, in their own words, how they understand and interpret the world around them. A research interview involves a planned interaction in which the researcher asks questions of participants to generate information relevant to the purpose of the study (Clandinin et al., 2025). Qualitative research may employ in-depth, one-on-one interviews with a small number of participants to explore their experiences, perspectives, and understandings of a particular issue or phenomenon (Clandinin et al., 2025). In this study, the interview guide enabled the researcher to obtain detailed information from head teachers and education officers regarding teachers' preparedness, ICT professional development, policy implementation, institutional support, and challenges associated with the use of ICT tools, particularly tablets, in teaching and learning.

One of the strengths of the interview as a data collection instrument is its flexibility, which enables the researcher to explore participants' responses in greater depth, seek clarification, and adapt questions to the context of the interview. This flexibility allows the researcher to probe participants' responses and obtain detailed and context-specific information about their experiences and perspectives (Lim, 2025). In this study, the interview guide comprised a set of questions developed from the research questions and study objectives. The questions were

structured to allow participants to provide detailed responses while giving the researcher an opportunity to probe for clarification and additional information where necessary. The interview guide was designed to obtain in-depth information that could not be adequately captured through the questionnaire. It provided participants with an opportunity to explain their experiences and perspectives and allowed the researcher to probe responses for clarification and additional information. The instrument was administered to head teachers, the Sub-County Education Officer, and the Sub-County Teachers Service Commission (TSC) officer. The interview guide sought to obtain from these selected informants, in-depth information on teachers' preparedness, ICT professional training, policy implementation, institutional support, and challenges affecting the use of ICT tools, particularly tablets, in teaching and learning. The interview guide comprised open-ended questions organized into three sections. Section A collected demographic information about the participants. Section B focused on teachers' expertise and competence in the use of ICT tools, particularly tablets. Section C examined teachers' ICT professional training, including the skills acquired and relevant courses undertaken. The interview guide is presented in **Appendices II, III** and **IV** of the dissertation.

3.5.2.1 Interview Guide for Public Junior School Headteachers

The headteachers were asked open-ended questions organized into three sections. Section A collected demographic information about the participants, while Section B focused on teachers' expertise and competence in the use of ICT tools, particularly tablets. Section C addressed the general use of ICT in teaching and learning. In Section B the headteachers were asked about the total number of teachers in their schools and the number of teachers who had received training in ICT-aided teaching skills. The headteachers were asked about the level of expertise and competence possessed by teachers in using ICT aides in their classrooms. They

were asked to explain teachers' ability to switch ICT devices on and off, give instructions using ICT tools, present teaching and learning content, prepare lessons using ICT, analyze learners' assessments, keep records of learners' work and progress, and monitor and evaluate learners' learning. The headteachers were also asked which software applications teachers mostly used when preparing and presenting lessons using ICT tools. They were asked to provide information on the use of spreadsheets, presentation software, graphics applications, word-processing software, and other relevant applications. The headteachers were further asked how ICT aides were maintained in their schools. They were asked whether teachers performed maintenance themselves or sought assistance from ICT personnel or other individuals, how long maintenance usually took, and what happened to the teaching and learning process when ICT equipment was unavailable. The headteachers were asked about teachers' access to the internet for teaching and learning purposes. They were asked to describe the availability of internet connectivity and ICT facilities such as smart boards, smart TVs, computers, tablets, and other related equipment. They were also asked to explain the efficiency and effectiveness of internet access and its effects on the teaching and learning process. Finally, the headteachers were asked about the types of ICT aides available in their schools, including the number of ICT aides, their frequency of use, and the extent to which teachers and learners used them in the teaching and learning process.

Section C addressed the general use of ICT in teaching and learning. The headteachers were asked whether their teachers had attended any ICT-related training courses. They were asked to provide information on who organized or conducted the training, where it was conducted, the content covered, the duration of the training, and its perceived effectiveness. The headteachers were also asked to evaluate the contribution of the ICT training received by teachers to their performance in teaching and learning using ICT aides. They were asked to

comment on the effectiveness of the training in areas such as lesson preparation, presentation of subject content, tracking learners' progress, classroom management, giving instructions, and improving learners' general performance. The headteachers were further asked about the strategies in place for the use of ICT aides in teaching and learning. They were asked to describe the policies and practices related to teachers' ICT professional development, follow-up training and mentorship, the use of ICT aides across different subjects, ways in which tablets were used in teaching and learning, and future plans for the use of tablets in their schools. In addition, the headteachers were asked which specific areas they would prefer to receive greater emphasis if their teachers were given an opportunity to attend ICT training in the future. Finally, the headteachers were asked about the possible challenges their teachers faced when using ICT aides in their classrooms. The interview guide is presented in **Appendices II** of the dissertation.

3.5.2.2 Interview Guide for the Kajiado North Sub-County Education Officer

The Interview Guide for the Kajiado North Sub-County Education Officer sought to establish whether the Sub-County Education Officer was aware of the ICT expertise required by teachers to effectively use ICT-aided devices, particularly tablets, as learning and teaching tools in public junior schools. The interview comprised three sections. Section A collected demographic information about the participant. The interview questions were organized under Sections B and C as follows.

Section B focused on information regarding teachers' ICT expertise and competence in the use of ICT tools, particularly tablets. The interview sought to determine the expected level of ICT expertise teachers should possess to effectively use tablets in their schools. The officer was asked what ICT skills teachers were expected to have in relation to giving instructions, presenting content, preparing lessons, analysing assessments, keeping records of work,

monitoring and evaluating learners, and performing other teaching and learning activities. The officer was further asked which software applications teachers were expected to be proficient in, including spreadsheet applications, presentation software, graphics applications, and other relevant software. The interview also examined the maintenance of ICT-aided devices, particularly whether teachers were able to undertake maintenance independently or required technical assistance, as well as the time taken to resolve technical problems. In addition, the interview sought to establish whether public primary schools were equipped with internet facilities. The officer was asked about the number of public junior schools with access to the internet, the efficiency and effectiveness of ICT-aided device usage in those schools, and the current effects of ICT use on teaching and learning.

Section C examined the officer's awareness of teachers' ICT professional training and the implementation of relevant ICT policies within the sub-county. The interview also sought to establish the Sub-County Education Officer's awareness of ICT professional training provided to teachers in preparation for using ICT-aided devices as learning tools. The officer was asked what ICT courses had been offered to teachers, who provided the training, where it was conducted, the content covered, the duration of the training, and its effectiveness. The interview further examined the strategies in place regarding the use of ICT-aided devices in teaching and learning. This included policies on teachers' ICT professional development and training, follow-up and mentorship after training, the use of tablets in teaching and learning, and the monitoring and evaluation of ICT-aided device use in schools. The officer was also asked about future plans for the use of tablets in teaching and learning within the sub-county. The interview further sought information on the measures put in place by the Sub-County Education Office to address challenges that may arise from the use of ICT-aided devices in teaching and learning. Finally, the

officer was asked about ICT training courses that the government planned to organize for teachers in the future and, if given an opportunity, which specific areas of ICT training the officer would recommend for greater emphasis. This interview guide is presented in **Appendix III** of the dissertation.

3.5.2.3 Interview Guide for Kajiado North Sub-County TSC Officer

The Interview Guide for the Kajiado North Sub-County TSC Officer sought to establish whether the Sub-County TSC Officer was aware of the ICT expertise required by teachers to effectively use ICT-aided devices, particularly tablets, as learning and teaching tools in public primary schools. The interview comprised three sections. Section A collected demographic information about the participant. The interview questions were organized under Sections B and C as follows.

Section B sought to assess knowledge of the ICT expertise required for teachers. The officer was asked what ICT skills teachers were expected to have in order to effectively use tablets and other ICT devices for teaching and learning. The officer was further asked about teachers' ability to give instructions and communicate with learners, present and access learning content, prepare lesson plans and teaching materials, conduct and analyze learner assessments, keep and manage learners' academic records, monitor and evaluate learners' progress, access and use digital learning resources, and communicate and collaborate with other teachers and learners. On software skills required by teachers, the officer was asked which software applications teachers were expected to know and use in teaching and learning. The officer was further asked about teachers' proficiency in word-processing, spreadsheet, presentation, graphics and image-editing software, internet and web-based applications, learning management systems, digital learning platforms, and other relevant educational software.

Section C sought to assess ICT training, policies, and support available to teachers. The officer was asked what ICT training or professional development programmes had been provided to teachers to prepare them to use tablets and other ICT devices for teaching and learning. The officer was further asked who provided or facilitated the training, where it was conducted, the topics and skills covered, the duration of the training, who participated, the teaching and learning methods used, the effectiveness of the training, the follow-up support provided, and the challenges experienced during the training. The officer was also asked what policies and strategies were currently in place to guide the use of tablets and other ICT devices in teaching and learning. The officer was further asked about policies on teachers' ICT professional development and training, follow-up training, mentorship and technical support, guidelines for the use of tablets in teaching and learning, monitoring and evaluation of ICT use in schools, support for teachers to integrate ICT into classroom instruction, measures for addressing different levels of ICT competence among teachers, and plans to expand or improve the use of tablets in teaching and learning.

The officer was asked what measures the Sub-County TSC Office had put in place to address challenges arising from the use of ICT devices in teaching and learning. The officer was further asked about technical support for teachers and schools, additional ICT training and capacity building, mentorship and peer support among teachers, monitoring and supervision, availability and maintenance of ICT equipment, internet connectivity and access to digital resources, security and proper management of ICT devices, and measures to address teachers' resistance or difficulties in adopting ICT. The officer was asked what ICT training courses or professional development programmes the government planned to provide for teachers in the future. The officer was further asked about the ICT competence areas that would be emphasized,

who would provide the training, how frequently it would be offered, whether follow-up or refresher training would be provided, what emerging ICT skills teachers should acquire, and which specific area of ICT training should be given greater emphasis and why. The interview guide is presented in **Appendix IV** of the dissertation.

3.6 Validity, Reliability and Trustworthiness of the Research Instruments

The study employed a mixed-methods approach; therefore, different procedures were used to establish the quality and rigour of the research instruments and the data generated from them. For the quantitative component, validity and reliability were assessed to determine whether the questionnaire measured the intended constructs accurately and consistently. For the qualitative component, trustworthiness was established to ensure that the findings derived from the interviews accurately represented the perspectives and experiences of the participants. In mixed-methods research, attention to validity, reliability, and trustworthiness is important because the quantitative and qualitative components have different methodological requirements (Levitt, 2024). The degree to which a tool measures what is anticipated of it is known as its validity. On the other side, reliability is the constancy of the consistency of a measure, that is, whether it would produce the same results if repeated, (Kothari, 2019). Trustworthiness is used to establish the quality and rigour of the qualitative data.

3.6.1 Validity of the Research Instruments

Validity refers to the extent to which a research instrument measures what it is intended to measure (Kothari, 2019). Validation of study tools is important in any given study. It is the extent to which the measurements' conclusions are corroborated by the data. For example, a study tool must prove that it fairly and thoroughly covers the domain or topics that it is meant to cover in order to establish content validity, (Cohen, Marion & Morrison, 2 007). In this study, face validity

of the instruments was tested. The quantitative instrument had each of its items reviewed and assessed to ascertain the extent to which it is related to what the researcher was to measure. This was achieved through feedbacks that were received from the supervisors and peers upon reading the instruments.

Sampling validity was also conducted on the instruments to ensure that all the question items covered the entire research questions and the content that the researcher sought. The researcher sought assistance from experts acquainted with ICT matters and the supervisors before the instruments were administered to the targeted population. Experts checked content coverage and clarity of questions items. In addition, the instruments were developed under the scrutiny of two supervisors at Catholic University of Eastern Africa. They did review the instruments regularly and provided suggestions and recommendations were incorporated to validate the instruments of the study.

To determine whether the questionnaire is valid, the researcher calculated content validity index (CVI) which was to be compared to the minimum content validity index According to Munyengabe et al. (2016) a validity of a questionnaire can be determined by calculating content validity index. In this case, CVI=R/N where R refers to the number of questions declared valid and N is the total number of all questions. The calculated content validity of independent variable was combined with that of dependent variable and both yielded an overall CVI. A scale withexcellent content validity should be composed of I-CVIs of 0.7. This validity was assessed by carefully checking the instrument against the conceptual definition of the construct.

The researcher conducted empirical validity of the quantitative instrument to find out whether the new instrument is related to other measures of scale towards the teaching profession. Thus, any ambiguous question item found was modified and restructured to improve the validityof the instrument. This was hoped to increase the credibility and dependability of the study.

3.6.2 Pilot Study

The validity of the questionnaire was not only established through expert review but also through a pilot study. The pilot study was conducted in two public junior schools in Kajiado North Sub-County whose respondents had characteristics similar to those of the target population. These schools were excluded from the final study to avoid influencing the study findings. During the pilot study, the questionnaires were administered to teachers in the selected public schools, while in-depth interviews were conducted with two head teachers. The head teachers were selected from the identified schools and interviewed to assess the clarity of the questionnaire items and estimate the time required to complete the instrument. The pilot exercise also enabled the researcher to familiarize herself with the administration of the research instruments and the procedures to be followed during the main study.

The pilot study was particularly useful in identifying unclear questions, inappropriate wording, inadequate response options, and other weaknesses in the questionnaire. The feedback obtained was used to refine the research instruments before their administration in the main study. In addition, the pilot study enabled the researcher to assess the reliability and validity of the instruments and to minimize potential measurement errors. This approach is consistent with methodological literature (Ahmed, 2024; Novak, & Jen, 2024) which emphasizes that validity concerns the extent to which a research instrument accurately measures the construct it is intended to measure. Appropriate instrument development, pilot testing, and evaluation were therefore considered essential for enhancing the quality and accuracy of research measurements.

3.6.3 Reliability of Research Instruments

According to Mugenda & Mugenda (2003), a study instrument's dependability is determined by how consistently it produces data or outcomes after several trials. Internal

coherence was used by the researcher type of reliability to determine the degree to which each item in a scale correlates with each other. Internal consistency is a way to assess how well an instrument actually measures what one wishes to measure, (Revicki, 2014). Likert type items in the questionnaire yielded to quantitative data that was used to compute Cronbach's Alpha reliability test. Data was entered into SPSS version 17 program. This was to estimate the internal consistency of the likert scale by figuring out the relationships between each test item and the other test elements as well as the entire test. Internal consistency reliability was assessed using Cronbach's alpha. A coefficient of 0.70 or higher was considered adequate, consistent with contemporary recommendations for evaluating the reliability of measurement scales (Youngstrom et al., 2025). The recent guidelines recommend 0.70 as adequate, 0.80 as good, and 0.90 as excellent, while also recommending that researchers consider reporting McDonald's omega alongside alpha (Stefana et al., 2025). However, for the current study, an alpha index of 0.7 was obtained thus considered acceptable for internal consistency of the tools.

Reliability in qualitative studies ascertains dependability of research studies. Patton (2015) argues that the criteria for establishing credibility differ between quantitative and qualitative research, with qualitative research emphasizing approaches that enhance the credibility and trustworthiness of findings. He further explains that, in qualitative research, the researcher serves as the primary instrument for data collection and interpretation, whereas in quantitative research, credibility depends largely on the careful development and validation of research instruments. Consequently, the quality and credibility of a qualitative study are closely linked to the researcher's skills, reflexivity, and methodological rigor. In qualitative research, validity and dependability are therefore considered important dimensions of the trustworthiness of the research process and the instruments used.

The credibility of the interview guide was done by having a prolonged engagement with the participants in the field. The researcher employed patience with the interviewees by giving them a considerable amount of time to respond adequately to questions. This means that the researcher did not hurry the participants in the process of responding to the questions but give them adequate time to think as they respond to the questions. This was to ensure adequate information solicited from the participants in response to research questions.

The researcher also employed triangulation to ensure credibility of the interview guide. This technique invokes using multiple data sources in an investigation to produce understanding of the phenomenon. The study used investigator triangulation. The researcher used two research assistants to collect the same information from the same participant for purposes of credibility. This was done at different times but on the same venue.

Peer briefing is a technique that the study also employed for purposes of credibility. The researcher shared the findings with the experts in the field of study to check on coherence of the findings and the research questions. The findings also shared with the supervisors of the researcher for review. They gave their recommendations and guidance on the findings which were taken keenly into considerations.

3.6.4 Trustworthiness of the Interview Guide and Qualitative Data

Because the study also employed qualitative interviews, the concept of trustworthiness was used to establish the quality and rigour of the qualitative data. Trustworthiness is commonly assessed through four criteria: credibility, transferability, dependability, and confirmability (Ahmed, 2024). These criteria provide an appropriate framework for demonstrating the rigour and integrity of qualitative research.

Credibility was enhanced through prolonged engagement with the participants, careful

probing during interviews, and triangulation of information obtained from different data sources. The researcher also ensured that interview questions were clearly aligned with the research objectives. Where necessary, participants were given opportunities to clarify their responses to ensure that their intended meanings were accurately captured.

Transferability was addressed through providing sufficiently detailed descriptions of the research context, participants, procedures, and findings. Such contextual detail enables readers to determine the extent to which the findings may be applicable to other settings with similar characteristics. Recent methodological literature identifies detailed contextual description as an important strategy for enhancing transferability in qualitative research.

Dependability was established by maintaining a clear and systematic record of the research procedures, including the development of the interview guide, participant selection, data collection procedures, interview process, transcription, coding, and data analysis. Maintaining such an audit trail makes the research process transparent and allows the consistency of the procedures to be assessed.

Confirmability was enhanced by ensuring that the findings were grounded in the data obtained from participants rather than being based on the researcher's personal opinions or expectations. The researcher-maintained interview records, field notes, and an audit trail and used participants' responses to support the interpretation of findings. Triangulation and reflexive documentation were also used to strengthen confirmability.

Since the study adopted a mixed-methods approach, the researcher also considered the extent to which the quantitative and qualitative findings complemented and explained one another. The questionnaire generated quantitative information, while the interviews provided detailed qualitative explanations of participants' experiences and perspectives. The two strands

of evidence were compared and integrated during interpretation to identify areas of convergence, complementarity, or divergence. This integration strengthened the overall methodological rigour of the study by allowing findings from one method to provide additional explanation and context for findings obtained through the other method. Recent literature on mixed-methods research emphasizes the importance of addressing validity and reliability in the quantitative strand, trustworthiness in the qualitative strand, and methodological integrity in bringing the two strands together.

3.7 Data Collection Procedures

Upon acquiring an introduction letter from the National Council for Science, Technology, and Innovations (NACOSTI) and an authorization from the Catholic University of Eastern Africa. Additionally, the researcher asked the Kajiado North Sub-County Director of Education for authorization. Subsequently, the head teachers of the selected schools were notified to obtain their consent for conducting the study within their premises and to schedule the completion of the exercise.

Questionnaire was administered by the research assistant to the sampled population of public primary school instructors in public elementary schools. A duration of two weeks was considered adequate but in consultation with the participants. The instrument was collected by the research assistant upon expiration of the agreed time.

Interview guides did solicit information from head teachers and the county education officer who are supervisors of education programs in public junior schools in Kajiado North Sub County. The interview guide was meant to get information that the questionnaires may fail to capture from the teachers. The interview was conducted upon prior arrangement between the

researcher and the participants in favor of their availability and acceptable time. The interview sessions were scheduled to take around thirty to forty-five minutes. The information was also to be captured using a recording gadget and note taking. For purposes of ethics, the participants were given different names which were not there really names. The researcher informed them about the recording in order to give their consent.

The interview sessions were recorded for purposes of capturing data. At the same time note taking was done which later was expounded to ensure data obtained was comprehensive. This was due to the fact that note taking is necessary and comes in handy at the point of compilation of the findings. In note taking, the researcher may fail to capture an important excerpt from the interviewee during an interview. In such case, the recording gadget will capture such important information. Thus, note taking and recording of the interview progress was paramount for they did complement and fill each other's gaps. However, recording was done with the full consent of the interviewee.

3.8 Data Analysis Procedures

Creswell and Creswell (2023) emphasize that raw quantitative and qualitative data require systematic analysis and interpretation before meaningful conclusions can be drawn. Accordingly, in this study, the raw data obtained through the quantitative and qualitative instruments were systematically analyzed and interpreted to generate meaningful findings and address the research questions.

In this study, the raw data from the qualitative and quantitative instruments was presented in separate sections and the two forms of data were converged at the point of interpretation for purpose of convergence or similarities. Quantitative data collected through the questionnaires were coded, entered, and analyzed using the Statistical Package for the Social Sciences (SPSS), Version 20.

Descriptive statistics, including frequencies, percentages, and mean scores, were used to summarize and present the characteristics of the data. Inferential statistical analyses were subsequently conducted to test the study hypotheses. The chi-square test was used to examine the association between categorical variables, while regression analysis was employed to determine the extent to which the independent variable(s) influenced the dependent variable. The hypotheses were therefore tested based on the statistical significance of the observed associations and predictive relationships at the specified level of significance.

Qualitative data analysis was done using thematic analysis to analyze data from interview guides. Data was transcribed, edited, cleaned and coded. It was put into categories and derived themes from the categories. The themes were interrelated and interpreted so as to give meaning to the raw data. Qualitative data analysis software was used to code and analyze the interview scripts. Data was organized to reflect participants' views while others were expressed using quotations and excerpts as captured from the interviewees.

3.9 Ethical Consideration

Ethics in research is pertinent. It emphasizes that, in any research, a participant should be given an open ground to choose whether to participate or not. The subject should be informed of the purpose of a study. Cohen et al. (2018) emphasize that researchers have an ethical responsibility to safeguard the welfare, rights, dignity, and well-being of research participants throughout the research process.

In this study the participants' consent was sought. They were informed in advance on the purpose of the study and on how the findings was of significant to the community and the country at large. This was done especially in seeking access to the target group. The leader was informed on the benefit of the study to the target group, the community and the country at large.

The participants were also informed of their voluntary participation and that they were to be allowed to withdraw their participation in the study at will. Regarding data to be collected, the researcher clearly informed them of their right to withhold any information that they felt uncomfortable to reveal to the study.

Confidentiality is equally important. The participants were guaranteed the privacy of the data they planned to disclose to the study. This was meant to gain their trust and enable them to freely participate and share without fear of being disclosed. According to Cohen et al. (2018), researchers should assure participants that the information they provide will be treated confidentially, as confidentiality is essential for protecting participants and encouraging them to provide accurate and reliable information. In this study, participants were assured that the information they provided would be kept confidential and used solely for the purposes of the research.

To ensure confidentiality and protect the identity of participants, respondents were advised not to indicate their names on the questionnaires. This measure ensured that individual responses could not be directly linked to specific participants, particularly where sensitive information was provided. Interview participants were similarly assigned pseudonyms to conceal their identities. Some interviewees were identified using alphabetical codes, while others were assigned fictitious names that did not correspond to their actual names.

All data collected during the study were securely stored and kept inaccessible to unauthorized persons. The researcher ensured that the data were handled in accordance with established ethical standards and were protected from unauthorized access, disclosure, or misuse. Upon completion of the study and in accordance with the applicable institutional requirements, the research data will be securely destroyed to prevent unauthorized access or disclosure.

The researcher also maintained academic integrity throughout the study by avoiding plagiarism, fabrication, falsification, and other forms of academic misconduct. All primary and secondary sources consulted were appropriately acknowledged through in-text citations and included in the reference list. Where ideas or information from other scholars were incorporated, the researcher used appropriate paraphrasing while retaining the original meaning and provided the necessary citations.

CHAPTER FOUR

PRESENTATION, INTERPRETATION AND DISCUSSION OF THE FINDINGS

4.1 Introduction

The chapter deals with the data presentation on the research results, interpretation and discussion of the findings of the research. The present research looked into how prepared teachers from public junior schools in Kajiado North, Sub-County, Kenya, were, to implement the policy on the use of technology. The research focused on the following questions; what ICT expertise do teachers have to implement ICT policy in teaching and learning in public junior schools in Kajiado North Sub County? What ICT professional training have teachers received in using ICT aides in teaching and learning in public junior schools in Kajiado North Sub County? To what extent education ICT policy is being implemented by public junior school teachers in public junior schools in Kajiado North Sub County? What challenges are teachers facing in implementing ICT policy in teaching and learning in public junior schools in Kajiado North Sub County? What are the possible solutions to the challenges experienced by teachers in implementing ICTpolicy in teaching and learning in Kajiado North Sub-County?

The participants were public junior school teachers, head teachers in the identified public junior schools, the sub county education officer and TSC sub county officer. The findings were presented in tables covering the demographic information return rate for questionnaires, responses from the participants and data analysis.

4.2 Return Rate of the Research Instruments

The research instruments, that is, the questionnaires were distributed among the one

hundred and ten (110) sampled teachers while interview guides were administered to the twelve (12) sampled head teachers, one interview guide to the sub county education officer and the sub county Teachers Service Commission (TSC) officer respectively.

The questionnaires that were received back from the sampled teachers were ninety-nine (99) out of the one hundred and ten administered to them. This represented ninety percent (90%) of the administered questionnaires. The eleven questionnaires, that is, ten percent (10 %) of the distributed questionnaires received were not fully filled hence they were discarded as spoiled by the researcher.

The interview guides return rate was a hundred percent (100%), that is, the interview guides that were administered to the head teachers, the Kajiado North Sub County Education Officer and Kajiado North Sub County Teacher's Service Commission Officer. That is, 12(100 %) interview guides were received back from the head teachers, 1(100%) and 1(100%) interview guides from the Kajiado Notrth Sub County Education Officer and Kajiado North Sub County Teachers Service Commission Officer respectively. The return rate of the research instruments was well above 70% which is an acceptable proportion and can be termed as adequate for analysis, (Gakuu, 2013).

4.3 Demographic Characteristics of the Respondents

The characteristics that were considered from the participants included age, number of years in teaching, number of years in using ICT aids and their highest level of education. The goal of the research was to determine whether the head teachers and teachers' demographic traits had an impact on the information gathered on teachers' preparedness in implementing the digital literacy policy in Kenya's Kajiado North Sub County.

4.3.1 Age of Participants

Data regarding the age of participants was very important in this study. The study sought to find out whether age had an effect on teachers' expertise in relation to masterly of subject content as well as the use of ICT aids in teaching and learning in their classrooms. Thus, using ICT aids in classrooms during content delivery is not likely to be challenge as far as subject content is concerned. The analysis for the respondents' age was key in this study. This was also to ensure a fair conclusion. Table 1 presents the findings of their ages.

Table 1 Age of Participants

Age	Age (Teachers) N (%)	Age (Head teachers) N (%)
31-35 yrs	22(22.2%)	
36- 40 yrs	22(22.2%)	0(0%)
Over 40 yrs	55(55.6%)	12(92.3%)

Source: Field Data 2022

Table 1 revealed that 55(55.6%) of the teachers that took part in the research were over 40yrs while 22 (22.2%) of the teachers were between 36–40 years and an equal number of 22 (22.2%) teachers were between 31–35 years. On the other hand, 12 (92.3%) of the head teachers who took part in the research were over forty years. None was within the range of 36–40years. The sub county education officer and the TSC officer in the sub county who participated in the study were over forty years (40).

From the results in Table 1 it was apparent that the highest percentage of teachers and school head teachers who were involved in the research were over 40 years. This indicates that

most teachers teaching in junior schools in the public sector were of middle age and have been in teaching before and after the introduction of digital literacy in teaching and learning. This could also mean that teachers in junior schools of Kajiado North Sub County have a wide experience in the masterly and delivery of subject content.

In relation to the ages of the Kajiado North Sub County education officer and TSC officer, it may signify long experience in their education supervisory role in the sub county. Thus, this could imply that teachers teaching in Kajiado Noth Sub County schools are likely to employ ICT aids in teaching and learning easily due to the masterly of subject content and their long experience in their profession of teaching compared to teachers who will be in their early years in the teaching profession.

4.3.2 The Number of Years in Teaching Career

Data regarding the number of years a teacher has been in the teaching career was important in this study particularly on their views regarding digital literacy and its implementation in their classrooms. It was likely to influence their use of ICT aids in teaching and learning in classrooms. The table below shows their responses.

Table 2. Number of Years in Teaching Career

Number of years in teaching	Teachers N (%)	Head teachers N (%)
1-5 yrs	19(19.1%)	0(0%)
6-10 yrs	23(23.1%)	0(0%)
11-15 yrs	31(31.2%)	1(7.7%)
16- 20 yrs	26(26.2%)	1(7.7%)
Over 20 yrs	0(0%)	11(86.4%)

Source: Field Data 2022

According to table 2, 31.2% (31) of the teachers have been in teaching career between 11 and 15 years, 26.2% (26) of the teachers which is a significant number have been in teaching career between 16 and 20 years while a few, that is, 23.1% (23), and 19.1% (19) of the teachers have been in teaching career between 6-10yrs and 1-5yrs respectively. In relation to head teachers, the table indicates that 86.4% (11) of the head teachers have been in teaching for over 20years and a few 7.7% (1) of the head teachers have been in the teaching career between 11-15 and 16-20 years singly. The findings in table 2, clearly indicates that most of the teachers' experience is between 11-15 years with 21 teachers. Based on the above findings this could mean that teachers in public junior schools in Kajiado North Sub County have a wide experience in teaching. This is likely to mean that the teachers teaching in public junior schools are good in content mastery and delivery. This means that using ICT aids in their classrooms in teaching and learning as far subject content is concerned may not be a problem if all factors are held constant.

4.3.3 The Number of Years in ICT Experience

The research participants were requested to indicate the range of years they have been using ICT aids to serve their individual needs. The table 3 below displays their answers.

Table 3. Years in ICT Experience

Number of years of using ICT	Teachers N (%)	Head teachers N (%)
1-5 yrs	15(15.4%)	2 (15.4%)
6-10 yrs	23 (23.1%)	3 (23.1%)
11-15 yrs	53 (53.8%)	7 (53.8%)
16- 20 yrs	7 (7.7%)	
Over 20 yrs	0 (0%)	0 (0%)

Source: Field Data 2022

Table 3 above shows that 53.8% (53) of the teachers between 11–15 years had an experience of using ICT aids, while 23.1% (23) of the teachers have been using ICT aids between 6–10 years, 15.4% (15) and 7.7% (7) of the teachers have used ICT aids between 1–5 and 16–20 years discretely. In relation to the head teachers, the table shows that 53.8% (53) of the head teachers have been using ICT aids for about 15 years while 23.1% (3) of the head teachers have used ICT aids between 6–10 years. The table also shows that 15.4% (2) of the head teachers have been using ICT aids for a period of 1–5 years.

The findings reveal that 53.8% (53) of the teachers who participated in the study had an extensive familiarity with ICT tools in their individual use. This could imply that teachers are more inclined to employ ICT aids in classrooms in teaching and learning if there is a suitable

ICT environment in their respective schools. The table also reveals that the head teachers 53 (7) of the head teachers had an experience in using ICT aids for a period of 11–15 years. This could imply that the head teachers were in a good position to supervise the ICT aids in teaching and learning in their respective schools.

In relation to Kajiado North Sub County Education Officer and the Kajiado North Sub County TSC Officer, their experience of using ICT aids at the individual level was between 16-20 years. Consequently, the Kajiado North Sub County Education Officer and the Kajiado North Sub County TSC officer's their long individual experience in using ICT aids shows their receptiveness to digital literacy and their ability to take their supervisory role on the implementation of digital literacy program in public junior schools in the Kajiado North Sub County.

4.3.4 The Highest Level of Education

The head teachers and teachers' highest professional qualifications were also sought to find out whether they were qualified to teach and run public junior schools. This information was meant to provide a bearing as far as the use of ICT aids in teaching and learning is concerned. The findings are presented in table 4

Table 4. The Highest Level of Education

Level of education	Teachers N (%)	Head teachers N (%)
P1	19(19.2%)	
DIP	33(33.3%)	2(16.5%)
PGDE	1(1.0%)	0 (0.0%)
B.ED	37(37.4%)	8(66%)
MA	7(7.1%)	2 (16.4%)
Others	2(2.0%)	0 (0.0%)

Source: Field Data 2022

Table 4 above displays that 37.7% (37) and 33.3% (33) of the teachers who participated in the study had bachelor of education degree and a diploma course respectively. The 19.2% (19) of the teachers were P1 teachers while 7.1% (7) and 1.0% (1) and of the teachers were Master's degree and PGDE holders respectively, while others, that is, 2.0% (2) of the teachers were untrained teachers.

The table also illustrates that 66% (8) of the head teachers were bachelor of education degree holders and the 16.5% (2) of the head teachers were diploma holders and masters' degree holders singly. The Kajiado North Sub County Education officer's highest level of education was masters while the Kajiado North Sub County TSC officer's highest level of education was a degree. The findings shows that majority of the teachers teaching in public junior schools in the Kajiado North Sub County are professionally trained teachers as deduced from table 4 above. This applies to the education office and teacher's service commissioner officer in Kajiado North Sub County. This could literally mean that the two officers' supervisory role in public junior schools in the sub county was to be professional and up to standard.

4.4 Teachers' Expertise in Using Education ICT Aids

The first research question in the study was to investigate public junior school teachers' level of expertise in using ICT aids in Kajiado North Sub County. The teachers were requested to indicate their agreement with the given statement by rating their level of expertise in performing various activities using ICT aids as excellent, very good, good, fair and poor. Their responses were as shown in the table below.

Table 5 Teachers' Expertise in ICT Aids

Statement on participants' ICT expertise in using ICT aids	Excellent		Very Good		Good		Fair		Poor	
	f	%	f	%		%	f	%	f	%
Use of Spreadsheet	13	13.1	7	8.1	27	31.4	37	43.0	15	17.4
Use of Presentation software	1	1.2	7	8.1	22	25.6	36	41.9	20	23.3
Use of Graphics software	1	1.2	1	1.2	19	22.1	36	41.9	29	33.7
Knowledge in troubleshooting	1	1.2	5	5.8	12	14.0	39	45.3	29	33.7
Effective and efficient use of internet in search of information	10	11.6	28	32.6	24	27.9	15	17.4	9	10.5
Evaluation of reliability and credibility of online sources of information	7	8.1	14	16.3	33	38.4	22	25.6	10	11.6
Knowledge of ethical and legal issues surrounding access to and use of digital information	2	2.3	14	16.3	30	34.9	27	31.4	13	15.1
Total (Mean)	0.36		0.77		1.69		2.14		1.26	

Source: Field Data 2022

Table 5 above shows that the statement on the use of spreadsheet had 43% (37) of the teachers who have a fair knowledge in using ICT aids, (27)31.4% of the teachers have good

knowledge on ICT aids, 17.4% (15) of the teachers are poor in using ICT aids, 13.1% (13) of the teachers have excellent knowledge in using ICT aids and 8.1% (7) of the teachers indicated to have good knowledge in it. On the item on use of presentation software, 41.9% (36) of the teachers rated their knowledge in the using of ICT aids as fair, while 25.6% (22) rated themselves as good, 23.3% (20) rated themselves as poor, 8.1% (7) rated themselves as very good and 1.2% (1) of the teachers rated themselves as excellent.

The item on the use of graphic software, showed (36)41.9% of the teachers rating their knowledge in ICT aids as fair, 33.7(29) of the teachers as poor, 22.1 % (19) of the teachers as good, 1.2 % (1) as very good while another 1.2 % (1) as excellent. In relation to the item on troubleshooting, (39)45.3% of the teachers rated their knowledge in ICT aids as fair, 33.7% (29/) of the teachers as poor, 14% (12) of the teachers as good, 5.8% (5) rated themselves as very good and 1.2% (1) of the teachers as excellent. In response to item on effective and efficient use of internet, 32.6% (28) of the teachers rated their knowledge on it as very good, 27.9% (24) as good, 11.6% (10) as excellent, 17.4% (15) of the teachers rated themselves as fair and 10.5% (9) as poor.

In response to the item on evaluating the reliability and credibility of online sources of information, 38.4% (33) of the teachers rated their knowledge in ICT aids as good, 25.6% (22)2) as fair, 16.3% (14) as very good, 11.6% (10) as poor and 8.1% (7) of the teachers as excellent. Concerning the item on ethical and legal on online issues, 34.9% (30) of the teachers rated their knowledge in ICT aids as good, 31.4% (27) as fair, 16.3% (14) as very good, 15.1% (13) as poor and 2.3% (2) rated themselves as excellent.

The results presented in Table 5 show that the largest proportion of teachers generally have a fair level of knowledge of ICT aids, followed by those with good knowledge and those

with poor knowledge. Although these findings suggest that teachers possess some basic knowledge and skills in using ICT aids for various activities, their level of competence may not yet be adequate to enable them to effectively implement the Digital Literacy Policy in teaching and learning in their classrooms. This is further demonstrated by the highest mean score of 2.14, which indicates that teachers rated their level of expertise in using spreadsheets, presentation software, and graphic software for teaching and learning as fair. The predominance of fair rather than good or very good ICT competence suggests that the integration of ICT into classroom practice has not yet reached the desired level.

The findings suggest that the ICT exposure teachers receive during their professional training may be insufficient to enable them to confidently and effectively integrate ICT into their day-to-day teaching and learning activities. This implies that merely being exposed to ICT during pre-service teacher education does not necessarily translate into adequate competence for its effective classroom application. The finding is consistent with the UNESCO ICT Competency Framework for Teachers (UNESCO, 2023), which emphasises the need for teacher education systems to systematically develop teachers' digital competencies and pedagogical capacity to integrate technology into teaching and learning. The framework recognises that teachers require continuous professional development to strengthen their ability to use digital technologies effectively across different aspects of teaching

These findings therefore point to a continuing gap between the Kenyan government's vision of making ICT a universal tool in education and training and the current level of ICT competence among teachers. While the government has put in place measures to promote ICT integration, the results indicate that this objective has not yet been fully achieved at the classroom level. The Kenya Ministry of Education (2023), through the National Education

Sector Strategic Plan 2023–2027, recognises the importance of strengthening teachers' capacity through ICT integration programmes and training in the use of digital applications. The need for such interventions is further underscored by the present findings, which demonstrate that a substantial proportion of teachers still have only fair knowledge and skills in the use of ICT aids.

Therefore, sustained and targeted professional development in ICT is necessary to equip teachers with the competencies required to effectively integrate digital technologies into teaching and learning and ultimately realise the government's vision of ICT as a universal tool in education and training. This confirms the responses from the interview with the head teachers of various public junior schools in Kajiado North Sub County, some of whom pointed that many of their teachers had been in the profession for long but showed reluctance in using ICT aids to perform personal professional requirement such as filing KRA returns or filling teachers' performance appraisal forms. Head teacher A said:

> Many of the teachers have ICT knowledge but they are not officially trained. Their ICT knowledge cannot enable them implement digital literacy policy in their classrooms. If with the ICT knowledge they have, some of them are still reluctant in using ICT aids to perform personal professional requirements such as TPAD, how about teaching and learning in their classrooms? You find some teachers seeking these services in cyber.

The sentiments of Head Teacher A above are consistent with UNESCO's (2024) view that teachers require appropriate levels of knowledge, skills, and values to effectively fulfil their professional roles and respond to the evolving demands of education. Moreover, this finding corroborates with other global empirical evidence. For instance, a large-scale international study involving a sample of practicing teachers from Germany, Belgium, the United States, and

Singapore, Scherer et al. (2023) managed to establish that teachers' ICT pedagogical competence significantly predicted learner-centred instructional practices $\beta = .42$, $p < .01$, which is a core requirement of CBE curriculum. Although the teachers in the present study seemed to be familiar with basic use of ICT aids, the dominance of fair competence in the use of ICT aids resonates with Scherer et al.'s observation that surface-level ICT skills are inadequate to drive the design of inquiry-based, learner-centred and formative assessment-driven lessons in teaching and learning in classrooms. It therefore implies that in the absence of advanced ICT competence skill particularly in ICT aids and applications such as spreadsheet for assessment analytics and presentation software for scaffolded learning, teachers are unlikely to actualize the full intent of CBE curricula.

Similarly, the findings reported by the OECD (2022) in a study conducted as part of their "Teaching and Learning International Survey" confirm this interpretation. Reportedly, through applying a multivariate regression analysis to the data collected in member and partner states, the study indicates, among other things, that "Teachers with higher levels of digital competence were significantly more likely to report the use of a range of enquiry-based learning approaches and project-based learning strategies, a set of strategies that are highly consistent with the CBE model." In marked contrast, the dominance of fair ICT competence in the present study points to a possible structural impediment for teachers to move away from "traditional" approaches to learning, and teaching as required by CBE especially in resource-constrained settings where efficient and innovative ICT deployment is a necessity.

From a continental perspective, Adarkwah (2021) utilized a mixed-methods approach to investigate teachers' ICT competence and pedagogical practices in Ghana, Nigeria, and South Africa. The results of the multiple regression analysis indicated that ICT competence accounted

for 38% of the variance in instructional adaptability and learner engagement ($R^2 = .38$, $p < .01$). However, despite a threshold level of basic ICT skills, many teachers still preferred to revert to traditional teacher-centred approaches. This finding closely relates to the present study, in which it appears that fair knowledge of the ICT aides among the teachers is still not good enough for facilitating the accomplishment of the learner-cantered CBE practices. Importantly, Adarkwah's study did not situate ICT competence within the competence-based curriculum framework, a conceptual limitation that this present study addresses by the direct linking of specific ICT aides to CBC implementation outcomes.

Yet another factor that further supported this trend is that of Tondeur et al. (2023) sought to examine predictors of effective ICT integration for learner-centred instruction in Sub-Saharan Africa and used logistic regression analysis to confirm that teachers who received ICT pedagogical instruction were significantly more likely to engage in competence-based instruction (Odds Ratio = 2.7; $p = < .05$). It should be noted that this research did not examine specific ICT competencies in teachers that included skills in using the spreadsheets, presentation programs, and problem-solving skills. This research would further add to the body of knowledge to show that deficiencies within specific ICT aides, particularly for assessment, visualization, and problem-solving skills among many which remain a significant barrier for CBE instruction.

At the national level, the findings are consistent with the empirical evidence in Kenya. For instance, Mwangi and Kihoro (2022) established a moderate, though statistically significant, correlation between ICT competence and effective CBC implementation ($r = .46$, $p < .01$) across public primary junior schools in Nairobi, Kiambu, and Nakuru counties. Although some gaps in teachers using ICT for formative assessment and monitoring students' progress using spreadsheets and troubleshooting, respectively, are noted as teachers' poor ability to apply this

concept in teaching and learning. This was also established in this study.

The findings have also been supported by national diagnostic evidence presented by the Kenya Institute of Curriculum Development (KICD, 2023). The study indicates that while most of the teachers showed some awareness of ICT, only half of them were able to show adequate preparation to effectively utilize ICT aides in teaching and learning in supporting CBC. The study also indicates that being an ICT savvy does not mean one is ready to carry out CBC duties, especially in terms of assessments using ICT aids. Thus, it is safe to conclude that teachers' sensitivities, capabilities and personal disposition are pertinent in successful ICT implementation.

4.5 Teachers' ICT Professional Training

The second objective was to seek information on teachers' ICT professional training that they may have received in preparation to implement digital literacy policy in Kajiado North Sub County. The teachers were asked to indicate their agreement to given statement by ticking yes or no, indicate the institutions in which they received ICT training, the level of ICT training they received, the length of the training period and also rate the relevance of the training in implementation of digital literacy policy in teaching and learning in their classrooms. Table 6 below shows their responses.

Table 6. Professional Training

Professional Training	N	%
Yes	74	74.7%
No	25	25.3%

Source: Field Data 2022

In relation to professional training, table 6 shows that 74.755 (74) of the teachers admitted that they had received ICT training while 25.25% (25) affirmed that they never received any ICT training. For instance, some of the interviewed head teachers consented that a sampled number of teachers in their schools received the county ICT organized trainings.

Head teacher B had this to say:

> There was an organized training that was offered by the county education office on ICT. From my school, I attended the training with four of my teachers; three from upper primary junior and one from lower primary junior school. The training was just basic; the 1st session was on general information on computers, that is, how to switch on, open a file, close and use word to type a document. The rest was a bout filling in the TPAD information online.

Head Teacher B explained that the ICT training provided by the county education office was largely introductory and focused on basic computer operations and the completion of TPAD information online. The training therefore appears to have concentrated more on basic computer literacy and administrative applications than on the pedagogical integration of ICT into classroom teaching and learning. This may explain why teachers who had attended the training could have basic ICT knowledge but still experience difficulties in using digital technologies to support instructional activities.

Head Teacher B's account is consistent with recent evidence from Kenya, where the Centre for Mathematics, Science and Technology Education in Africa (CEMASTEA) has continued to provide teachers with training on how to integrate ICT into teaching and learning. The 2024 training programme specifically aimed to equip teachers with skills for using computers, laptops, tablets and other digital technologies to source and develop teaching and learning materials. This continued emphasis on ICT capacity building suggests that basic exposure to digital technologies alone may not be sufficient to achieve effective classroom integration

The statement of Head Teacher B is also well supported by Tondeur, Scherer, Siddiq, and Baran (2020) study who sought to ascertain whether there was efficacy in the effective integration of ICT in teaching and learning classrooms, which, apart from being technically oriented, also entailed pedagogical competence development for effective integration and use of ICT for teaching and learning. In their empirical research entailing data collection and analysis on teacher learning for ICT integration in schools. Tondeur et al. (2020) reported ascertaining an empirical fact that while technically oriented ICT training for teachers did no more than affirm low levels of teacher confidence and exercise in ICT for effective teacher-centered, learner-centered education, pedagogically oriented ICT training was more effective in ICT integration by teachers for effective teaching and learning, as opposed to its absence, which rendered them unable to effectively integrate or promote digital literacy and competence-based education, no matter how much training they received in ICT aids and skills.

In this objective the study also sought an information on the institutions in which the teachers received training in using ICT aids skills and knowledge. The information meant to inform the study whether the government took an initiative to offer ICT training to teachers

teaching in junior public school in Kajiao North Sub County as a way to prepare them to implement digital literacy policy in teaching and learning in their classrooms. The table below reveals their response.

Table 7 Training Institution

Training Institution	N	%
Commercial college	11	11.1%
School organized	31	31.3%
TTC/University	14	14.1%
Self-taught	21	21.2%
Others	3	3.0%
None	19	19.2%

Source: Field Data 2022

Table 7 above shows that teachers acquired ICT training through different sources, with 31.3% (31) reporting that their training was organised by their schools, while 21.2% (21) indicated that they were self-taught. A further 11.1% (11) received ICT training from commercial colleges, 14.0% (14) from technical training institutions or universities, and 3.0% (3) from other sources. Notably, 19.2% (19) of the teachers reported that they had not received any ICT training. These findings reveal that access to ICT training among teachers was not uniform and that a considerable proportion of teachers either relied on self-directed learning or had no formal ICT training at all.

The relatively high proportion of teachers who were self-taught, together with those who had received no ICT training, suggests that teachers' acquisition of ICT competencies may have depended largely on individual initiative rather than a systematic and continuous professional

development programme. While self-directed learning can contribute to the development of basic digital skills, it may not provide teachers with the pedagogical competencies required to integrate ICT effectively into teaching and learning. The situation is particularly concerning given that nearly one-fifth of the teachers had received no ICT training.

This finding is also consistent with the continuing emphasis on strengthening teachers' digital competencies in contemporary education. The UNESCO ICT Competency Framework for Teachers recognises that effective technology integration requires teachers to develop not only basic digital skills but also pedagogical competencies for using ICT to support teaching, learning, assessment and professional practice. This underscores the importance of structured and continuous professional development rather than relying predominantly on self-teaching or sporadic training opportunities.

Therefore, the findings suggest that although opportunities for ICT training exist, they have not yet reached all teachers in a systematic and equitable manner. The fact that 19.2% of teachers had received no ICT training, while 21.2% depended on self-directed learning, indicates a continuing gap in teachers' access to formal ICT professional development. This gap may constrain the effective implementation of ICT-based teaching and learning and highlights the need for more regular, structured and pedagogically oriented ICT training programmes for teachers.

Either, the trainings the teachers acknowledges to have received as indicated in table 7 above was not meant to enable them integrate ICT aids in teaching and learning in their classrooms but for their own professional development. Besides, even if one gained experience in using ICT aids during professional training, the experience may not mean much since in Kenya it takes a while for one to get a job in teaching opportunity in an educational institution.

Further reinforcing this pattern, Kalinga (2024) found that although teachers in Tanzanian public secondary schools were aware of national ICT-in-education policies, about 85% did not apply ICT aids pedagogically in teaching and learning but instead used basic technologies such as smartphones and laptops for non-teaching purposes. This supports the observation made in the current study that school-based, self-taught, or institutionally acquired ICT training was largely disconnected from competence-based teaching and learning imperatives in classrooms, hence its limited positive effect on classroom practice.

Head teacher G highlighted the changing role of technology in education and noted that although teachers have access to various technological devices, they do not always take the initiative to integrate them into classroom instruction. He recalled his experience as a student teacher:

> I remember when I was a student teacher undertaking my degree in education, we had communication technology as a common unit. We learnt to present course content using different ICT aids, e.g., one could project his or her work using PowerPoint or use a smart board. Years have gone since then, and currently most of the things that were done manually are being handled technologically. Technology has become part of our life. For example, here in my school, most teachers have smartphones, some have laptops, and some have typed notes which they use to teach in their classrooms. But I have not seen them taking the initiative to teach using these technologies. Reasons best known to them.

The sentiments expressed by Head teacher G suggest that access to technology alone does not necessarily translate into its effective integration into classroom teaching. Although teachers may possess smartphones, laptops, digital teaching materials, and other ICT resources, they may lack the confidence, motivation, or practical skills required to incorporate these technologies

meaningfully into their lessons. Teacher preparation should go beyond introducing ICT as a theoretical component and provide sustained opportunities for teachers to develop practical competencies in technology-supported teaching. This thus demands that teachers to undergo ICT trainings and hands on in ICT delivery in their day-to-day teaching and learning. This will empower and give them confidence to use the available ICT aids to deliver their subject content in classrooms.

These findings also bear significant similarity with a study that was conducted by Dzidzornu et al. (2025). The study examined that whereas student-teachers were able to demonstrate basic skills in digital literacy, they were deficient when it came to pedagogical application in terms of competence-based education and information and communication technology competence for teachers following UNESCO's information and communication technology competency framework for teachers' guidelines. This is somewhat akin to what was also noted in the present study, whereby there was an emphasis on operational skills and not on application skills when it came to ICT training.

Similar evidence is given by Shayo and Mnyanyi (2023) in Tanzania Mainland, where their mixed-method study disclosed that although teachers and teacher trainees enjoyed access to ICT training and resources, there was a significant gap that existed between ICT training and pedagogical use in the classroom. This resonates with what Head Teacher G said: that though teachers owned digital devices and had some exposure to ICT during their professional training, they seldom used them during classroom teaching and learning. Shayo and Mnyanyi explain this with a lack of sufficient training opportunities that are practical, contextual, and integrated within realistic teaching situations, a limitation similarly found in the present study.

Either teachers were asked to indicate the training levels at which they received ICT skills and knowledge in their professional development. Table 8 below shows their responses.

Table 8. ICT Training Levels

Training Levels	N	%
Computer Packages	32	32.3%
Certificate level	19	19.2%
Diploma	4	4.0%
Degree	5	5.1%
Others	16	16.2%
None	23	23.2%

Source: Field Data 2022

The findings presented in Table 8 indicate that teachers had acquired ICT knowledge and skills at varying levels. The largest proportion, 32 (32.3%), had undertaken computer packages, followed by 19 (19.2%) who had acquired ICT training at certificate level. A further 16 (16.2%) reported having obtained ICT knowledge through other forms of training, while 5 (5.1%) had acquired ICT skills at degree level and 4 (4.1%) at diploma level. Notably, 23 (23.2%) of the respondents indicated that they had not received any ICT training. These findings suggest that although a considerable proportion of teachers had received some form of ICT training, the training was largely oriented towards acquiring general computer literacy and personal professional development rather than developing the pedagogical competencies required to integrate ICT effectively into subject content delivery.

More troublingly, nearly one-quarter of the teachers reported to have not received any ICT skills and knowledge whatsoever (23.2%). Taken together, the ICT training reported at these levels was also overwhelmingly individual-oriented, with a focus on basic computer use rather than pedagogical competence related to classroom teaching. This represents an interesting echo of a broader tendency within ICT teacher training literature, where most professional development opportunities are centred on technical skills acquisition rather than pedagogical integration methodologies.

The implication of these findings is that possessing basic computer skills does not necessarily mean that teachers are able to integrate ICT into classroom instruction. There is therefore a need for continuous, practical, and subject-specific ICT professional development that enables teachers to connect technological knowledge with pedagogical practices and subject content. Such training would help teachers progress from merely knowing how to operate digital devices to using technology purposefully to enhance teaching, learner engagement, collaboration, problem-solving, and achievement.

This finding is consistent with Shikomera, Mulwa, and Mwania (2023), who examined teacher ICT training and the integration of ICT in teaching and learning in public primary schools in Kenya. Their study established that a majority of teachers lacked adequate ICT training and recommended strengthening ICT training to enhance the integration of technology into classroom instruction

This finding is strongly supported by Tondeur, Scherer, Siddiq, and Baran (2020), whose study showed that ICT training in teacher education is often provided as fragmented technical training rather than in conjunction with instructional planning, assessment practices, and subject-specific pedagogy. An empirical analysis indicated that such fragmented training significantly

constrains teachers' capacity to transfer ICT skills into meaningful teaching and learning in classroom.

Similarly, Dzidzornu et al. (2025), through their study on ICT competencies among student teachers, revealed that although its basic skills are common among student teachers, they lack the depth or confidence expected of them with regard to ICT pedagogy. They determined that it was necessary to move ICT professional development beyond mere training on basic ICT skills towards a more continuous ICT pedagogy-based approach. Following such a line of reasoning with regard to ICT literacy pedagogy, it has become apparent that a lack of ICT training and a lack of professional development with a grounding within ICT pedagogy remain key hindrances towards effectively utilizing digital literacy within classroom contexts. Thus, teacher ICT professional development workshops and other regular trainings are essential if at all digital literacy policy has to be implemented effectively by teachers in classrooms.

In relation to time span of the trainings, the participants were requested to put a tick on the appropriate time span in their acquisition of ICT skills and knowledge. The information sought was to show the time scale of exposure in acquiring ICT skills and knowledge. Their response is as in table 9 below.

Table 9 Training Period

Training Period	N	%
Several weeks	33	33.3%
Some months	27	27.3%
One year	5	5.1%
More than one year	8	8.1%
None	26	26.3%

Source: Field Data 2022

The findings presented in Table 9 show that the duration of ICT training among teachers varied considerably. Thirty-three (33.3%) teachers reported that they had received ICT training for several weeks, while 27 (27.3%) had undergone training for several months. A smaller proportion, 8 (8.1%), of the teacher had received training for more than one year, whereas 5 (5.1%) had received training for one year. However, 26 (26.3%) of the respondents did not indicate the duration of their ICT training. These findings suggest that although most teachers had participated in some form of ICT training, the duration and intensity of the training varied, with a substantial proportion receiving relatively short-term exposure. The quantitative findings are supported by the views of Head Teacher D, who explained that the ICT training offered to teachers was conducted for only four days during each school holiday. The head teacher stated:

> The training we received took four days per holiday and it was offered during long holidays. This was done during April holiday, August and December holidays and that was it. It was too compressed. It focused on filling in TPAD online by an individual teacher and computer basic knowledge.

The statement indicates that the training was largely short-term and focused on basic computer skills and administrative tasks rather than on the pedagogical integration of ICT into classroom teaching. The limited duration of the training may therefore have constrained teachers' opportunities to practise, reflect on, and develop the skills required to use technology effectively in subject-specific instruction. This is consistent with Shikomera, Mulwa, and Mwania (2023), who found that inadequate ICT training among teachers was a significant concern in Kenyan public primary schools and recommended strengthening teacher training to enhance the integration of ICT into teaching and learning.

The findings are highly corroborated in more recent ICT training literature. In fact, Dzidzornu et al. (2025) established that short-term and foundational ICT training courses among teachers render them low in terms of confidence and competence in ICT for effective competence-based education contexts. The study went on to highlight the fact that ICT training for teachers and teacher trainees which lacks continuity and application fails to yield effective impacts on actual instructional contexts. In essence, another study by Shayo and Mnyanyi (2023) established that even though teachers and teacher trainees in Tanzania received ICT training, the duration and structure of ICT training rendered were low for actual effective pedagogical integration and factors later brought forth a sharp disconnect between training and its actual application.

Further supporting evidence comes from the study by Kalinga (2024), which indicated the failure of teachers to integrate ICT pedagogically despite exposure to ICT training and knowledge of ICT in education policies due to an insufficient amount of hands-on training. This study found teachers using basic ICT tools such as smartphones and laptops, thus supporting the fact that short-duration ICT training is insufficient in creating pedagogical ICT competence. In Kenya, Opicho et al. (2025) established a statistically significant association between the digital literacy of teachers and the implementation of the CBC curriculum ($\chi^2 = 32.050$, $p < .001$). Similar evidence supporting the fact that continuous and progressive ICT training for teachers is essential but short-duration ICT training is insufficient was provided in the study by Omar, Warfa, and Karienye (2025). This study confirmed the fact that associations between an increase in the digital competence of teachers and ICT integration in classrooms exist but highlighted the fact that the absence of ongoing training, follow-ups, and professional learning communities contributes to the failure of integrating ICT in the classroom.

Consequently, the findings imply that the effectiveness of ICT training should not be

assessed solely by whether teachers have attended training, but also by its duration, continuity, relevance, and practical application to classroom instruction. Short and highly compressed training sessions that focus mainly on basic computer operations or administrative requirements may have limited impact on teachers' ability to integrate ICT pedagogically. Schools and education stakeholders should therefore provide sustained and subject-specific professional development, accompanied by opportunities for practical application, collaboration, follow-up support, and reflection. Such an approach would enable teachers to move from basic digital literacy towards meaningful integration of ICT in teaching and learning. Frequent hands on training and regular workshops for the teachers are of necessity. This will enhance their skills and knowledge in ICT.

Either, regular exposure to varieties of ICT aids is necessary for purposes of gaining tangible wide experience in using different ICT aids to present different subject content. These ICT aids should be made available and accessible to teachers as much as possible. Exchange programs among teachers of different institution should be encouraged so as to enhance networking and teamwork among teachers. This may boost their level of competence in education technology. Banister (2006) quoting the International Society for Technology in Education posits that teacher-students have to go through a sequence of experiences that will developin them an in-depth understanding on how education technology can be used as a tool in teachingand learning in a classroom. Regular ICT training, follow-ups and mentorship programs on teachers during service delivery will build confidence and competence in them. It will enable them to explore various ICT aids available and utilize them to the advantage of the learner in their classrooms.

Either the teachers were requested to indicate whether the trainings they received were relevant to their teaching career. The table 10 below shows their responses.

Table 10 Training Relevance

Training Relevance	N	%
Very Relevant	27	27.3%
Relevant	39	39.4%
Slightly relevant	12	12.1%
Not relevant	21	21.2%

Source: Field Data 2022

The findings presented in the table indicate that 27 (27.3%) of the teachers considered the ICT training they received to be very relevant, while 39 (39.4%) rated it as relevant. A further 12 (12.1%) regarded the training as slightly relevant, whereas 21 (21.2%) reported that it was not relevant. Overall, the findings suggest that 66.7% of the teachers perceived the ICT training they received as either relevant or very relevant. However, further analysis indicates that the perceived relevance of the training was largely associated with its usefulness in meeting administrative requirements rather than its application to classroom teaching and learning. In particular, teachers identified training that enabled them to perform Teachers Service Commission (TSC) administrative tasks, such as completing the Teacher Performance and Appraisal and Development (TPAD) process online, as relevant. This suggests that the training primarily developed teachers' ability to use ICT for administrative purposes rather than equipping them with pedagogical skills for integrating technology into the delivery of subject content.

Head teacher F posited in an interview:

> After the ICT trainings the county government offered us, some of our teachers were and are now able to individually fill TPAD forms online unlike when most of them could que in cybers for the same service. In relation to teaching using ICT aids one or two of the teachers can teach using ICT aid as per the ICT room time table, others do not. Some say they do not use ICT aids because its time consuming since it drags the syllabus, others say it's because of the large class population while others do not give any reason.

The statement by the head teacher is consistent with evidence that basic ICT training does not necessarily equip teachers with the competencies required to integrate technology effectively into classroom teaching. Recent evidence from Kenyan public schools indicates that some teachers receive ICT training that focuses primarily on basic computer applications, such as Microsoft Office and Excel, without adequately preparing them for the pedagogical integration of technology in teaching and learning. The study further found that computer literacy alone does not guarantee the effective use of ICT in classroom instruction, highlighting the need for deeper training in the pedagogical application of digital technologies.

This finding is also supported by UNESCO's ICT Competency Framework for Teachers, which emphasizes that teacher ICT development should progress beyond basic digital literacy towards the effective application of technology in pedagogy, curriculum and assessment, classroom practice, and professional learning. The framework identifies teacher professional learning and pedagogical application as key components of ICT competence and advocates continuous professional development rather than one-time training.

Therefore, although a majority of teachers perceived the ICT training as relevant, its relevance appears to have been limited in relation to classroom instruction. The findings point to a gap between ICT skills for administrative compliance and ICT competencies for pedagogical

integration. This implies that future ICT training should place greater emphasis on subject-specific applications of technology, lesson preparation, digital content development, learner engagement, assessment, and the effective integration of ICT into everyday classroom practice.

The Kajiado North Sub County TSC officer D had this to say:

> Some of our teachers in the sub county from various public junior schools have attended two ICT training workshops that was organized by the national government in one of the secondary schools in the sub county. I happened to be in attendance. The training was generally on how to operate a computer. It was all about the general knowledge on computers. The training did not focus as such on how to use ICT aids to teach in a classroom. May be in the future they will organize for that since they have begun it.

The excerpt from the Kajiado North Sub-County TSC Officer provides important evidence regarding the nature, scope, and limitations of ICT training provided to teachers. The officer's observation indicates that although teachers had attended two ICT training workshops organized by the national government, the training primarily focused on basic computer literacy rather than pedagogical integration of ICT into classroom teaching.

The statement that the training was "generally on how to operate a computer" suggests that the programmes concentrated on foundational digital skills, such as computer operation, rather than on how teachers could use specific ICT tools to enhance lesson delivery. This points to a gap between knowing how to use technology and knowing how to use technology effectively for teaching and learning. Teachers may therefore acquire the technical ability to operate computers without necessarily developing the pedagogical competencies required to select and integrate appropriate digital resources into different subjects.

The excerpt also reveals that the ICT training was not sufficiently aligned with teachers' classroom needs. The officer explicitly notes that the training "did not focus as such on how to use ICT aids to teach in a classroom." This suggests that the training was largely technology-centred rather than pedagogy-centred. Consequently, teachers may remain unable or reluctant to translate their newly acquired computer skills into meaningful classroom practices.

Furthermore, the officer's expectation that such training may be provided "in the future" indicates that ICT teacher professional development may be occurring in stages but remains incomplete. The two workshops appear to have established a foundation in basic computer literacy, but there is a need for subsequent training that moves teachers from basic ICT competence to the pedagogical application of technology.

The excerpt therefore suggests that the challenge facing ICT integration in the sampled junior secondary schools is not necessarily the complete absence of teacher training, but rather the limited relevance and depth of the training provided. Training that focuses primarily on general computer knowledge may have limited influence on classroom ICT integration unless it is followed by practical, subject-specific training on lesson planning, digital content development, interactive teaching, learner assessment, and the use of specific ICT aids.

The finding also implies that ICT professional development should be continuous, practical, and closely connected to classroom practice. Teachers need opportunities to practise using ICT tools in actual teaching situations, receive feedback, collaborate with colleagues, and receive follow-up mentorship. Thus, the officer's testimony reinforces the broader finding that basic ICT literacy alone is insufficient to guarantee effective integration of technology into teaching and learning.

In regard to this, the sub county education officer A said:

> Our office has no official communication whether there has been any organised ICT training workshop. The government working procedures and official communications follow some protocols, may be the communication would be on the way. But as for now our office is not directive from the ministry. Our office is not aware.

The excerpt from the Sub-County Education Officer A provides important evidence concerning institutional coordination, communication, and administrative support for ICT training. The officer's statement that the office had received "no official communication" about organized ICT training suggests that there was a gap in the flow of information between the national government or Ministry of Education and the sub-county education administration.

The excerpt further indicates that ICT training initiatives may be implemented without adequate communication to, or involvement of, the local education administration. Since the officer states that the office can only undertake its supervisory role after receiving an official directive from the Ministry, the absence of such communication potentially limits the office's ability to coordinate, monitor, and support ICT training activities in schools. This may result in weak institutional oversight and limited follow-up on whether teachers actually participate in training and apply the acquired ICT skills in their classrooms.

The officer's response also highlights the importance of clear administrative structures and communication channels in the implementation of ICT programmes. Even where ICT training is organized at the national level, effective implementation at school level requires coordination among the Ministry of Education, sub-county education offices, school administrators, and teachers. Without timely communication and clear responsibilities, local education officers may

be unable to provide the necessary supervision, mobilize schools, or assess the outcomes of ICT training.

The excerpt therefore suggests that the challenge of ICT integration extends beyond teachers' individual skills and access to ICT resources to include institutional and administrative factors. The lack of awareness at the sub-county level may indicate weaknesses in the dissemination of information and coordination of ICT training programmes. This could contribute to fragmented implementation, inadequate monitoring, and limited follow-up support for teachers.

Importantly, the statement also reveals a potential disconnect between policy implementation at the national level and practice at the local level. For ICT training to have a sustained impact on classroom teaching, communication about training programmes needs to reach sub-county education offices in a timely manner, with clearly defined roles for mobilization, supervision, monitoring, and follow-up. Strengthening these communication and coordination mechanisms would enable education officers to support schools more effectively and ensure that ICT training translates into meaningful classroom practice.

The findings correlate with the existing literature on ICT training for the contemporary context. The study by Dzidzornu et al. (2025) indicated that although perceptions for ICT training by both teachers and student teachers exist, the correlation lies within its basic computer usage rather than its pedagogical application. The study established that ICT training programs, even though they emphasize computer knowledge and skills, are not effective in providing teachers with the needed confidence and competence for competence-based learning outcomes, considering its failure to integrate training with actual class environment exposure for teachers. Similarly, Shayo and Mnyanyi (2023) indicated that although teachers recognized the importance

of ICT training, they experienced huge gaps between information training and instructional knowledge resulting from its failure to sufficiently emphasize its pedagogical application and usage.

Additionally, this claim is also supported by another study by Kalinga (2024), which revealed that even though the majority of the teachers are aware of ICT-in-education policies and are exposed to ICT training programs, a vast majority failed to incorporate ICT learning tools into their instructional methods. This study also found that a vast majority of the teachers are using ICT for non-instructional purposes, which is also close to the present study findings following the relevance of ICT training for non-instructional purposes. In the context of this study among the Kenyan population, Opicho et al. (2025) found a statistically significant relationship between the implementation of an effective CBC method among teachers and their level of digital literacy ($\chi^2 = 32.050$, $p < .001$), which also Indicates that ICT training needs to be aligned with learner-centered and instructional goals; otherwise, it will be considered relevant by the teacher.

Likewise, Omar, Warfa, & Karienye (2025) asserted that though the enhanced digital literacy among teachers had a positive impact on the integration of ICT, the absence of context-responsiveness, continuity, and practicality in teachers' professional development hindered the effective usage of ICT aids in the classroom. The researchers stressed the need for doing away with tokenism or training undertaken for compliance's sake when training teachers for ICT use in the classroom, arguing that such an attempt does not adequately empower teachers with the requisite skill or self-confidence for using ICT in their day-to-day handling of teaching and learning processes—issues also witnessed in the findings of this study where the teachers'

training in ICT, though relevant to the training needs assessment, did not thoroughly consider the large class sizes, time, and the corresponding coverage of the relevant topics in the curriculum.

Further, the respondents were asked to rate their level of competence in using different ICT aids as an expert, advanced, proficient, basic and limited. Their replies are as shown on the table below.

Table 11 Competence Level

Participant's statement on their ability to use ICT aids	Expert		Advanced		Proficient		Basic		Limited	
	f	%	f	%	f	%	f	%	f	%
Connect computer cables to electricity and switch ON or OFF	17	17.2	21	21.2	23	23.2	31	31.3	7	7.1
Open, close, save and rename file	15	15.2	20	20.2	24	24.2	26	26.3	14	14.1
Search online for educational materials	19	19.2	1	1.0	16	16.2	33	33.3	7	7.1
Use the internet for emailing other teachers, parents and pupils on issues related to teaching and learning.	14	14.1	16	16.2	30	30.3	24	24.2	15	15.2
Scan for viruses and fix basic faults (trouble shoot)	5	5.1	9	9.1	14	14.1	33	33.3	38	38.4
Use word processor e.g., Ms Word to type lesson notes, exam	11	11.1	19	19.2	20	20.2	25	25.3	24	24.2
Use spreadsheet e.g., Ms excel to perform arithmetical calculations and plot graphs	4	4.0	19	19.2	15	15.2	29	29.3	32	32.3
Use databases e.g., access to store pupils' personal and performance records	5	5.1	19	19.2	18	18.2	28	28.3	28	28.3
Use any software for classroom presentation	7	7.1	13	13.1	24	24.2	30	30.3	24	24.2
Total (mean)	**0.98**		**1.38**		**1.86**		**2.6**		**1.9**	

Source: Field Data 2022

Table 11 above unveils teachers' response to item on connecting computer cables and switch on or off, (31) 31.3% of the participants agreed to have basic knowledge in it, (23) 23.2% of the teachers were proficient in it, (21) 21.2% of the teachers had advanced knowledge in ICT, (17)17.2% of the teachers had excellent ICT skills and knowledge while (7) 7.1% of the teachers had limited knowledge and skills in ICT. In relation to item on opening, closing, saving and renaming a file in a computer, (26) 26.3% of the participants rated their competence level as basic, (24) 24.2% of the teachers rated themselves as proficient, (20) 20.2% of the teachers rated themselves as advanced, (15) 15.2% as experts and (14) 14.1% had limited skills and knowledge in it.

On the item on their competence in search for education online materials, (33) 33.3% of the participants rated their competence in it as basic, (19) 19.2% as expert, (16) 16.2% as proficient, (7) 7.1% as advanced and (1) 1.0% as limited. Responding to the item on their ability to use internet to email other teachers, parents and learners, (30) 30.3% of the participants rated their competence as proficient, (24) 24.2% as basic, (16) 16.2% as advanced, (15) 15.2% as limited and (14) 14.1% as expert.

In relation to the item on their ability to scan for viruses and fix basic faults (troubleshoot), (38) 38.4% of the participants indicated their competence as limited, (33) 33.3% as basic, (14) 14.1% as proficient, (9) 9.1% as advanced and (5) 5.1% as excellent. The item on using word processor for example for typing lesson notes and examinations, (25) 25.3% of the participants rated their competence as basic, (24) 24.2% as limited, (20) 20.2% as proficient, (19) 19.2% as advanced and (11) 11.1% as excellent. The item on their ability to use spreadsheet for example MS excel to perform mathematical calculations, (32)32.3% of the participants rated their competence as limited, (29) 29.3% as basic, (19) 19.2% as advanced, (15) 15.2% as

proficient and (4) 4.0% as excellent. On the item on their ability to use the databases for example to access and store learner's personal and performance records, (28)28.3% of the participants rated their level of competence as limited, (28) 28.3% as basic, (19)19.2% as advanced, (18)18.2% as proficient and (5)5.1% as excellent.

In response to the item on the use of any software for class presentation, (30)30.3% of the participants rated it as basic, and 24.2% (24) as limited, (24)24.2% as proficient, (13)13.1% as advanced and (7) 7.1% as excellent. In an interview, Head Teacher D observed that the increasing use of digital technologies in different aspects of life has also created a growing expectation for teachers to integrate ICT into teaching and learning. He stated:

> The current trend in the world is that everything is moving to technology. Majority of the people in the world are doing most of their activities digitally. This includes teachers. However, to integrate ICT aid into teaching and learning in classrooms has become a challenge to many of my teachers. This calls for teacher professional development in pedagogical ICT training.

The statement highlights a significant gap between teachers' general exposure to digital technology and their ability to apply ICT effectively for pedagogical purposes. Although teachers may increasingly use digital technologies in their personal and professional lives, such exposure does not necessarily translate into the effective integration of ICT into classroom instruction. The head teacher therefore identifies pedagogical ICT training as necessary for enabling teachers to move beyond basic technology use and apply ICT purposefully to enhance teaching and learning.

The finding suggests that teacher professional development should focus not only on technical skills but also on the pedagogical application of ICT. Teachers require practical training on how to select appropriate digital tools, integrate them into lesson planning and delivery, develop digital learning resources, engage learners through technology, and use ICT for

assessment. Continuous professional development in these areas could enhance teachers' confidence and competence and enable them to respond more effectively to the increasing digital demands of education.

From a CBE framework, digital competence is not only seen to encompass ICT skills but also encompasses the pedagogical use of ICT to enable learner-centered approaches, formative assessment, and differentiation. Therefore, the findings show that there is a mismatch between the ICT competence of the teacher and the needs of CBE. For instance, although some of the teachers showed ICT competence in terms of search skills for online sources of learning materials or email communication with stakeholders, this is not sufficient to meet CBE requirements, which emphasize assessment, learner portfolios, and feedback mechanisms, among others.

The findings of the study correlate with existing global empirical trends in recent studies. In a huge study undertaken by Viberg, Hatakka, Bälter, and Mavroudi (2023), affirm that teacher digital competencies ($\beta = .38$, $p < .05$) were significant predictors of the measure of how far ICT contributed experientially in the promotion of learner-centered and competency-based instructional strategies. The study showed that teachers acting solely based on basic operational skills were less likely to employ ICT for furthering higher-order thinking, collaboration, and performance-based strategies essence of CBE.

This phenomenon can also be witnessed at the continental level, and the findings gathered in sub-Saharan Africa are similar to those mentioned above. A qualitative case study published by the journal Frontiers in Education in 2025 examined the ICT policy implementations in rural and disadvantaged schools within South Africa and concluded:

> Teacher training was mostly computer literacy, and as such, teachers did not have the necessary pedagogical strategies and content knowledge to leverage ICTs toward learner-centered practices. Thus, we suggest teacher training begins with trainers who themselves are not only computer literate but educated on CBE and its implications for ICT integration.

In the same way, Asare, Mensah and Boateng (2023) results revealed the existence of a policy-practice disconnect, where policies that promoted ICT integration failed to expose teachers to concrete ICT competencies such as competency development, assessment, and engagement through ICT. It was asserted that teacher programs should be explicitly linked with curriculum competencies and not focus on ICT exposure.

Similarly, Mukhula et al. (2021) revealed that for readiness of teachers, however, was strongly influenced by teachers' confidence and applied competence, thus emphasizing the fact that mere policy is not sufficient for effective ICT-based CBE without a specific skill component. According to the research findings by Omutange (2025), ICT literacy of teachers was a powerful predictor of learner-centered teaching practices (\R^2 = .37, p < .05). It was determined that most teachers were only basic ICT users in that they were not in a position to accommodate learning approaches such as project-based teaching, ICT monitoring of learner progress, and so forth as required in CBE.

Similar findings have been made at the continental level, with

Either, teachers were asked to indicate their respective schools' ICT initiatives that were provided in the use of ICT aids in teaching and learning. The table 12 below shows their responses

Table 12 Schools' Own Initiative in the Use of ICT Aids in Teaching and Learning

Schools' Own Initiative	N	%
Additional ICT aids	35	35.4%
Provision of WIFI/Bundles	3	3.0%
Regular ICT trainings	8	8.1%
None	44	44.4%
Using them	8	8.1%

Source: Field Data 2022

Table 12 shows that 44 (44.4%) of the respondents indicated that their respective schools had not taken any ICT initiatives to support the use of ICT aids in teaching and learning. In contrast, 35 (35.4%) reported that their schools provided additional ICT aid support. Furthermore, 8 (8.1%) respondents indicated that they were provided with regular ICT training, while another 8 (8.1%) reported that they were given opportunities to use ICT aids in teaching and learning. Only 3 (3.0%) respondents indicated that their schools provided them with Wi-Fi or internet bundles. These findings suggest that, although some schools have made efforts to support the integration of ICT in teaching and learning, a considerable proportion of schools have not implemented adequate ICT initiatives.

The findings in Table 12 reveal that the integration of ICT in teaching and learning remains limited in the schools under study. The fact that the largest proportion of respondents, 44 (44.4%), indicated that their schools had not taken any ICT initiatives suggests that institutional support for ICT integration is inadequate. This may limit teachers' ability to effectively adopt and utilize ICT aids in their teaching practices. Without deliberate school-level initiatives, such

as provision of ICT resources, technical support, training, and internet connectivity, teachers may continue to rely on traditional teaching approaches.

However, the finding that 35 (35.4%) of the respondents reported receiving additional ICT aid support indicates that some schools have made efforts to promote the use of technology in teaching and learning. This support could potentially enhance teachers' access to ICT resources and create a more favourable environment for technology integration. Nevertheless, the relatively lower proportion compared with those reporting no initiatives suggests that such efforts may not be widespread or consistently implemented across schools.

The findings further show that only 8 (8.1%) respondents reported receiving regular ICT training. This is a concern because continuous professional development is important in enabling teachers to develop the skills and confidence required to use ICT effectively for instructional purposes. Similarly, only 8 (8.1%) respondents indicated that they were given opportunities to use ICT aids in teaching and learning. This suggests that access to ICT resources alone may not necessarily translate into effective classroom integration if teachers are not provided with sufficient opportunities to practise and apply the technologies.

The provision of Wi-Fi or internet bundles was particularly low, with only 3 (3.0%) respondents reporting access to such support. This finding points to a significant gap in internet connectivity, which is an important component of effective ICT integration. Limited internet access may restrict teachers' ability to access online learning materials, digital content, educational platforms, and other resources that could enrich teaching and learning.

Overall, the findings indicate that institutional support for ICT integration is inadequate and unevenly distributed. Although some schools provide ICT aids and related support, the low levels of training, opportunities for ICT use, and internet connectivity may hinder effective

utilization of these resources. The findings therefore underscore the need for schools and relevant education stakeholders to strengthen ICT initiatives through the provision of adequate resources, regular teacher training, reliable internet connectivity, and opportunities for teachers to practically integrate ICT into classroom instruction. Such measures would contribute to creating a supportive environment for sustainable ICT integration in teaching and learning.

UNESCO ICT competence framework 3rd edition (2022) observes that to achieve ICT implementation in teaching and learning, it's necessary to have a favourable environment necessitated by the government, teacher training, professional development of teachers and school principals. The government in collaboration with the school administration has to ensure that teachers have an access to various learning technologies during their trainings and in their teaching institutions. This is important in that after the training, they apply the skills acquired on the same in their teaching institutions. Training workshops and mentorship programs are necessary for purposes of gaining appropriate experiences on ICT aids.

It also observes the dimension of organisation and administration as an essential component in the ICT competence framework in ICT implementation. This dimension holds the school administration as the sole manager in the management of digital tools for instance in organising ICT classrooms and the rest of the environment to ensure accessibility, efficiency and availability.

The institutions management have to create a conducive environment for teachers in relation to ICT aids management and maintenance, setting up ICT rooms and classes and coming up with other non-government initiatives which can motivate the teacher. The administration for example is expected to be flexible and supportive in using technologies in their institution be it in providing WIFI/ bundles, regular ICT trainings, installation of UPS, etc.

Further, the teachers were requested to stipulate their frequency use of ICT software in classroom. They were required to rate the frequency as always, often, sometimes, seldom and never. Their answer is as stipulated in the table below.

Table 13. ICT Aids Frequency Usage

Frequency Usage	N	%
Always	5	5.1%
Often	12	12.1%
Sometimes	38	38.4%
Seldom	17	17.2%
Never	27	27.3%

Source: Field Data 2022

The findings from the table 13 shows that 38 (38.0%) of the teachers sometimes used ICT aids in teaching and learning, while 27 (27.0%) reported that they never used ICT aids. In addition, 17 (17.2%) indicated that they rarely used ICT aids, whereas 12 (12.0%) reported using ICT aids often. Only 5 (5.0%) of the teachers indicated that they always used ICT aids in teaching and learning.

The findings indicate that the use of ICT aids in teaching and learning among teachers was generally low and inconsistent. The largest proportion, 38 (38.0%), reported that they sometimes used ICT aids, suggesting that although teachers had some exposure to ICT, its integration into classroom instruction was not a regular practice. This occasional use may imply

that ICT aids were employed only when specific resources were available or when teachers considered their use necessary for particular lessons.

The finding that 27 (27.0%) of the teachers reported that they never used ICT aids is particularly significant. It suggests that more than a quarter of the teachers were not incorporating technology into their teaching practices at all. This may be attributed to factors such as inadequate ICT facilities, limited access to digital devices, lack of technical support, insufficient skills, or limited institutional encouragement to use technology in classroom instruction.

Similarly, 17 (17.2%) of the respondents indicated that they rarely used ICT aids. This further demonstrates that ICT integration was not yet embedded in the routine teaching practices of many teachers. When the teachers who never and rarely used ICT aids are considered together, they account for 44 (44.2%) of the respondents. This means that nearly half of the teachers had very limited engagement with ICT in their teaching.

In contrast, only 12 (12.0%) of the teachers reported using ICT aids often, while a very small proportion, 5 (5.0%), indicated that they always used them. The low percentage of teachers who regularly used ICT suggests that effective ICT integration was limited to a small group of teachers. This may indicate differences in teachers' ICT competencies, access to resources, confidence, or the level of support provided by their respective schools.

These results are consistent with more recent studies that emphasize a lack of actual use of ICT by teachers, with or without ICT policy and infrastructure provisions. For example, Mwangi and Khatete (2024) indicated that although primary schools in Kenya were provided with ICT devices and training provisions, the actual use of ICT by teachers was still quite elementary and less related to CBE principles. Omutange (2025) indicated that TVET teachers,

despite being provided with ICT devices, may lack the actual digital skills necessary to properly use ICT and therefore integrate it sporadically and superficially.

The present study is also commensurable with the findings of Viberg, Kivela, and Kynaslahti (2023) about teacher self-efficacy and digital competence, which were strong predictors of ICT uptake, and teachers with basic skills never utilized the technology appropriately. Moreover, the Frontiers in Education (2025) case study conducted in South Africa indicated that a lack of teacher training, which was related to basic ICT literacy rather than its application, accounted for the minimal use of ICTs at school, especially at disadvantaged schools.

On the contrary, these results deviate from the international contexts in which holistic digital competencies and continuous training support are coupled with regular integration of ICT. For instance, Viberg et al. (2023) and Asare et al. (2023) established that in countries where teacher development programs were structured, the technology use practices of the teachers in their classrooms were more frequent and learner-centered. This contrast reiterates that in the current study, the infrequent use of ICT was clearly linked to the limited, hands-off approach to use in teacher training, which, according to the head teachers, provided only general knowledge in computers but not at the level of practical skills for subject-specific teaching.

Overall, the findings suggest that ICT had not been fully integrated into teaching and learning practices. Although some teachers used ICT aids occasionally or frequently, the majority did not use them consistently. This situation may limit the potential benefits of ICT in enhancing learner engagement, access to instructional resources, lesson presentation, and interactive learning. The findings therefore point to the need for schools and education stakeholders to provide adequate ICT facilities, strengthen teacher training and continuous

professional development, improve technical support, and create opportunities for teachers to practise and regularly integrate ICT into classroom instruction.

The participants were also asked to indicate the software that they frequently used teaching and learning in classrooms. They retorted as shown in table 14 below.

Table 14. Software Used During Teaching and Learning Process

Software Used	N	%
IMlango program	8	8.1%
Other	57	57.6%
None	34	34.3%

Source: Field Data 2022

The findings in the table 14 reveals that (57) 57% used Platforms that were provided by other non-governmental organizations such as Kahoot, Google classroom that was provided by other non-governmental organizations such as Learning Alliance, (8) 8% used IMlango program that was provided by IMlango non-governmental organization which had the bigger share of schools in the sub county while 3.3% (34) indicated that they did not have any learning software or platform in their schools.

The findings presented in Table 14 indicate that the use of learning software and digital platforms in schools was largely dependent on support from non-governmental organizations (NGOs). The majority of respondents, 57 (57.0%), reported using learning platforms provided through NGO initiatives, including platforms such as Kahoot and Google Classroom, supported by organizations such as Learning Alliance. This finding suggests that NGOs played a significant

role in promoting the integration of digital technology into teaching and learning in the schools. Such external support may have increased teachers' and learners' access to digital learning resources that might otherwise have been unavailable.

The findings further show that 8 (8.0%) of the respondents reported using the iMlango programme, which was provided by the iMlango NGO initiative. The programme reportedly had a significant presence in schools within the sub-county. This indicates that some schools benefited from targeted digital education interventions aimed at improving access to technology and supporting teaching and learning. The presence of such programmes demonstrates the contribution of development partners in complementing government and school efforts towards ICT integration.

The findings also revealed that the government at the time worked in collaboration with non-governmental organizations in implementing digital literacy policy in public primary schools in the sub county such as IMlango, Kahoot, and Kenyatta University (which sent its technology experts to supply the tablets to public primary schools in the sub county). Some of the organizations rolled out their collaboration with the government in the sub county as back as 2014/2015

However, 34 (33.3%) of the respondents indicated that they did not have any learning software or digital platform in their schools. This is a substantial proportion and points to a significant gap in the availability of digital learning resources. The absence of learning platforms may limit teachers' ability to incorporate interactive and technology-supported approaches into their lessons. It may also create disparities between schools that benefit from NGO-supported programmes and those that do not.

Head Teacher C stated:

> My school was supplied with 150 tablets by the Kenyatta University Technology Group, which were subsequently deployed by the Ministry. Several organizations, in collaboration with the government, supported digital learning in many public schools. For instance, my school benefited from support provided by an organization known as iMlango, which worked in collaboration with the government to promote digital learning. The organization established a fully equipped ICT room in the school and installed an online learning platform. The devices were interconnected, allowing teachers to use the ICT room on a rotational basis to conduct lessons using the installed technology. At the beginning, the initiative was very successful, and many teachers showed considerable interest in engaging in digital learning. The learners were also very eager to learn, and the experience was highly interesting and motivating.

The excerpt from Head Teacher C provides qualitative evidence that external partnerships between the government, universities, and non-governmental organizations played an important role in promoting ICT integration in teaching and learning. The provision of 150 tablets through the Kenyatta University Technology Group and the support received from iMlango demonstrate that schools benefited from interventions aimed at increasing access to digital learning technologies. This finding complements the quantitative results in Table 14, where 57 (57.0%) of the respondents reported using digital platforms provided through support from non-governmental organizations.

The excerpt further demonstrates that ICT integration involved more than simply providing digital devices. The establishment of a fully equipped ICT room and an interconnected online learning platform created an environment in which teachers could access and use technology for instructional purposes. The rotational arrangement for teachers suggests that the school developed a mechanism for sharing the available ICT resources among teachers. This was

important because it enabled more teachers to participate in digital learning despite the possible limitation of having a finite number of devices.

Another important aspect emerging from the excerpt is the positive initial response of teachers and learners. Head Teacher C reported that many teachers showed interest in engaging in digital learning, while learners were eager and motivated to use the technology. This suggests that the introduction of ICT resources had the potential to enhance teachers' willingness to adopt innovative teaching approaches and increase learners' interest in classroom activities. The enthusiasm observed at the beginning of the programme also indicates that access to appropriate digital resources can create a positive attitude towards technology-supported learning.

However, the statement that the initiative was successful "at the beginning" is noteworthy. It may suggest that although the initial introduction of ICT generated considerable enthusiasm, sustaining such initiatives could present challenges. The continued effectiveness of ICT programmes requires regular maintenance of devices, reliable internet connectivity, technical support, teacher training, and sustainable institutional or government support. Without these measures, the initial enthusiasm among teachers and learners may decline and the available ICT resources may become underutilized.

Overall, the excerpt illustrates that partnerships and external support can significantly improve schools' capacity to integrate ICT into teaching and learning. It also highlights that successful ICT integration depends not only on the provision of devices but on the availability of supporting infrastructure, digital platforms, teacher participation, and mechanisms for continued use. The experience of Head Teacher C therefore reinforces the quantitative findings that external organizations made an important contribution to digital learning, while also highlighting

the need for sustainable strategies to ensure that ICT initiatives remain functional and beneficial over time.

According to Head Teacher G, one of the schools included in the study, most of the organizations that initially supported digital learning had since withdrawn their support. As a result, digital learning activities in many schools had largely come to a standstill due to inadequate internet connectivity, lack of learning platforms, and limited maintenance of ICT equipment. Head Teacher G explained:

> Around 2018/2019, iMlango began to withdraw its support, particularly in the maintenance of internet connectivity, servicing of servers, and maintenance of the technology. Over time, the organization completely pulled out. Currently, we still have the ICT room, but it is not active because there is no internet or learning software, and some of the machines cannot even open. They are simply there. The government only brought in the tablets, but there was no additional support. The Sub-County Education Office is aware of the situation, and we are waiting for the government to take action. Currently, learning has returned to the normal approach that was used before the introduction of digital learning. However, the challenge has become greater with the introduction of the new curriculum. One of the pillars of the Competency-Based Curriculum (CBC) is digital literacy. As a result, teachers sometimes have to use their personal phones to access online materials and resources for teaching in their classrooms. I hope the government will intervene fully and provide the necessary support.

The excerpt from Head Teacher G reveals that the sustainability of digital learning initiatives was a major challenge in the schools under study. Although organizations such as iMlango initially played an important role in introducing and supporting digital learning, their eventual withdrawal resulted in the deterioration of ICT infrastructure and services. The head teacher specifically mentions the withdrawal of support for internet connectivity, server servicing, and maintenance of technological equipment. This suggests that the initial

provision of ICT resources was not accompanied by adequate long-term mechanisms for their maintenance and sustainability.

The statement that the school still had an ICT room but that it was “not active” is particularly significant. It demonstrates that the mere availability of ICT infrastructure does not necessarily guarantee its effective utilization. The absence of internet connectivity and learning software, coupled with malfunctioning machines, rendered the ICT room largely unusable. This finding illustrates the difference between access to ICT resources and functional access to ICT resources. For digital learning to be effective, schools require not only devices and physical facilities but also reliable connectivity, appropriate software, technical support, and regular maintenance.

The excerpt also highlights the limitations of government intervention. According to the head teacher, the government provided tablets but did not provide the additional support required to make them fully functional for digital learning. This indicates a possible gap between ICT equipment provision and comprehensive ICT implementation. Providing devices without ensuring internet connectivity, relevant digital content, technical support, and maintenance may result in underutilization of the resources. The presence of unused or malfunctioning equipment therefore represents a loss of potential investment in digital education.

Another important finding is the apparent dependence on external organizations for the implementation and maintenance of digital learning programmes. Once iMlango withdrew, the school struggled to sustain the initiative. This suggests that digital learning programmes that depend heavily on donor or NGO support may face sustainability challenges when external funding or technical assistance ends. There is therefore a need for stronger

government ownership and institutional mechanisms that can sustain ICT programmes beyond the lifespan of externally funded interventions.

The excerpt further demonstrates the tension between the demands of the Competency-Based Curriculum (CBC) and the availability of ICT resources in schools. The head teacher notes that digital literacy is an important component of the curriculum, yet teachers lack adequate institutional resources to support its implementation. Consequently, teachers have resorted to using their personal mobile phones to access online teaching materials. While this demonstrates teachers' resourcefulness and commitment to supporting learners, it also indicates an inequitable situation in which teachers may be expected to use personal resources to compensate for institutional shortcomings.

The reliance on teachers' personal phones may also create challenges related to affordability, internet data costs, device capacity, and equitable access to digital resources. Teachers who cannot afford sufficient data or do not possess appropriate devices may face greater difficulties implementing digital learning. Thus, the situation described by Head Teacher G points to a broader issue of inequality in access to digital learning resources.

Generally, the excerpt demonstrates that the challenge facing digital learning was not simply the lack of ICT devices but the lack of sustainable support systems. The withdrawal of development partners, inadequate maintenance, unreliable internet connectivity, absence of learning platforms, and limited government support contributed to the decline of digital learning activities. These findings suggest that for ICT integration to be sustained, the government and other education stakeholders need to move beyond the provision of hardware and establish comprehensive strategies that include internet connectivity, digital content, teacher training, technical support, equipment maintenance, and sustainable financing. Such

measures would enable schools to effectively implement digital literacy under CBC and prevent ICT facilities from becoming underutilized or obsolete.

From the findings, it's clear that the government needs to be fully in charge of digital literacy program in public schools. Teachers should be given adequate training so as to ensure this dream is realized. Also, the government has to be completely in it with or without the support of the non-governmental organizations to ensure that this investment does not go to the drain. Otherwise, teachers may not achieve much as far as the current conditions are concerned.

In addition, the respondents, were requested to designate the level of their expertise in using software in classroom presentations. Their responses are as shown in table 15 below.

Table 15. Use of Software in Classroom Presentation

Use of Software	N	%
Expert	7	7.1%
Advanced	13	13.1%
Proficient	24	24.2%
Basic	30	30.3%
Limited	24	24.2%

Source: Field Data 2022

Table 15 above shows that 30 (30.3%) of the teachers had basic knowledge of using software for classroom presentations. Similarly, 24 (24.2%) reported having proficient knowledge, while another 24 (24.0%) indicated that they had limited knowledge of using software for classroom presentations. In addition, 13 (13.1%) of the teachers reported having

advanced knowledge, whereas only 7 (7.1%) indicated that they were experts in using software for classroom presentations.

The findings presented in Table 15 indicate that teachers had varying levels of knowledge and competence in using software for classroom presentations. The largest proportion, 30 (30.3%), reported having basic knowledge. This suggests that although many teachers were familiar with presentation software, their level of competence may have been insufficient for the effective and comprehensive integration of digital tools into classroom instruction. Teachers with basic skills may be able to perform simple tasks such as preparing slides and displaying information but may experience difficulties when using more advanced features or interactive digital applications.

The findings further show that 24 (24.2%) of the teachers reported proficient knowledge, indicating that nearly one-quarter of the respondents had developed a relatively good level of competence in using presentation software. This group may have been better positioned to incorporate technology into lesson delivery and use digital presentations to enhance the organization and presentation of learning content. However, the presence of proficient teachers does not necessarily imply that ICT was being consistently used in classrooms, since effective ICT integration also depends on access to appropriate equipment, software, internet connectivity, and institutional support.

Conversely, 24 (24.0%) of the teachers indicated that they had limited knowledge of using software for classroom presentations. This finding is significant because it suggests that almost one-quarter of the teachers may face challenges when attempting to use digital presentation tools. Limited ICT knowledge can affect teachers' confidence and willingness to incorporate technology into their lessons and may contribute to the inconsistent use of ICT

observed in the earlier findings.

Only 13 (13.1%) of the respondents reported having advanced knowledge, while a smaller proportion, 7 (7.1%), identified themselves as experts. The relatively low proportion of teachers with advanced or expert-level skills suggests that only a small number of teachers had developed a high level of mastery of presentation software. This may limit the extent to which schools can fully exploit the pedagogical potential of digital technologies, particularly where more sophisticated or interactive applications are required.

Thus, the findings demonstrate that most teachers possessed basic to proficient levels of ICT knowledge, while relatively few had advanced or expert-level competencies. This pattern suggests that teachers may require continuous professional development to progress beyond basic familiarity towards effective and innovative use of digital technologies. Regular ICT training, practical hands-on sessions, peer support, and opportunities to apply digital skills in actual classroom settings could enhance teachers' competence and confidence. Strengthening these areas would contribute to more effective integration of ICT in teaching and learning and support the broader goal of developing digital literacy among both teachers and learners.

Viberg et al. (2023) have proved the significance of teachers' digital literacy as a predictor of the effective integration of ICT into competency-based learning and learner-centered approaches. Furthermore, Mwangi & Khatete (2024) found that despite the availability of school-based ICT facilities, teachers lacked the proficiency required effectively to harness technology for instructional intent, leading to its superficial integration into the classroom.

Further, Omutange (2025) revealed that TVET trainers who possess basic ICT knowledge find challenges in effectively using technology-based learning approaches, which resulted in minimal use of learning technologies by these trainers in their teaching sessions. This is in line

with the current research results, where teachers' ICT competence was generally at low levels, which limited their potential of delivering ICT-based learning tasks as recommended for CBE. This study supports findings by Murithi and Yoo (2021), who proposed that lack of effectiveness in ICT use for teaching may be attributed to teachers' inadequate or shallow-level knowledge about ICT use in teaching, even after receiving ICT training. Lacking digital literacy may impair a student-centred approach to learning and teaching with ICT.

The respondents were further requested to rate their frequency use of ICT aids in teaching and learning in their classrooms with the statements rated as very often, often, sometimes, seldom and never. Their responses are as shown in Table 16 below.

Table 16. Frequency use of ICT Aids in Classrooms

Participants' statement on their frequency use of ICT	Very Often		Often		Sometimes		Seldom		Never	
	f	%	f	%	f	%	f	%	f	%
Teaching/learning specific content	2	2.0	19	19.2	54	54.5	16	16.2	8	8.1
Teaching learners on ICT aids skills	2	2.0	19	19.2	43	43.4	21	21.2	14	14.1
Finding and accessing information/ educational material online	4	4.0	32	32.3	39	39.4	14	14.1	10	10.1
Preparing lessons	8	8.1	14	14.1	35	35.4	23	23.2	19	19.2
Making class presentations	5	5.1	13	13.1	44	44.4	27	27.3	10	10.1
Giving instructions to learners	4	4.0	17	17.2	39	39.4	26	26.3	13	13.1
Monitoring and evaluating learners' performance	8	8.1	16	16.2	36	36.4	20	20.2	19	19.2
Preparing class reports	9	9.1	28	28.3	28	28.3	19	19.2	15	15.2
Total (mean)	**0.42**		**1.6**		**3.2**		**1.68**		**1.1**	

Source: Field Data 2022

Table 16 above unveils (54) 54.5% of the teachers rated the item on teaching/learning specific content using ICT aids as sometimes, (19) 19.2% as often, (16) 16.2% as seldom, (8) 8.1% as never and (2) 2.0% as very often**.** On the item on teaching learners on ICT aids skills, (43) 43.4% of the teachers rated this item as sometimes, (21) 21.2% as seldom, (14) 14.1% as never, (19) 19.2% as often and (2) 2.0% as very often. Responding to item on finding and accessing educational material online, (39) 39.4% rated the item as sometimes, (32) 32.3% as

often, (14) 14.1% as seldom, (10) 10.1% as never and (4) 4.0% (4) as often. In relation to preparing lessons, (35) 35.4% rated the item as sometimes, (23) 23.2% as seldom, (19) 19.2% as never, (14) 14.1% as often and (8) 8.1% as very often. On the item on making class presentations, (44) 44.4% rated this item as seldom, (27) 27.3% as sometimes, (13) 13.1% as often, (10) 0.1% as never, and (5) 5.1% as very often.

Responding to the item on giving instruction to learners using ICT aids, (39) 39.4% of the teachers rated this item as sometimes, (26) 26.3% as seldom, (17)17.2% as often, (13) 13.1% as never and (4) 4.0% as very often. On the statement on monitoring and evaluating learner's performance using ICT aids, (36) 36.4% rated the statement as sometimes, (20) 20.2% as seldom, (19) 19.2% as never, (16) 16.2% as often and (8) 8.1% as very often. Rating the statement on preparing class reports using ICT aids, (28) 28.3% of the teachers rated the statement as often, (28) 28.3% as sometimes, (19) 19.2% as seldom, (15) 15.2% as never and (9) 9.1% as very often. The findings from the table indicates that sometimes is highly rated with the mean of 3.2 followed by seldom with the mean of 1.6. This clearly shows that teacher rarely use ICT aids in teaching and learning in their classrooms.

The findings presented in Table 16 demonstrate that teachers' use of ICT aids across different teaching and learning activities was generally low and inconsistent. Although the teachers reported using ICT aids for various activities, the dominant response across most of the items was "sometimes," suggesting that ICT had not been fully integrated into routine classroom practices. This finding is consistent with the earlier results, which showed that a considerable proportion of teachers either rarely or never used ICT aids in teaching and learning.

Regarding teaching and learning specific content using ICT aids, the majority of teachers, 54 (54.5%), indicated that they did so sometimes. Only 19 (19.2%) reported doing this often,

while 16 (16.2%) did so seldom, 8 (8.1%) never did so, and only 2 (2.0%) did so very often. This suggests that ICT aids were used occasionally to support the presentation of specific content rather than being consistently incorporated into lesson delivery.

Similarly, in relation to teaching learners ICT skills, 43 (43.4%) of the teachers reported doing so sometimes. A further 21 (21.2%) indicated seldom, while 19 (19.2%) reported often, 14 (14.1%) never, and only 2 (2.0%) very often. These findings suggest that opportunities for learners to develop practical ICT skills through classroom instruction were limited. This is particularly important given the increasing emphasis on digital literacy in contemporary education.

The findings on finding and accessing educational materials online show a somewhat more positive pattern. 39 (39.4%) of the teachers reported doing this sometimes, while 32 (32.3%) indicated often. Only 14 (14.1%) reported seldom and 10 (10.1%) never. This suggests that teachers were relatively more likely to use ICT for accessing educational resources than for other classroom activities. However, the fact that the largest proportion still reported "sometimes" indicates that online resource use was not yet a consistent practice for many teachers.

With regard to lesson preparation, 35 (35.4%) of the teachers reported using ICT aids sometimes, while 23 (23.2%) indicated seldom and 19 (19.2%) never. Only 14 (14.1%) reported often and 8 (8.1%) very often. This indicates that ICT was not routinely incorporated into lesson preparation. Limited use of ICT during preparation may reduce teachers' opportunities to identify and incorporate digital resources that could enrich lesson content and improve instructional delivery.

The use of ICT aids for class presentations was particularly limited. A substantial 44 (44.4%) of the teachers reported using ICT aids seldom, while 27 (27.3%) indicated sometimes. Only 13 (13.1%) reported often and 5 (5.1%) very often, while 10 (10.1%) indicated never. This finding is significant because classroom presentation is one of the most common areas in which ICT can be used to enhance lesson delivery. The high proportion reporting "seldom" suggests that many teachers were not regularly using digital presentation tools in their classrooms.

Similarly, when asked about giving instructions to learners using ICT aids, 39 (39.4%) reported doing so sometimes, while 26 (26.3%) indicated seldom. Only 17 (17.2%) reported often and 4 (4.0%) very often, while 13 (13.1%) never used ICT aids for this purpose. This demonstrates that ICT was not yet a routine medium through which teachers provided instructions to learners.

The use of ICT for monitoring and evaluating learners' performance was also relatively limited. 36 (36.4%) of the teachers reported doing so sometimes, while 20 (20.2%) indicated seldom and 19 (19.2%) never. Only 16 (16.2%) reported often and 8 (8.1%) very often. These findings suggest that digital technologies were underutilized for assessment, monitoring, and evaluation of learners' progress. Greater use of digital assessment tools could potentially enable teachers to collect, organize, and analyse learner performance more efficiently.

In contrast, the findings concerning preparing class reports using ICT aids show comparatively greater use. 28 (28.3%) of the teachers reported using ICT aids often, and an equal 28 (28.3%) indicated sometimes. However, 19 (19.2%) reported seldom, 15 (15.2%) never, and only 9 (9.1%) very often. This suggests that teachers were more likely to use ICT for administrative or reporting purposes than for direct classroom teaching and learning activities.

The pattern may indicate that teachers were more familiar or comfortable with using technology for routine administrative tasks than for pedagogical purposes.

Overall, the findings reveal that “sometimes” was the most frequently selected response across most of the ICT-related teaching activities, with a reported overall mean of 3.2, followed by “seldom,” with a mean of 1.6. This pattern indicates that ICT use among teachers was largely occasional rather than regular or systematic. The findings therefore suggest that the availability of ICT resources alone may not be sufficient to ensure their effective integration into classroom practice.

The low level of ICT utilization may be associated with several factors, including inadequate ICT infrastructure, unreliable internet connectivity, limited access to digital learning platforms, insufficient teacher training, lack of technical support, and inadequate opportunities for teachers to practise using ICT. Consequently, there is a need for schools and education stakeholders to strengthen both the availability of ICT resources and teachers’ capacity to use them pedagogically. Continuous professional development, reliable connectivity, functional digital platforms, technical support, and regular opportunities for teachers to integrate ICT into different stages of teaching and assessment would be important in promoting more consistent and effective ICT use in classrooms. Head teacher F said:

> My two teachers who attended the training have so far tried to induct others on the same. However, it has not impacted much. I occasionally see one or two teachers teaching using the ICT aid and its once or maximum twice a term. There is no hands-on for learners since we do not have enough of the tablets; they use a projector to project the content being presented. Some I hear them complaining of time due to movements that have to be made for learners to assemble in the ICT room. For others I think its lacking of enough skills on using the ICT tools to present the specific content. However, you can see many of the teachers with laptops doing their personal work during their free time. Anyway no one can explain what actually is happening

The excerpt from Head Teacher F provides important qualitative evidence on the limited and inconsistent use of ICT aids in teaching and learning, despite some teachers having received ICT training. The head teacher reported that two teachers who attended the training attempted to share their knowledge with their colleagues through induction. However, this peer-training approach had limited impact, as only one or two teachers were occasionally observed using ICT aids, and even then, usage occurred only once or twice in a term. This finding suggests that exposure to ICT training alone may not be sufficient to translate into sustained classroom application.

The excerpt further highlights the inadequacy of ICT resources, particularly tablets, as a major barrier to effective ICT integration. The head teacher explained that learners could not engage in hands-on activities because there were not enough tablets for them to use individually or in groups. Instead, teachers relied on a projector to display learning content. While the use of a projector provides some form of technology-supported instruction, it limits learners' active participation and interaction with digital content. This may explain why ICT was used more as a presentation tool than as an interactive learning resource.

Another challenge identified in the excerpt relates to time constraints and logistical difficulties. The movement of learners to the ICT room was reported to consume instructional time, with some teachers complaining about the time required to assemble learners in the room. This suggests that the physical arrangement of ICT facilities may affect their utilization. Where ICT resources are concentrated in a separate room, teachers may be less willing to use them because of the time and organizational demands involved in moving learners from their regular classrooms.

The head teacher also identified limited teacher skills and confidence as another possible barrier. The observation that some teachers lacked sufficient skills to use ICT tools for presenting specific content indicates that having access to computers or laptops does not necessarily mean that teachers possess the pedagogical and technical competencies required for effective ICT integration. This observation supports the quantitative findings in Table 15, which showed that a substantial proportion of teachers had only basic or limited knowledge of using software for classroom presentations.

Interestingly, the head teacher noted that many teachers had laptops and used them for personal activities during their free time, yet these same teachers were rarely observed using ICT in classroom teaching. This contrast is important because it suggests that the problem may not be entirely about teachers' access to personal ICT devices. Rather, it may involve the ability to transfer general ICT skills into pedagogical applications. Teachers may be comfortable using technology for personal purposes but lack the confidence, training, motivation, or appropriate support to integrate it into their instructional practices.

The statement that "no one can explain what actually is happening" further reflects uncertainty surrounding the low utilization of ICT resources. It may point to a lack of monitoring

and evaluation of ICT initiatives at the school level. Without systematic monitoring, school administrators may have difficulty identifying why teachers are not using available ICT resources and determining what interventions are required.

Overall, the excerpt demonstrates that ICT integration is constrained by a combination of inadequate resources, limited practical training, logistical challenges, insufficient pedagogical skills, and weak monitoring. The findings imply that providing a few trained teachers or supplying ICT equipment is not enough to ensure effective classroom use. Schools need to provide adequate devices, practical and continuous teacher training, accessible ICT facilities, technical support, and effective monitoring mechanisms. These measures would help transform ICT use from an occasional activity into a regular and meaningful component of teaching and learning.

The sentiments of head teacher F above concur with Professional growth, according to Baylor and Ritchie (2002), has a major impact on how well ICT is adopted in the classrooms. The head teacher's sentiments would mean either that the teachers who were being inducted did not get the induction well from their colleagues or that they did not have interest at all. Kamaruddin, Abdullah, Idris & Nawi (2017) in their study found out that the majority of experienced instructors were regular users of ICT and ICT applications, using them for personal work rather than integrating them into their classroom instruction, and teachers' ICT integration was still at a low level in the district of Mualim in the state of Perak Malaysia. Whatever the reason, teachers require more in-service ICT trainings for purposes of creating confidence and competence among teachers and even convince them that digital learning is the way to go.

Either, the participants were requested to display the contribution of ICT trainings received in the professional development. Their response is as displayed in table 17 below.

Table 17. Contribution of ICT Acquired Knowledge for Personal Development

Contribution of ICT	N	%
Very Positive	12	12.1%
Positive	68	68.7%
Indifferently	13	13.1%
Negative	3	3.0%
Very negative	3	3.0%

Source: Field Data 2022

Table 17 above indicates that the proportion of teachers acknowledging the positive contribution of ICT training to their professional development is high at 68.7%, followed by 12.1% very positive, 13.1% indifferent, and only 3% negative, which can be considered very negative. The findings presented in Table 17 indicate that ICT training was generally perceived positively by teachers and was considered an important contributor to their professional development. A large majority of the teachers, 68.7%, acknowledged that ICT training had a positive contribution to their professional development. This suggests that most teachers recognized the value of ICT training in enhancing their knowledge, skills, and confidence in using technology for professional and instructional purposes.

Furthermore, 12.1% of the teachers rated the contribution of ICT training as very positive. When combined with those who rated it as positive, the findings demonstrate that a substantial majority of teachers had a favorable perception of ICT training. This implies that teachers who participated in ICT training were able to appreciate its potential in improving their ability to use digital tools and resources in their professional practice.

However, 13.1% of the respondents were indifferent towards the contribution of ICT training. This proportion suggests that some teachers did not perceive significant changes in their professional development as a result of the training. Indifference could be associated with factors such as the relevance of the training content, limited opportunities to practice newly acquired skills, inadequate access to ICT resources, or the infrequent nature of training programs.

Only 3% of the teachers expressed a negative or very negative perception of the contribution of ICT training. This relatively small proportion indicates that dissatisfaction with ICT training was not widespread. Nevertheless, their responses should not be overlooked, as they may point to shortcomings in the design, delivery, or follow-up of ICT training programs.

Generally, the findings suggest that ICT training is widely regarded as beneficial to teachers' professional development. However, the positive perception of training does not necessarily translate into regular classroom use of ICT, as demonstrated by the earlier findings on teachers' actual utilization of ICT aids. This implies that training should be accompanied by adequate ICT resources, hands-on practice, continuous technical support, follow-up programs, and opportunities for teachers to apply the acquired skills in real classroom settings. Such measures would help bridge the gap between teachers' positive attitudes towards ICT training and the actual integration of ICT into teaching and learning.

This is in line with more recent research confirming that training teachers in ICT skills improves their level of confidence and general digital literacy but does not necessarily improve the actual integration of technology into teaching. In research conducted by Murithi & Yoo (2021), it was observed that although teachers benefited significantly from training in digital skills, the application of training was limited to administration purposes. In another study conducted by Mwangi & Khatete (2024), it was established that although the effectiveness of

training in ICT skills was recognized by the teachers, the level of actual application was minimal.

Therefore, although the training had a positive impact on teacher professional development, it was not able to achieve its intended goal of ensuring that teachers emerged from the training with ICT skills to improve teaching and learning in classrooms. This again shows that there is a wide gap in ICT training for professionals, focusing on their competencies in terms of teaching and learning, as discussed in (Frontiers in Education, 2025; UNESCO, 2022).

Teachers were asked to indicate ICT areas that they may need to be more emphasized in future ICT trainings. The response is as indicated below.

Table 18. Future Preferable Trainings

Respondents' statement on the trainings they would prefer to attend	**Yes**		**No**	
	f	**%**	**f**	**%**
Pedagogical ICT use	55	55.6	44	44.4
The same ICT trained areas to be repeated	12	12.1	87	87.9
Programming	49	49.5	50	50.5
Use of operating system	41	41.4	58	58.6
Use of specific software	49	49.5	50	50.5
Multimedia	30	30.3	69	69.7
Telecommunication	21	21.2	78	78.8
Acquisition of specialized dextries in ICT (website development	49	49.5	50	50.5

Source: Field Data 2022

Table 18 above reveals that (55) 55.6% of the teachers agreed to the statement that pedagogical ICT use to be emphasized in their future trainings, (44) 44.4% disagreed with the statement. In relation to programming, (87) 87.9% of the participants disagreed with the statement that programming to be emphasized in their future trainings, (12) 12.1% were in agreement. Concerning the use of operating system, (50) 50.5% of the participants disagreed with the statement, (49) 49.5% agreed. Responding to the statement that teachers to be trained on the use of specific software (58) 58.6% of the educators didn't agree with the assertion, (41) 41.4% agreed.

In relation to multimedia and telecommunication, (69) 69.7% of the participants disagreed to the statement, (30) 30.3% disagreed, (78) 78.8% teachers disagreed to the statement that in future training telecommunication to be emphasized in their trainings while (21) 21.2% conceded to the statement. Regarding the acquisition of specialized dextries in ICT aids such as website development, (50) 50.5% of the participants disagreed to the statement, (49) 49.5% agreed. The findings presented in Table 18 reveal that teachers had different preferences regarding the areas of ICT that should be emphasized in future training programmes. Overall, the responses suggest that teachers preferred training that is directly relevant to classroom teaching and learning rather than highly technical ICT skills.

Regarding pedagogical use of ICT, a majority of teachers, 55 (55.6%), agreed that pedagogical ICT use should be emphasized in future training, while 44 (44.4%) disagreed. This indicates that more than half of the teachers recognized the importance of acquiring skills on how to integrate ICT into teaching practices. The relatively high level of agreement suggests that teachers considered pedagogical application of ICT more relevant to their professional responsibilities than purely technical ICT knowledge.

In contrast, programming received very limited support as a priority area for future training. A substantial 87 (87.9%) of the respondents disagreed that programming should be emphasized, while only 12 (12.1%) agreed. This finding suggests that most teachers did not perceive programming skills as essential to their immediate teaching responsibilities. Their preference may reflect a desire for training that focuses on the practical use of ICT tools and applications that can directly support classroom instruction rather than on developing technical programming competencies.

The findings concerning operating systems were almost evenly divided. 50 (50.5%) of the teachers disagreed that operating systems should be emphasized in future training, while 49 (49.5%) agreed. This near-equal distribution suggests that teachers had mixed views regarding the importance of operating-system knowledge. While some teachers may require such skills to manage and troubleshoot ICT devices, others may consider them less important than pedagogical applications of technology.

Similarly, 58 (58.6%) of the respondents disagreed that training on the use of specific software should be emphasized, while 41 (41.4%) agreed. This may indicate that teachers were more interested in acquiring broader pedagogical ICT competencies rather than being trained in particular software packages. However, given the earlier findings showing that many teachers had only basic or limited knowledge of presentation software, this result may also suggest a need to provide teachers with carefully selected software training that is directly aligned with their classroom needs.

With regard to multimedia, the majority of teachers, 69 (69.7%), disagreed that it should be emphasized in future training, while 30 (30.3%) agreed. Likewise, a very large proportion, 78 (78.8%), disagreed that telecommunication should be emphasized, compared with 21 (21.2%)

who agreed. These findings suggest that teachers generally did not consider multimedia and telecommunication skills to be immediate priorities for their professional development. This could reflect their perception that such technical competencies are less directly connected to their daily classroom activities.

Regarding the acquisition of specialized ICT skills such as website development, the responses were again almost evenly divided. 50 (50.5%) disagreed that such specialized skills should be emphasized, while 49 (49.5%) agreed. This finding suggests that teachers had varied perceptions of the relevance of advanced ICT skills. While some may view website development as useful for creating and sharing educational content, others may consider it beyond the requirements of their teaching responsibilities.

Overall, the findings demonstrate a clear preference for practical and pedagogically oriented ICT training rather than highly specialized technical training. Teachers appeared to place greater value on skills that can directly enhance lesson delivery and classroom practice, particularly pedagogical ICT use. The strong rejection of programming and telecommunication training suggests that future capacity-building programmes should be designed around teachers' actual instructional needs.

The findings therefore imply that ICT training programmes should adopt a needs-based and context-specific approach. Rather than providing generalized technical training, education stakeholders should prioritize areas such as integrating ICT into lesson delivery, accessing digital learning materials, developing digital instructional content, using appropriate educational software, and applying ICT in assessment and learner engagement. At the same time, the mixed responses on operating systems, specific software, multimedia, and specialized skills indicate that training needs may differ among teachers. A flexible training programme that

accommodates different levels of ICT competence would therefore be more appropriate for promoting effective ICT integration in teaching and learning.

The findings from the table unveils (55) 55% of the teachers prefer to be trained of pedagogical use of ICT. This is one of the competences spelled out by UNESCO ICT competence framework 3rd edition (2022). This competence forms the central focus of all the specified competences that teachers require to competently use ICT aids in teaching and learning. It spells out on how teachers can use various technologies to teach their specific content in their field of specialization.

The findings presented in Table 18 indicate that teachers generally preferred practical, pedagogically oriented ICT training over highly technical or specialized ICT skills. Specifically, 55 (55.6%) of the teachers agreed that pedagogical ICT use should be emphasized in future training, while 44 (44.4%) disagreed. This finding is consistent with recent research emphasizing that teacher ICT training should move beyond basic technical skills and focus on how technology can be integrated effectively into teaching and learning. For example, UNESCO's current ICT Competency Framework for Teachers emphasizes competencies related to pedagogy, curriculum and assessment, digital skills, and professional development rather than technology skills in isolation, (UUNESCO, 2023)

The preference for pedagogical ICT training is also supported by Haarala-Muhonen et al. (2023), whose study found that pedagogical training enhanced teachers' learning-focused approaches to online teaching and encouraged more diverse use of digital tools. The study further observed that teachers tended to use digital technologies more for delivering information than for actively engaging learners. This finding is particularly relevant to the present study because the earlier results showed that teachers in the study area used ICT aids only

occasionally. Thus, emphasizing pedagogical ICT training could help teachers move from simply using technology to present information towards using it to facilitate interactive and learner-centred instruction.

The finding that 87 (87.9%) of the teachers disagreed that programming should be emphasized in future ICT training indicates that most teachers did not perceive programming as an immediate professional development priority. This finding can be interpreted in light of the teachers' primary instructional responsibilities. Most classroom teachers may require competencies that directly support lesson preparation, digital content delivery, assessment, communication, and learner engagement rather than advanced programming skills. UNESCO similarly frames teacher ICT competence around the effective application of digital technologies to professional practice, including pedagogy, curriculum and assessment, rather than requiring all teachers to become software developers (UNESCO, 2023).

The findings on operating systems were almost evenly divided, with 50 (50.5%) disagreeing and 49 (49.5%) agreeing that this area should be emphasized in future training. This near-even distribution suggests that teachers have different perceptions of their technical support needs. Some teachers may require knowledge of operating systems to troubleshoot devices and manage ICT resources, while others may consider such skills less important than classroom-oriented applications. This interpretation is consistent with recent evidence showing that teachers' digital competence is influenced not only by individual skills but also by infrastructural support and opportunities for collaboration. A 2023 study of preservice teachers found positive relationships between ICT self-efficacy, collegial collaboration, infrastructural support, and digital competence (Wuyun, 2023).

Similarly, 58 (58.6%) of the teachers disagreed that training on specific software should be emphasized, compared with 41 (41.4%) who agreed. This finding may indicate that teachers prefer transferable ICT competencies rather than training restricted to particular software applications. However, it should not be interpreted to mean that software-specific training is unnecessary. Rather, software training may be most useful when it is linked directly to teachers' instructional needs. This is supported by a recent Kenyan study conducted in Mwala Sub-County, which found that teachers' digital content evaluation skills were significantly related to learner engagement and recommended continuous professional development focusing on advanced digital proficiency and effective integration into instruction.

The relatively low preference for multimedia training, where 69 (69.7%) disagreed and 30 (30.3%) agreed, is also noteworthy. Although teachers did not strongly identify multimedia as a priority, multimedia resources can potentially enhance the presentation of instructional content and support learner engagement. The finding may therefore reflect a gap between teachers' perceived training priorities and the broader possibilities offered by digital technology. It may also indicate that teachers are more concerned with acquiring basic pedagogical ICT competencies before moving to more advanced multimedia applications. The finding concerning telecommunication was even more pronounced. 78 (78.8%) of teachers disagreed that telecommunication should be emphasized in future training, while only 21 (21.2%) agreed. This suggests that teachers did not view telecommunication skills as directly relevant to their immediate classroom responsibilities. However, in an increasingly connected educational environment, communication technologies can support collaboration, online learning, access to educational resources, and interaction between teachers and learners. UNESCO's recent work on teacher professional development similarly emphasizes digital platforms and technology-enabled

professional learning as important components of contemporary teacher development, (UNESCO, 2023)

Regarding specialized ICT skills such as website development, the responses were almost equally divided, with 50 (50.5%) disagreeing and 49 (49.5%) agreeing. This finding suggests that teachers have divergent views about the relevance of advanced ICT competencies. While website development may not be an immediate requirement for every teacher, such skills could be useful for teachers involved in developing and sharing digital learning materials. However, given the limited ICT use identified elsewhere in the study, prioritizing fundamental pedagogical ICT competencies may be more appropriate before introducing highly specialized skills.

The findings are also consistent with evidence from Kenya showing that pedagogical ICT training can make a substantial difference in teachers' classroom practices. Kithugu (2020) did a study comparing ICT-trained and non-ICT-trained teachers in Machakos County found that ICT-trained teachers were more likely to use technology to prepare e-learning activities, develop instructional materials, present content, conduct assessments, and facilitate teacher-learner interaction. The study recommended strengthening pedagogical ICT training and making it an important component of teacher preparation,

Similarly, UNESCO's work in Kenya (2016) has emphasized teacher training in areas such as designing ICT-supported lesson activities, developing online materials, managing ICT resources for learners, and using ICT to search, manage, analyse, integrate, and evaluate information. More recent UNESCO work in Africa also indicates that teachers' inability to integrate technology pedagogically remains a significant challenge, while many existing training programmes continue to focus more heavily on basic ICT skills than on deeper pedagogical use.

Taken together, the findings of Table 18 suggest that teachers' preferred ICT training is primarily practical and classroom-oriented rather than highly technical. The strongest support was for pedagogical ICT use, whereas programming, telecommunication, multimedia, and some specialized technical skills received less support. This preference is broadly consistent with contemporary research and international guidance, which increasingly emphasizes the pedagogical integration of technology, rather than simply teaching teachers how to operate technological tools (UNESCO, 2023).

Therefore, future ICT professional development programmes should prioritize ICT integration in lesson planning and delivery, digital content development, learner engagement, digital assessment, access to online educational resources, and effective use of educational platforms. Technical skills such as programming and website development can be offered as optional or advanced modules for teachers who require them. This approach would align training with teachers expressed needs while also addressing the broader objective of ensuring that ICT contributes meaningfully to teaching and learning rather than remaining primarily a technical resource (UNESCO 2023).

4.6 Implementation of the Existing Digital Literacy Policy

The third objective of the study was to find out the existing digital literacy policy available that teachers were to implement in teaching and learning in their classrooms in Kajiado North Sub County. The respondents were to affirm the available policies by ticking yes or no. Table 19 below indicate their responses.

Table 19. Existing Policy

ITEM	Yes		No	
Existing Policy	**f**	**%**	**f**	**%**
A specific policy for a teacher to undergo ICT professional development training	23	23.2	76	76.8
Presence of a policy on follow-ups/ mentorship on using ICT aids in teaching/learning	30	30.3	69	69.7
School's own written statement on the use of ICT aids in teaching/learning	40	40.4	59	59.6
A policy to use ICT aids in teaching/learning in specific subjects	32	32.3	67	67.7
Regular discussion with teachers on the use of ICT aids in teaching/learning	31	31.3	68	68.7
A specific policy to prepare learners for responsible behaviour while handling ICT aids	28	28.3	71	71.7
Scheduled time for teachers for meet to share, monitor and evaluate or prepare instructional materials and approaches	34	34.3	65	65.7
An official policy statement about innovation within the school in teaching/learning	37	37.4	62	62.6

Source: Field Data 2022

Table 19 above indicates 76.8% (76) of the instructors objected of the claim that there's a specific policy for a teacher to undergo ICT professional development training while 23.2% (23) disagreed to the statement. Concerning the statement on the presence of a policy of follow-ups/ mentorship on using ICT aids in teaching/learning 69.7% (69) disagreed to the statement that there is such a policy while 30.3% (30) agreed to the statement of the presence of such policy.

In relation to the statement on the school having its own statement on the use of ICT aids in teaching and learning, 59.6% (59) disagreed to this statement while 40.4% (40) agreed to the

statement. Responding to the statement that there's a policy to use ICT aids in teaching and learning specific subjects, 67.7% (67) of the teachers disagreed to this statement, 32.3% (32) agreed to the same statement.

The table also reveals that 68.7% (68) of the subjects disagreed to the statement that there's a policy regarding regular discussion with teachers on the use of ICT aids in teaching and learning while 31.3% (31) agreed that there's such policy. Regarding the presence of a specific policy to prepare learners on the use of ICT aids in teaching and learning, 71.7% (71) of the teachers disagreed to this statement while 28.3% (28) agreed to the statement that there's a specific policy to teacher to prepare learners on the use of ICT aids. Responding to the statement that there's a policy on scheduled time for teachers to meet in order to share, monitor and evaluate or prepare instruction materials and approaches, 65.7% (65) of the teachers disagreed to this statement and 34.3% (34) were in agreement with the same statement. On the statement that there's an official policy statement about innovation within the school in teaching and learning using ICT aids, 62.6% disagreed to this statement and 37.4% (37) agreed to the same statement.

The findings presented in Table 19 reveal that most schools lacked formal policies and institutional guidelines to support the integration of ICT in teaching and learning. Across all the statements, the majority of teachers disagreed that specific ICT-related policies existed in their schools. This suggests that ICT integration was largely dependent on individual teachers, external interventions, or informal school practices rather than being guided by clear institutional policies.

Regarding the existence of a specific policy requiring teachers to undergo ICT professional development, a substantial 76 (76.8%) of the teachers disagreed, while only 23 (23.2%) agreed. This finding indicates that most schools did not have formal mechanisms

requiring teachers to participate in ICT-related professional development. The absence of such a policy may contribute to differences in teachers' ICT competencies because participation in training may depend on individual interest or availability of external training opportunities. It may also explain the earlier finding that only a small proportion of teachers received regular ICT training.

Similarly, 69 (69.7%) of the respondents disagreed that their schools had a policy providing for follow-up or mentorship on the use of ICT aids, while only 30 (30.3%) agreed. This finding points to a weakness in post-training support. Even when teachers receive ICT training, lack of follow-up, mentoring, and peer support may make it difficult for them to apply newly acquired skills consistently in classroom practice. The finding therefore suggests that professional development was not adequately supported by continuous guidance and monitoring.

The findings further show that 59 (59.6%) of the teachers disagreed that their schools had their own statement or policy on the use of ICT aids in teaching and learning, compared with 40 (40.4%) who agreed. This suggests that many schools lacked clear institutional expectations concerning how ICT should be incorporated into teaching. Without such guidelines, teachers may have different interpretations of when, how, and for what purposes ICT should be used, potentially resulting in inconsistent utilization across classrooms and subjects.

With regard to the existence of a policy requiring the use of ICT aids in specific subjects, 67 (67.7%) disagreed, while only 32 (32.3%) agreed. This finding suggests that ICT integration had not been systematically embedded within subject-specific teaching practices. A lack of subject-based ICT guidelines may limit teachers' ability to identify appropriate digital tools and resources for supporting particular areas of the curriculum.

The absence of policy was also evident in relation to regular discussions with teachers concerning the use of ICT aids. The majority, 68 (68.7%), disagreed that such a policy existed, while 31 (31.3%) agreed. This indicates that schools may not have established formal structures for discussing ICT use, sharing experiences, addressing challenges, or identifying effective practices. Regular professional discussions could provide opportunities for teachers to learn from one another and collectively address challenges associated with ICT integration.

Similarly, 71 (71.7%) of the teachers disagreed that there was a specific policy for preparing learners to use ICT aids, while only 28 (28.3%) agreed. This finding is particularly important because effective ICT integration requires not only teachers who are digitally competent but also learners who possess the skills necessary to use digital resources effectively. The absence of learner-focused ICT policies may therefore constrain the development of digital literacy and reduce learners' ability to participate actively in technology-supported learning.

Regarding scheduled meetings for teachers to share, monitor, evaluate, and prepare instructional materials and approaches using ICT, 65 (65.7%) disagreed that such a policy existed, compared with 34 (34.3%) who agreed. This suggests that schools had limited formal structures for collaborative planning and evaluation of ICT-supported teaching. Such collaboration is important because teachers can share digital resources, demonstrate effective practices, and collectively identify solutions to challenges affecting ICT integration.

Finally, 62.6% of the teachers disagreed that their schools had an official policy statement supporting innovation in teaching and learning through ICT, while 37.4% (37) agreed. This indicates that innovation through ICT was not formally institutionalized in many schools. Consequently, teachers who wished to experiment with new technologies or digital teaching approaches may have had limited institutional guidance or encouragement.

The findings in Table 19 demonstrate a significant policy gap in the institutionalization of ICT in teaching and learning. The consistently high levels of disagreement across the eight policy-related statements indicate that ICT integration was not adequately supported by formal school-level policies. This finding provides an important explanation for the low and inconsistent use of ICT reported in the earlier tables.

They suggest that the challenge was not simply a matter of providing ICT equipment. Rather, schools also lacked the institutional structures necessary to ensure sustained and effective use of those resources. The absence of policies on teacher professional development, mentorship, subject-specific ICT use, learner preparation, collaborative ICT planning, monitoring, and innovation may have resulted in ICT being used on an occasional and individual basis rather than as an integral part of teaching and learning. The findings therefore point to the need for schools and education authorities to develop and implement comprehensive ICT policies and implementation frameworks. Such policies should clearly define expectations for teacher ICT professional development, establish mentorship and follow-up mechanisms, encourage regular sharing of ICT practices, provide guidance on subject-specific ICT integration, prepare learners for effective use of digital technologies, and promote innovation. Establishing these structures would help move ICT integration from isolated individual efforts towards a coordinated, sustainable, and institutionally supported approach to digital teaching and learning.

Such a trend is in full conformity with the World Bank's proposed SABER ICT Policy Framework, which specifically indicates that ICT's incorporation is subject to dimensions beyond the actual existence of policy but rather its implementation mechanisms and processes, such as teacher capacity building, mentoring, and consistency with learning-centered philosophies, among others (World Bank, 2020). The high levels of policy unawareness in this

study's findings seem to neglect dimensions related to vision dissemination, implementation oversight, and assessment, which are key components in the proposed framework.

These arguments are supported by empirical findings of recent international research studies. In a large-scale study carried out in six countries using structural equation modelling, Viberg et al. (2023) concluded that teacher self-efficacy (.45 $\beta < .01$) and digital competence .38 $\beta < .05$ were significant predictors of effective ICT use and the uptake of learner-centred instruction with CBE-compatible strategies. While the authors note that such competencies are not best acquired without teacher training and mentoring policies in place, which corresponds with the present research results.

Likewise, qualitative research in South Africa found that, while ICT policies recognize the importance of teacher training and infrastructure development, at school level, these policies have poor implementation, especially in rural disadvantaged areas, affecting the integration of ICT in teaching and learning (Frontiers in Education, 2025). This shows how teacher perceptions correlate to high levels of disagreement, as observed in this study.

Asare et al. (2023) studied the ICT policy implementation in Ghana from the viewpoint of teacher educators using both document and interviewer data, and revealed how ICT policy, though very comprehensive at the national level, did not get implemented uniformly, which resulted in low professional development, mentoring, and fitness of ICT with curriculum competencies. The policy-in-practice gap, as observed in the current research, where there seems to be policy at higher administrative levels, becomes evident.

Evidence from Uganda also supports such an argument. Mukhula et al. (2021) found a moderate positive correlation between the degree of implementation of ICT policy and teachers' preparedness for using ICT in classroom instruction ($r = .50$, $p < .01$). It appears that, even good

policy, as seems to be the case, is heavily dependent on implementation and teacher preparedness, areas that, as shown, are wanting.

Similarly, Mwangi & Khatete's (2024) research conducted in public primary schools in Kenya showed that although the formulation of ICT policies was instrumental in providing device availability, the level of use of ICT in class was minimal and inappropriate compared to the applications of CBE. The data showed that ANOVA results of the lack of follow-up support, poor monitoring, and policy formulation and classroom implementation all limited the effective use of ICT. This supports the present research finding conclusively that the implementation of ICT policy in public primary schools is not very clear or effectively communicated.

"Owing to inadequate teacher ICT literacy skills, though ICT policies existed within the TVET institutions, learner-centered approaches and CBE-oriented pedagogies were not fully exploited in teaching and learning processes. The need for policy-driven ongoing professional development for teachers emerged as a significant outcome area for such studies, thus seeking and filling the gap related to the absence of structured training and mentorship policy as indicated in Table 4.6.1."

For instance, there should be a policy on ICT education implementation follow ups in schools with teachers by other stakeholders just to make sure that ICT is being implemented. The findings from the above table indicates that 68% of the teachers said that there is no policy on regular discussions and engagement from the concern parties in ICT implementation in education. This shows a big loophole in ICT implementation in education. Regular discussions and engagements among the parties involved in education is paramount. It's through these engagements that the ICT implementation progress can be monitored and any other challenge can be dwelt with to ensure a successful implementation. The same table reveals that 76% of the

teachers indicated that there is no policy that directs teachers to go for ICT professional training. In relation to this, 58% (7) of the head teachers unanimously indicated that they did not receive any ICT policy that was to guide on the use of ICT aids in teaching and learning in their schools.

Head teacher G said:

> I received the 80 tablets, two desk top and 5 lab tops and one projector. That is all. There was no any policy document that was given by the ministry of education. So the gadgets are there and my teachers are reluctant. You cannot give them a directive to use them as such since there is no policy giving directive on the same. Even the training it was on the willingness of the individual teacher.

The excerpt from Head Teacher G provides qualitative evidence that the provision of ICT equipment was not accompanied by adequate policy and institutional guidance. The head teacher reported receiving 80 tablets, two desktop computers, five laptops, and one projector, indicating that the school had been supplied with a considerable range of ICT equipment. However, the absence of a policy document from the Ministry of Education created uncertainty regarding how the resources should be used and how teachers should be expected to integrate them into teaching and learning.

The statement that "the gadgets are there and my teachers are reluctant" suggests that the availability of ICT equipment did not automatically translate into its utilization. This finding reinforces the quantitative results in Table 19, where 76.8% of teachers disagreed that there was a specific policy requiring teachers to undergo ICT professional development, while 59.6% disagreed that their schools had their own policy statement on the use of ICT aids. The qualitative evidence therefore supports the view that the absence of clear policy direction may have contributed to teachers' reluctance to use the available ICT resources.

The head teacher's observation that "you cannot give them a directive to use them as

such since there is no policy giving directive on the same" further highlights the importance of institutional policy in promoting accountability and guiding ICT implementation. Without clear guidelines, school administrators may find it difficult to establish expectations regarding ICT use, monitor teachers' utilization of ICT resources, or hold teachers accountable for incorporating technology into their instructional practices. Consequently, ICT use may remain dependent on individual teachers' motivation and willingness rather than being integrated into normal school practice.

The excerpt also reveals that ICT training was largely dependent on individual teachers' willingness to participate. The statement that "even the training it was on the willingness of the individual teacher" indicates the absence of a structured professional development framework. This may result in uneven levels of ICT competence among teachers, where some acquire relevant skills while others remain inexperienced or reluctant to use technology. It also limits the possibility of developing a common school-wide approach to ICT integration.

Importantly, the excerpt demonstrates a distinction between ICT provision, ICT policy, and ICT utilization. The school had received several ICT devices, but the absence of policy and structured training reduced the likelihood that these resources would be effectively utilized. This suggests that successful ICT integration requires more than the distribution of hardware. It requires clear policy direction, defined institutional expectations, continuous professional development, monitoring, technical support, and opportunities for teachers to practise using ICT in actual classroom situations.

The experience of Head Teacher G reinforces the findings in Table 19 that the lack of formal ICT policies was a major institutional barrier to effective ICT integration. The findings suggest that government and school authorities need to accompany ICT equipment provision

with clear implementation guidelines, mandatory or structured professional development, school-level ICT policies, mentorship, and monitoring mechanisms. Such measures would provide school leaders with the authority and framework to guide teachers and would help transform ICT resources from underutilized equipment into functional tools for improving teaching and learning.

Absence of ICT professional training policy that spells out who to be trained, when to be trained, what to be trained and who to offer the training, then there isn't much that can be achieved as far as digital literacy in teaching and learning in schools is concerned. There should be a clear policy that call for all teachers to undergo an ICT professional training and a specified content that should be covered in the training so as to ensure ICT competence among teachers. A timeline policy stating time when the teachers and learners are expected to competently use ICT aids in their learning without much hustle is of necessity. Education ICT policies are paramount in ensuring digital literacy program is effectively implemented in teaching and learning in schools.

4.7 Obstacles to Digital Policy Implementation among Public Primary Junior School Teachers.

The fourth objective of the study was to find out the existing obstacles to digital policy implementation among public primary school teachers in Kajiado North Sub County. The respondents were requested to indicate their level of agreement on the given obstacles by ticking yes or no while using ICT aids in learning and teaching. Besides this, they were also required to suggest other possible challenges they face that were not included in the list. Table 20 below indicate their responses.

Table 20. Challenges facing digital literacy policy

Statement	Yes		No	
Challenges	**f**	**%**	**f**	**%**
Lack of technical support	76	76.8	23	23.2
Lack of enough time in school	72	72.7	27	27.3
Lack of knowledge on how to make full use of ICT aids in teaching/learning	75	75.8	24	24.2
Inadequate software that cover different subject content	75	75.8	24	24.2
There's insufficient ICT aids for learners	76	76.8	23	23.2
Lack of electricity	69	69.7	30	30.3

Source: Field Data 2022

The findings in table 20 shows that 76.8% (76) of the teachers indicated lack of technical support as a challenge while 23.2% (23) indicated it as not a challenge. Responding to item on lack of time, 72.7% (72) of the teachers agreed to this as a challenge while 27.3% (27) indicated it to be of no challenge to them. Regarding the item on lack of knowledge on how to make full use of ICT aids, 75.8% (75) agreed this to be a challenge while 24.2% (24) disagreed. Either, 75.8% (75) of the teachers agreed on the item that inadequate software that cover different subject content was a challenge while 24.2% (24) disagreed. The item on insufficient ICT aids for learners' use, 76.8% (76) agreed to it as a challenge while 23.2% disagreed. Responding to item on lack of electricity, 69.7% (69) indicated this to be a challenge while 30.3% (30) disagreed to it.

The findings presented in Table 20 reveal that teachers experienced multiple challenges that hindered the effective integration and use of ICT aids in teaching and learning. The high

percentages reported across all the identified challenges indicate that ICT utilization was constrained not by a single factor but by a combination of technical, human, instructional, and infrastructural limitations.

The most prominent challenge was lack of technical support, reported by 76 (76.8%) of the teachers, while only 23 (23.2%) did not consider it a challenge. This finding suggests that many teachers lacked access to personnel who could assist them when ICT equipment malfunctioned or when they encountered difficulties using digital tools. Inadequate technical support can discourage teachers from using ICT because technical problems may interrupt lessons and reduce teachers' confidence in relying on technology. This finding also complements the earlier qualitative evidence from Head Teacher G, who reported that some ICT equipment was no longer functional due to inadequate maintenance and support.

The findings further show that lack of time was a significant challenge, with 72 (72.7%) of the teachers identifying it as a problem. Only 27 (27.3%) did not regard time as a challenge. This suggests that teachers experienced difficulties finding sufficient time to prepare ICT-supported lessons, access ICT facilities, or move learners to designated ICT rooms. Where ICT resources are centralized in specific rooms, additional time may also be required to organize and transport learners. Consequently, teachers may choose conventional teaching methods because they are perceived as less time-consuming.

Another major challenge was lack of knowledge on how to make full use of ICT aids, reported by 75 (75.8%) of the teachers. Only 24 (24.2%) disagreed. This finding indicates that a substantial proportion of teachers lacked adequate technical and pedagogical competencies to exploit ICT resources effectively. It is consistent with the findings in Table 15, where most teachers reported basic, limited, or proficient rather than advanced or expert knowledge in using

software for classroom presentations. The finding suggests that merely providing ICT equipment without equipping teachers with appropriate skills may not result in effective classroom integration.

Similarly, 75 (75.8%) of the teachers identified inadequate software covering different subject content as a challenge, while 24 (24.2%) did not. This finding indicates that access to hardware alone was insufficient because teachers also required relevant digital content aligned with the curriculum. Where appropriate software and digital learning materials are unavailable, teachers may find it difficult to use ICT meaningfully in different subjects. This could encourage reliance on general-purpose tools or traditional teaching methods rather than subject-specific digital resources.

The insufficient ICT aids for learners' use was also identified as a major challenge by 76 (76.8%) of the teachers, with only 23 (23.2%) disagreeing. This suggests that there were inadequate numbers of devices to enable learners to participate actively in ICT-supported activities. The finding is consistent with the qualitative evidence provided by Head Teacher F, who explained that learners could not engage in hands-on ICT activities because there were not enough tablets, forcing teachers to rely on projectors to display content. Thus, ICT use may have remained largely teacher-centred rather than facilitating interactive and learner-centred learning.

Finally, lack of electricity was reported as a challenge by 69 (69.7%) of the teachers, while 30 (30.3%) did not consider it a challenge. Although this was the lowest reported challenge among the six factors, the proportion remains substantial. Reliable electricity is a fundamental requirement for operating computers, projectors, tablets, charging devices, and other ICT equipment. Where electricity supply is unreliable or unavailable, teachers cannot consistently depend on ICT for lesson delivery.

Overall, the findings demonstrate that ICT integration was constrained by interconnected technical, human-resource, content, resource, time, and infrastructural challenges. The highest-rated challenges were lack of technical support and insufficient ICT aids for learners, each reported by 76.8% of teachers, followed by lack of knowledge and inadequate subject-specific software, each reported by 75.8%. Lack of time (72.7%) and electricity (69.7%) were also substantial barriers.

These findings suggest that addressing ICT integration requires a comprehensive approach rather than focusing solely on the provision of ICT equipment. Schools and education authorities need to ensure regular technical maintenance and support, provide sufficient devices for learners, develop or provide curriculum-relevant digital content, strengthen teacher ICT competencies through continuous practical training, and improve electricity and other infrastructure. In addition, schools should create adequate time and organizational arrangements that allow teachers to prepare and deliver ICT-supported lessons.

The findings further imply that the challenges identified in Table 20 may help explain the low and inconsistent use of ICT aids reported in the earlier tables. Even where teachers have a positive attitude towards ICT and recognize the value of ICT training, inadequate resources, limited skills, technical difficulties, and infrastructural constraints can prevent them from translating this positive attitude into regular classroom practice. Therefore, sustainable ICT integration requires simultaneous attention to teacher capacity, infrastructure, digital content, technical support, and availability of functional ICT resources.

In relation to the challenges facing digital learning in schools, Head Teacher D highlighted several factors that hindered the effective use of ICT resources. The head teacher explained:

> Our ICT challenges are quite many. One of the major challenges is the inadequacy of laptops. The government supplied 150 laptops for a population of 2,256 learners, giving a ratio of approximately 1:15. This is not realistic for effective digital learning. In addition, we have only one room equipped for digital learning. Due to the high number of learners, teachers find it difficult to organize digital learning activities. As a result, the laptops are available, but they are not being fully utilized.
>
> Another challenge is time. Due to the limited number of classrooms and the location of the digital learning room, teachers find it time-consuming to move learners from their classrooms to the digital room and back. For teachers, time is very important, particularly when it comes to covering the syllabus.
>
> The continuous availability of electricity is also not guaranteed. Internet connectivity and Wi-Fi are another major challenge. The Wi-Fi was installed by the iMlango organization, but the organization withdrew about two years ago. Since then, we have not had reliable Wi-Fi connectivity." (Head Teacher D, 2022).

The excerpt from Head Teacher D provides qualitative evidence that the availability of ICT equipment did not necessarily translate into effective digital learning. The head teacher identified several interrelated challenges, including inadequate laptops, limited digital learning space, time constraints, unreliable electricity, and lack of internet connectivity. These challenges help explain the low and inconsistent utilization of ICT aids reported in the quantitative findings.

A major concern highlighted in the excerpt is the inadequate number of laptops in relation to the learner population. The school had 150 laptops for 2,256 learners, resulting in an approximate ratio of one laptop for every 15 learners. The head teacher considered this ratio unrealistic for effective digital learning. This suggests that although the government had made an effort to provide ICT equipment, the number of devices was insufficient to facilitate meaningful learner participation. When many learners have to share a limited number of devices, opportunities for individual or small-group interaction with technology are reduced.

Consequently, ICT may be used mainly for teacher demonstrations rather than learner-centred activities.

The excerpt also points to the problem of having only one ICT room. The concentration of ICT resources in a single room creates logistical difficulties, particularly in a school with a large learner population. Teachers have to organize learners to access the facility, which can make ICT-supported lessons difficult to schedule. This finding is consistent with the earlier observation that learners had limited opportunities for hands-on ICT activities because of inadequate devices and restricted access to ICT facilities. Thus, the physical organization of ICT resources can be as important as the availability of the resources themselves.

Another significant challenge identified is time. Head Teacher D explained that teachers have to move learners from their ordinary classrooms to the digital learning room and then return them after the lesson. Such movement consumes instructional time and may discourage teachers from planning ICT-supported lessons. The concern is particularly important in a curriculum environment where teachers are expected to cover substantial amounts of content within limited instructional time. Consequently, teachers may perceive conventional classroom instruction as more efficient than organizing lessons that require learners to move to a separate ICT facility.

The excerpt further identifies unreliable electricity as an infrastructural barrier. Continuous access to electricity is essential for charging laptops, operating projectors, maintaining network equipment, and supporting other digital technologies. Where electricity is unreliable, teachers cannot depend consistently on ICT resources for lesson delivery. This can result in cancelled or interrupted ICT-supported lessons and may discourage teachers from incorporating technology into their regular instructional plans.

Internet and Wi-Fi connectivity emerged as another critical challenge. The head teacher reported that Wi-Fi had initially been installed by iMlango but became unavailable following the organization's withdrawal. This finding illustrates the sustainability problem associated with ICT initiatives that depend heavily on external organizations. Although the initial intervention provided the infrastructure necessary for digital learning, the withdrawal of the supporting organization left the school without reliable connectivity. As a result, the ICT equipment could not be fully exploited for accessing online educational resources and digital learning platforms.

Importantly, the excerpt demonstrates that the challenges facing digital learning are interconnected. Inadequate devices, a single ICT room, time constraints, unreliable electricity, and lack of internet connectivity collectively reduce the effectiveness of ICT integration. Providing laptops without ensuring adequate infrastructure, connectivity, technical support, and appropriate access arrangements may therefore result in underutilization of the equipment. The statement that “the laptops are available, but they are not being fully utilized” captures this gap between ICT provision and actual classroom use.

Overall, the experience of Head Teacher D reinforces the quantitative findings that insufficient ICT aids, lack of time, inadequate infrastructure, and unreliable connectivity are major barriers to digital learning. The excerpt suggests that addressing these challenges requires a comprehensive approach that goes beyond the distribution of ICT devices. There is a need to increase the number of devices, expand or decentralize ICT facilities, ensure reliable electricity and internet connectivity, and develop sustainable mechanisms for maintaining ICT infrastructure after external organizations withdraw. Such interventions would create more favourable conditions for teachers to integrate ICT regularly and meaningfully into teaching and learning.

Head teacher G observed:

> We have two challenges. One of the challenges is that some teachers are not keen in using ICT aids in their classrooms. The reason they give is that it consumes a lot time while some do not give any reason at all. The other challenge is technical support. Some of the laptops have both or mechanical software problems. We informed the office concerned but it's a year now and nothing has been. Learning must continue. The laptops are lying there in the digital room waiting for the government to act (Head teacher G, 2022).

The excerpt from Head Teacher G highlights two major challenges affecting the integration of ICT aids in classroom teaching: teachers' reluctance to use ICT and inadequate technical support and maintenance. These challenges provide qualitative evidence that complements the quantitative findings presented in Table 20, where 72.7% of teachers identified lack of time as a challenge, while 76.8% identified lack of technical support as a major challenge.

First, the head teacher observed that some teachers were not keen on using ICT aids in their classrooms because they perceived ICT-supported teaching as time-consuming. This finding suggests that teachers' willingness to adopt technology is influenced not only by their ICT skills but also by their perception of the practicality of using ICT within the available instructional time. Where teachers have demanding syllabi and limited time, they may prefer conventional teaching approaches that require less preparation and logistical organization. The finding therefore indicates that ICT integration can be affected by teachers' attitudes and perceptions about the amount of time required to prepare and implement technology-supported lessons.

The statement that some teachers "do not give any reason at all" for not using ICT is also significant. It may suggest a lack of motivation, confidence, or interest in adopting technology. It could also indicate that some teachers have not received sufficient guidance on how ICT can be

integrated efficiently into their existing teaching practices. This observation is consistent with the earlier findings showing that many teachers had only basic or limited knowledge of using ICT software for classroom presentations. Thus, reluctance to use ICT may partly reflect limited confidence in teachers' ability to use technology effectively.

The second major challenge identified is inadequate technical support. Head Teacher G reported that some laptops had hardware or software problems and that, despite informing the relevant office, no action had been taken for approximately one year. This demonstrates how prolonged technical problems can render ICT resources unavailable even when equipment has initially been provided. The finding strongly supports the quantitative result in Table 20, where lack of technical support was identified as a challenge by 76.8% of the teachers.

The statement that "the laptops are lying there in the digital room waiting for the government to act" illustrates the gap between ICT provision and actual utilization. The school possessed ICT equipment, but malfunctioning devices and the absence of timely technical assistance prevented teachers and learners from benefiting from them. This suggests that investment in ICT hardware must be accompanied by sustainable maintenance systems, technical personnel, and clearly defined mechanisms for reporting and resolving equipment problems.

The excerpt also reveals the consequences of delayed technical intervention. The head teacher noted that "learning must continue," implying that teachers were compelled to continue using conventional teaching methods despite the availability of ICT equipment. This situation can lead to underutilization of ICT resources and may discourage teachers from incorporating technology into their teaching. If technical problems persist for extended periods, teachers may lose confidence in ICT and develop a preference for traditional approaches that they perceive as more reliable.

Overall, the excerpt demonstrates that successful ICT integration depends on both teacher-related and institutional factors. Teachers need adequate skills, confidence, motivation, and sufficient time to use ICT effectively, while schools and education authorities need to provide reliable technical support and timely maintenance of equipment. The findings therefore suggest that simply supplying laptops and other ICT devices is insufficient. There must be a comprehensive support system that includes continuous teacher training, efficient technical maintenance, and timely repair of equipment, adequate instructional time, and monitoring of ICT utilization. Addressing these factors would help ensure that ICT resources remain functional and are transformed from underutilized equipment into effective tools for teaching and learning.

Head Teacher C explained that the school had limited access to ICT training and infrastructure. The head teacher stated:

> I have six teachers, but only one teacher has attended an ICT workshop organized by the Sub-County ICT Office. The Ministry also promised to supply the school with laptops, but it has now been a year, and we are still waiting for them. In addition, the school does not have electricity. I was told to wait for the government to address the issue, and I am still waiting for the government to take action (Head Teacher C, 2022).

The excerpt from Head Teacher C highlights significant infrastructural and capacity-related barriers to the integration of ICT in teaching and learning. The experience of the school demonstrates that the availability of ICT training, equipment, and basic infrastructure remains uneven, limiting the extent to which teachers can incorporate technology into classroom practice.

The head teacher reported that out of the six teachers in the school, only one had attended an ICT workshop organized by the Sub-County ICT Office. This indicates that access to ICT professional development was very limited. With only one teacher trained, the school had

inadequate internal capacity to support other teachers in acquiring and applying ICT skills. Although the trained teacher could potentially share the acquired knowledge with colleagues, the excerpt suggests that there was no structured mechanism for ensuring that all teachers received ICT training. This finding supports the broader quantitative evidence that many teachers had limited opportunities for continuous ICT professional development.

The excerpt also points to a significant challenge concerning the delayed provision of ICT equipment. The Ministry had promised to supply laptops, but the school had waited for approximately one year without receiving them. This delay illustrates the gap between ICT policy intentions and actual implementation at the school level. Even where government programmes recognize the importance of ICT in education, delays in providing the necessary equipment can prevent schools from implementing digital learning initiatives effectively.

More critically, the school did not have electricity, making the effective use of computers, laptops, projectors, and other ICT equipment impossible or highly difficult. Electricity is a fundamental prerequisite for digital learning because most ICT devices require reliable power for operation and charging. Therefore, even if the promised laptops had been delivered, the absence of electricity would still have school appears to have limited capacity to address the infrastructure and equipment challenges independently. This situation may contribute to inequalities in ICT access between schools that significantly limited their utilization. This finding demonstrates that ICT equipment provision must be accompanied by adequate basic infrastructure.

The head teacher's repeated statement that they were "still waiting for the government to take action" further reveals a sense of dependence on external intervention. The school appears to have limited capacity to address the infrastructure and equipment challenges independently.

This situation may contribute to inequalities in ICT access between schools that have adequate infrastructure and those that continue to wait for government support.

Overall, the excerpt demonstrates that ICT integration is affected by interconnected challenges involving teacher training, equipment provision, electricity, and government implementation. The findings suggest that providing ICT equipment alone cannot guarantee successful digital learning. Schools require trained teachers, functional infrastructure, reliable electricity, timely delivery of ICT equipment, and continuous institutional support. The experience of Head Teacher C therefore reinforces the need for education authorities to adopt a holistic approach to ICT integration, ensuring that teacher capacity development and basic infrastructure are addressed alongside the provision of digital devices.

The Sub-County TSC Officer observed that although there was no specific evidence immediately available, several challenges were likely to affect the implementation of the digital literacy programme.

The officer explained:

> Although I do not have evidence at hand, there are likely to be several challenges. One of the major challenges is the lack of a clear ICT policy defining the various aspects of digital literacy programme implementation. For instance, the number of teachers who attended the training was low. I think this is because there is no policy requiring teachers to attend ICT training.
> Another challenge I foresee is the adequacy of ICT devices, particularly given the high population in our public primary schools. Internet connectivity is also likely to be a major problem. As a result, many teachers may continue using traditional methods of teaching and learning until such a time when the government fully provides the ICT facilities required in our schools. I therefore foresee significant challenges in the implementation of the digital literacy programme.

The excerpt from the Sub-County TSC Officer provides an institutional perspective on the challenges likely to affect the implementation of the digital literacy programme. The officer identifies lack of a clear ICT policy, limited teacher participation in training, inadequate ICT devices, poor internet connectivity, and continued reliance on traditional teaching methods as major concerns. These observations reinforce the findings presented in the quantitative data and those obtained from head teachers.

A key concern raised by the officer is the absence of a clear ICT policy to guide implementation of the digital literacy programme. The officer links the lack of policy directly to the low number of teachers who participated in ICT training, arguing that teachers may not consider training compulsory in the absence of a formal requirement. This observation is consistent with the findings in Table 19, where 76.8% of teachers indicated that there was no specific policy requiring teachers to undergo ICT professional development training. The qualitative evidence therefore suggests that the absence of policy may contribute to uneven participation in ICT capacity-building programmes.

The officer also identifies the inadequacy of ICT devices in relation to the high learner population as another major challenge. This concern is consistent with the findings in Table 20, where 76.8% of teachers identified insufficient ICT aids for learners' use as a challenge. Where the number of devices is inadequate, learners may have limited opportunities for hands-on interaction with technology. This can reduce the effectiveness of digital learning and encourage teachers to rely on teacher-centred approaches such as demonstrations and presentations rather than learner-centred digital activities.

Another significant concern is internet connectivity. The officer anticipates that inadequate internet access could hinder teachers from accessing online educational materials

and digital learning platforms. This observation corresponds with the experiences reported by several head teachers, particularly those whose schools lost internet connectivity following the withdrawal of external organizations. Without reliable internet access, even schools equipped with computers, tablets, or laptops may not be able to fully utilize online educational resources.

The officer's concern that teachers may continue using traditional teaching methods is particularly important. It suggests that when ICT resources are inadequate or difficult to access, teachers are likely to revert to methods with which they are more familiar. This helps explain the earlier findings showing that ICT use among teachers was largely occasional, with many teachers reporting that they used ICT aids sometimes, rarely, or never. Therefore, the continued use of traditional teaching approaches may not necessarily result from resistance to technology alone but may be a response to the practical limitations surrounding ICT implementation.

The excerpt also highlights the importance of government responsibility in creating an enabling environment for digital learning. The officer emphasizes that teachers may continue relying on traditional approaches until the government provides the ICT facilities required in schools. This implies that successful digital transformation requires coordinated investment in devices, connectivity, infrastructure, teacher training, technical support, and policy implementation. Providing ICT equipment without addressing these complementary requirements may result in underutilization.

The excerpt generally, demonstrates that the challenges affecting digital literacy implementation are systemic and interconnected. The absence of a clear policy can affect teacher training; inadequate training can affect teachers' confidence and competence;

insufficient devices can restrict learner participation; and poor internet connectivity can limit access to digital resources. Together, these factors can undermine the sustainability and effectiveness of ICT integration.

The views of the Sub-County TSC Officer therefore reinforce the broader finding that effective digital learning requires more than the provision of ICT devices. There is a need for clear policy frameworks that establish expectations for ICT training and utilization, adequate provision of devices based on learner populations, reliable internet connectivity, continuous teacher professional development, and sustained government support. Addressing these factors would create a stronger foundation for implementing digital literacy and reducing teachers' dependence on traditional teaching methods.

These findings are also consistent with recent empirical evidence emanating from both global and regional perspectives. Nkosi and Dlamini (2022), in a qualitative study conducted in secondary schools in South Africa, reported that "inadequate funding, lack of ICT infrastructure, inadequate training, and weak enforcement of policy were among the major impediments to teachers' effective integration of ICT within competency-based learning environments." The study further showed that where policy exists but is operationalized neither through resources nor support, teachers retreat to traditional ways of instruction.

In a similar vein, Ioannou and Papadopoulos (2021), in a mixed-methods approach with 120 teachers across several European countries, reported that limited time, outdated equipment, high student-to-computer ratios, and a lack of technical and pedagogical support greatly diminished teachers' confidence and competence in the use of ICT ($\beta = .42$, $p < .05$). The findings of Ioannou and Papadopoulos (2021) point toward continuous mentoring and

collaborative professional development that enables effective ICT integration into CBE contexts-gaps that are clearly reflected in the present study.

Olayemi et al. (2023) found that "insufficient infrastructural supports in the schools, inaccessibility of appropriate educational software in the schools, the low level of embedding ICT in school strategic plans, as well as the low confidence level of teachers about ICT were key hindrances to CBE-oriented ICT use in the schools" ($r = .53$, $p < .01$). Although ICT policies were formulated in the present investigation, as seen in the findings of the above-mentioned investigation with regards to ICT policies in relation to classroom-level applicability, the policies were found to be purely conceptual in nature.

In further comparison, Mugisha et al. (2020) conducted a study on ICT use by primary school teachers in Rwanda and proved that teacher training, digital resources, and teacher confidence are crucial in predicting ICT integration in learner-centered classrooms. In their study, the teachers failed to effectively apply what they knew in the classroom. The study at hand shows a similar case, as was noted by the teachers.

Besides the suggested ICT challenges that participants were to tick, they were also asked to propose other challenges they encountered. Some of the teachers 79% (79) proposed lack of internet connectivity/ WIFI as a challenge, 75.8% (75) proposed insufficient aids, 69.7% (69) gave lack of electricity as a challenge, and 81.8% (81) said it was time consuming while 78.8% (78) pointed out unclear digital literacy policy as a challenge. The findings indicate that teachers encountered several additional challenges that constrained the effective integration of ICT aids in teaching and learning. The most frequently reported challenge was time consumption, identified by 81 (81.8%) of the teachers. This suggests that teachers perceived the preparation and implementation of ICT-supported lessons as demanding considerable instructional time. Time

may be spent preparing digital content, setting up equipment, moving learners to ICT rooms, connecting devices, and addressing technical difficulties. Consequently, teachers may prefer conventional teaching approaches, particularly where they are under pressure to complete the prescribed curriculum within the available instructional period.

The second most frequently identified challenge was unclear digital literacy policy, reported by 78 (78.8%) of the teachers. This finding suggests that many teachers lacked clear institutional or government guidance regarding how ICT should be integrated into teaching and learning. The absence of clear policy may create uncertainty about teachers' responsibilities, ICT training requirements, expected levels of ICT utilization, and mechanisms for monitoring implementation. This finding is consistent with the earlier results in Table 19, where the majority of teachers indicated that their schools lacked specific policies relating to ICT professional development, mentorship, subject-specific ICT use, and innovation.

Lack of internet connectivity or Wi-Fi was identified by 79 (79.0%) of the teachers as another major challenge. This finding highlights the importance of reliable connectivity in supporting digital learning. Internet access enables teachers to obtain educational materials, access online learning platforms, communicate digitally, and update instructional resources. Where connectivity is unavailable or unreliable, the usefulness of ICT devices becomes significantly limited. This finding also corresponds with the qualitative evidence from the head teachers, who reported that some schools lost internet services after supporting organizations withdrew.

Similarly, 75 (75.8%) of the teachers identified insufficient ICT aids as a challenge. This indicates that the number of available devices and other ICT resources was inadequate in relation to the number of learners. Insufficient devices limit opportunities for learners to interact directly

with digital resources and may force teachers to use ICT mainly for whole-class demonstrations rather than interactive learning. The finding is also consistent with earlier evidence showing that some schools had large learner populations but relatively few tablets or laptops.

The lack of electricity was identified by 69 (69.7%) of the teachers as a further challenge. Although this was the least frequently reported among the five additional challenges, the proportion remains substantial. Reliable electricity is essential for powering and charging computers, tablets, projectors, networking equipment, and other ICT devices. In schools where electricity is unavailable or unreliable, teachers cannot depend consistently on ICT-supported teaching. This challenge therefore has implications for the sustainability and regularity of digital learning activities.

Overall, the findings demonstrate that the challenges to ICT integration were multidimensional and interconnected. Time constraints, unclear policy, poor internet connectivity, inadequate ICT resources, and unreliable electricity collectively created an environment in which teachers found it difficult to use ICT consistently.

The high proportion of teachers identifying time consumption (81.8%) and unclear digital literacy policy (78.8%) is particularly important. It suggests that the challenges were not limited to physical infrastructure but also involved institutional organization and policy implementation. Even where ICT equipment was available, the absence of clear guidelines and adequate time for ICT-supported teaching could discourage teachers from using the resources.

The findings reinforce the argument that effective ICT integration requires more than supplying schools with digital devices. There is a need for clear ICT policies, adequate and functional equipment, reliable electricity and internet connectivity, technical support, and appropriate allocation of instructional time. Addressing these challenges would create a more

supportive environment in which teachers can integrate ICT into classroom practice more consistently and meaningfully. Moreover, Kenyan studies support these findings. In a study conducted by Nyaga & Wanjiru (2022), "the success of ICT integration cannot be realized without adequate technical support and teachers' in-service training." Wekasat al. (2021) concluded their investigation with the following arguments: "The absence of teacher preparation, insufficient teacher preparatory time, and poor infrastructure were among factors which significantly hindered ICT adoption in CBE for public primary school settings." Moreover, they added: "The results of inferential analysis confirmed an existing significant link between teacher's understanding and CBE learning activities ($t = 3.45$, $p < .01$)."

Finally, Omondi and Karanja (2021) established that a lack of adequate funding, a lack of ICT rooms, a lack of a classroom structure, and a lack of ICT instructional manuals were key stumbling blocks to ICT integration in public primary schools in the North Rift region of Kenya. This was supported by the results of the ANOVA analysis that established that there were differences in ICT implementation based on the level of availability of resources ($F(2,147) = 6.72, < .01$). This supports the findings of the current research that were observed in a curriculum that promotes a competency-based approach.

4.8 Solutions to Challenges Facing Digital Literacy Policy Implementation

The fifth aim of the research was to examine possible solutions to the obstacles facing the introduction of computer literacy in public elementary schools in Kajiado North Sub County. The respondents were asked to indicate the possible solutions to the suggested digital literacy implementation challenges in their public primary schools in Kajiado North County.

In their responses, 67% (67) of the teachers proposed frequent ICT training of teachers., 48.5% (48) provision of adequate ICT aids, 42.4% (42) to be provided with adequate software,

63.6% (63) suggested to have focused education ICT trainings,48.5% (48) did advocate for continuous ICT conversations, 69.7% (69) proposed to be clear digital literacy policy, 86.9% (86) be provided with internet/WIFI while 86.9% (86) were of the idea that their schools to be provided with UPS (Uninterrupted power supply).

The findings indicate that teachers proposed several measures for addressing the challenges affecting the integration of ICT in teaching and learning. The recommendations focused on teacher capacity development, provision of ICT resources and software, policy development, internet connectivity, continuous professional dialogue, and reliable power supply. This suggests that teachers viewed ICT integration as requiring a comprehensive support system rather than relying on a single intervention. The most strongly supported recommendations were provision of internet/Wi-Fi and uninterrupted power supply (UPS), with each proposed by 86 (86.9%) of the teachers. This finding highlights the critical importance of reliable infrastructure in sustaining digital learning. Without internet connectivity, teachers may be unable to access online learning platforms, digital content, and other educational resources.

Similarly, unreliable electricity can prevent teachers from operating or charging ICT devices. The strong preference for UPS provision therefore suggests that teachers considered reliable power to be essential for ensuring continuity of ICT-supported teaching, particularly where electricity supply is unstable. The need for a clear digital literacy policy was identified by 69 (69.7%) of the teachers. This finding demonstrates teachers' recognition that ICT integration requires clear institutional and policy direction. A well-defined digital literacy policy could clarify expectations concerning teacher training, use of ICT resources, learner preparation, maintenance of equipment, monitoring, and evaluation. This recommendation is particularly significant given the earlier finding that the majority of teachers reported the absence of specific

policies governing ICT use in their schools. Establishing clear policy guidelines could therefore provide the institutional framework necessary for more systematic ICT integration.

Regarding teacher professional development, 67 (67.0%) of the respondents proposed frequent ICT training for teachers, while 63 (63.6%) recommended focused educational ICT training. These findings indicate that teachers did not simply want more training; they wanted training that was relevant to their actual instructional needs. Focused training could address practical areas such as integrating ICT into lesson delivery, developing digital instructional materials, using educational platforms, conducting digital assessment, and accessing online learning resources. Frequent training would also provide opportunities for teachers to update their skills as technologies and curriculum requirements change.

The recommendation for frequent and focused ICT training is particularly important in light of the earlier findings showing that many teachers possessed only basic or limited knowledge of ICT applications. It also suggests that one-off workshops may not be sufficient to develop sustainable ICT competencies. Continuous professional development, combined with opportunities for practical application and follow-up support, could help teachers develop greater confidence and competence in using ICT in classroom settings.

In addition, 48 (48.5%) of the teachers advocated for the provision of adequate ICT aids. This finding reflects the earlier challenge concerning insufficient ICT devices for learners. Adequate provision of tablets, laptops, projectors, and other ICT equipment would increase opportunities for learners to interact directly with digital resources. It would also reduce excessive sharing of devices and enable teachers to implement more learner-centred approaches to digital learning.

Similarly, 42 (42.4%) of the teachers recommended the provision of adequate software. This suggests that teachers recognized that hardware alone cannot facilitate meaningful ICT integration. Appropriate software and digital learning materials need to correspond with different subjects and curriculum requirements. Providing curriculum-relevant digital content would enable teachers to move beyond using ICT merely for presentations and instead employ technology for interactive learning, assessment, content exploration, and learner engagement. The recommendation for continuous ICT conversations, supported by 48 (48.5%) of the teachers, further emphasizes the importance of collaboration and professional sharing. Regular discussions among teachers could provide opportunities to exchange experiences, share digital resources, demonstrate successful practices, and collectively address challenges. Such conversations could also complement formal training by creating a culture of peer learning and continuous professional support within schools.

The findings demonstrate that teachers perceived ICT integration as requiring simultaneous investment in infrastructure, teacher capacity, resources, policy, and professional collaboration. The strongest recommendations—internet/Wi-Fi and UPS, each at 86.9%—show that teachers considered basic infrastructure to be a priority. However, the relatively high support for frequent and focused training and a clear digital literacy policy demonstrates that teachers also recognized the importance of human and institutional factors.

Thus, I can decisively say that improving ICT integration cannot be achieved through the provision of devices alone. A holistic ICT implementation strategy is required, combining reliable internet connectivity and electricity, adequate ICT equipment and software, continuous and focused teacher training, clear digital literacy policies, and regular professional discussions. Such an approach would address both the material and institutional barriers identified in the

study and provide teachers with the necessary conditions to integrate ICT more consistently and effectively into teaching and learning.

In relation to the need for continuous and adequate ICT training, Head Teacher A explained:

> My teachers received a one-time, three-day training, which focused mainly on basic computer operation skills. Since then, I have not observed any of my teachers making a deliberate effort to use the digital room to engage learners in teaching and learning. The school received 80 laptops for a population of 1,540 learners. However, the laptops are still available, and teachers often say that using them in classrooms requires a lot of time for preparation and lesson delivery.
>
> I think teachers require proper and adequate ICT training to develop the competence and confidence needed to integrate technology into teaching and learning. For instance, they need skills on how to access authentic subject content online and how to use ICT aids to prepare and present such content with minimum effort (Head Teacher A, 2022) .

The excerpt from Head Teacher A highlights the importance of continuous, practical, and pedagogically focused ICT training in promoting effective integration of technology into teaching and learning. Although the school had received ICT equipment and teachers had undergone training, the head teacher reported that the resources remained largely underutilized. This suggests that the provision of ICT equipment and one-time training alone was insufficient to achieve sustained ICT integration. The head teacher reported that teachers had received only one three-day training session, which focused mainly on basic computer operation skills. This indicates that the training concentrated on foundational technical competencies rather than on how ICT could be applied to actual classroom

instruction. Basic computer literacy is important, but teachers also require pedagogical skills that enable them to select appropriate digital resources, integrate them into lesson plans, present content effectively, and engage learners through technology. The finding therefore suggests a gap between learning how to operate ICT devices and learning how to use ICT effectively for teaching.

The limited impact of the training is evident from the head teacher's observation that teachers had not made deliberate efforts to use the digital room to engage learners in teaching and learning. This suggests that the training did not translate into sustained classroom practice. One possible explanation is that the training was too brief and lacked adequate follow-up, practical sessions, mentorship, and opportunities for teachers to apply the acquired skills. This interpretation is consistent with the earlier findings in which teachers identified the need for frequent and focused ICT training as an important intervention.

The excerpt also highlights the challenge of inadequate ICT resources in relation to the learner population. Although the school received 80 laptops, it had a population of 1,540 learners. This represents a very low device-to-learner ratio, limiting opportunities for learners to interact directly with ICT. Consequently, even motivated teachers would face difficulties implementing learner-centred digital activities where devices are insufficient. The availability of laptops therefore does not necessarily guarantee meaningful digital learning.

Another important issue raised by the head teacher is time consumption. Teachers reportedly perceived the use of laptops in classroom teaching as requiring considerable time for preparation and delivery. This finding corresponds with the earlier quantitative results,

where 81.8% of teachers identified time consumption as a challenge. It suggests that teachers may avoid ICT-supported lessons when they perceive them as adding to their workload or making it more difficult to cover the syllabus. Adequate training could help address this challenge by equipping teachers with efficient strategies for preparing and delivering technology-supported lessons.

The head teacher's recommendation that teachers need to develop competence and confidence is particularly significant. Lack of confidence may discourage teachers from experimenting with ICT, especially when they anticipate technical or pedagogical difficulties. Continuous hands-on training could enable teachers to become more familiar with ICT tools and gradually develop the confidence needed to incorporate them into regular classroom practice.

The reference to teachers needing skills to access authentic subject content online and use ICT aids to prepare and present that content with minimum effort further demonstrates the need for training that is directly connected to teachers' instructional responsibilities. Rather than focusing primarily on generic computer skills, professional development should address practical classroom applications such as searching for reliable educational materials, evaluating digital content, preparing ICT-supported lessons, presenting digital resources, and engaging learners through technology.

This demonstrates that effective ICT integration requires more than equipment provision and basic computer training. Teachers need continuous, practical, and subject-specific professional development, together with adequate devices and institutional support. The findings suggest that training should be designed around teachers' actual classroom needs and should include follow-up, mentoring, and opportunities for practical application.

Such an approach would help bridge the gap between ICT availability and actual utilization, enabling teachers to use technology more confidently, efficiently, and meaningfully in teaching and learning.

In this aspect, the sub county education office noted with a lot of concern that the laptops were ferried direct to schools without its knowledge. It also retorted that it was not aware if at all there was a policy that governed the use of laptops in schools. In relation to ICT trainings, the office revealed that there was a training that was held in one of the sub county schools and it was invited to attend. According to the office, the training was facilitated by Kenyatta University, since then, it had no idea whether there were more trainings that were offered. The office emphasized that if the training the teachers received was anything to go by, then more trainings were necessary if at all teachers were to teach using ICT in teaching and learning in their classrooms. Sub county education officer D said:

> The ministry directly delivered the laptops to schools. We were not involved for instance informed about it. Right down I can't tell which school received how many laptops and if they are being used and how they are being used. I did not receive any guideline (policy) from the ministry concerning the same. Thus, it's difficult for anyone to take up a supervisory role for a program you are totally blank of. Concerning the training, I can easily say it was all basic skills of how to operate a computer, that opening, closing, saving, deleting and access data saved. No much was delivered on the laptops or any other ICT aid and how to use them to teach and learn in a classroom. As a result, I don't think teachers can do much in implementing digital learning. More training and workshops for teachers may be required if digital learning has to be implemented and well implemented (Officer D, 2022).

The Sub-County Education Officer D excerpt highlights weak coordination, inadequate policy guidance, limited monitoring, and insufficient teacher training as major factors

constraining the implementation of digital learning. The officer's account provides an important institutional perspective that complements the findings obtained from teachers and head teachers. A key issue raised by the officer is the centralized distribution of ICT equipment without adequate involvement of local education authorities. The officer explained that the Ministry delivered laptops directly to schools without informing the sub-county education office. As a result, the officer could not establish which schools had received laptops, the number of devices supplied, or whether and how the devices were being used. This points to a coordination and communication gap between the national level and local education administration. Such a gap makes it difficult for local officers to plan, coordinate, monitor, and provide appropriate support for digital learning initiatives.

The statement that the officer “did not receive any guideline (policy) from the ministry” is particularly significant. Without clear policy guidelines, local education officers may lack the necessary framework for supervising implementation and evaluating whether schools are meeting expected ICT objectives. This finding reinforces the results in Table 19, where the majority of teachers reported the absence of specific policies governing ICT professional development, ICT use, mentorship, learner preparation, and innovation. The qualitative evidence therefore demonstrates that the policy gap existed not only at the school level but also affected the capacity of education officials to provide effective supervision.

The excerpt further reveals a weak monitoring and accountability mechanism. The officer's inability to determine whether laptops were being used, and how they were being used, suggests that there was no effective system for tracking the utilization of ICT resources. This is important because the provision of equipment should ideally be followed by monitoring to determine whether the resources are functional, accessible, and contributing to teaching and learning.

Without such monitoring, ICT devices may remain unused or become dysfunctional without timely intervention. Another important finding concerns the nature and adequacy of ICT training provided to teachers. According to the officer, the training mainly focused on basic computer operations such as opening, closing, saving, deleting, and accessing stored data. This suggests that the training concentrated on basic technical skills rather than pedagogical ICT competencies. Teachers were not adequately trained on how to use laptops and other ICT aids to facilitate classroom teaching and learning. This finding closely corresponds with the observation made by Head Teacher A that teachers had received only a brief three-day training focused primarily on basic computer skills.

The limited focus of the training may explain why teachers experienced difficulties translating ICT knowledge into classroom practice. Knowing how to operate a computer does not necessarily equip a teacher with the ability to integrate technology into lesson planning, content presentation, learner engagement, assessment, or collaborative learning. Effective digital learning therefore requires training that connects technical skills with curriculum content and pedagogical practice. The officer's assertion that “I don’t think teachers can do much in implementing digital learning” further emphasizes the consequences of inadequate professional development. Without sufficient skills and confidence, teachers may be reluctant to use ICT devices, particularly when they encounter technical or pedagogical challenges. This observation is consistent with the quantitative findings showing that 75.8% of teachers identified lack of knowledge on how to make full use of ICT aids as a challenge.

The officer’s recommendation for more training and workshops is therefore highly relevant. Continuous professional development would enable teachers to move beyond basic computer literacy towards practical competencies in using ICT for teaching and learning.

Training could focus on areas such as accessing and evaluating online educational materials, developing digital instructional resources, using educational platforms, integrating multimedia into lessons, conducting digital assessment, and managing learner activities using ICT.

The excerpt demonstrates that the challenges affecting digital learning were systemic rather than solely teacher-related. While teachers may lack adequate ICT competencies, the problem is compounded by weak communication between education levels, absence of clear implementation guidelines, inadequate monitoring, and insufficient pedagogical training. The findings therefore suggest that successful digital learning requires stronger coordination between the Ministry, sub-county education offices, school administrators, and teachers. In conclusion, it indicates that ICT provision without adequate policy, coordination, monitoring, and pedagogically oriented training is unlikely to produce effective digital learning. Education authorities should establish clear implementation guidelines, involve local education offices in ICT programmes, develop mechanisms for monitoring equipment utilization, and provide continuous, hands-on training that demonstrates how ICT can be integrated into actual classroom teaching and learning.

On the contrary, in regard to training, the sub county TSC office admitted that a certain number of educators were trained which were government sponsored. Responding on whether the office was aware of the number of teachers attended the trainings and the frequency of attendance, the office observed that every public primary school had a fair teacher presentation in the trainings who were meant to be trainers of trainers in their schools. The TSC Officer B explained that the government sponsored the ICT training programmes, although there were limitations in tracking teachers' participation and assessing the effectiveness of the training. The officer stated:

> The training was offered under government sponsorship. However, I cannot exactly tell the number of teachers who attended or the frequency of their attendance. Regarding the training itself, everything was delivered within a short period. I am not sure whether the teachers actually gained meaningful knowledge and skills from the training or whether the training enabled them to implement digital learning effectively in their classrooms.
>
> What I can say is that more frequent and regular training for teachers is necessary, especially now that our education system is moving towards digital learning. If digital learning is to be implemented effectively, teachers need continuous training and professional support (TSC Officer B, 2022).

The excerpt from TSC Officer B highlights important weaknesses in the implementation and sustainability of ICT teacher training programmes. Although the government sponsored the training, the officer's response suggests that the programme faced challenges related to participation, duration, monitoring, and continuity. These factors may have limited the extent to which the training contributed to effective digital learning in schools. First, the officer indicated that it was difficult to establish the number of teachers who attended the training and the frequency of their participation. This suggests inadequate monitoring and documentation of teacher professional development. Effective implementation of ICT programmes requires education authorities to maintain clear records of trained teachers and identify those who have not received training. Without such information, it becomes difficult to determine whether training opportunities are equitably distributed or whether additional training is required.

Secondly, the officer noted that the training was delivered within a short period. This raises concerns about whether teachers had sufficient time to acquire and practise the necessary ICT competencies. Effective digital learning requires more than basic exposure to computers; teachers need practical skills in selecting digital resources, preparing ICT-

supported lessons, using learning platforms, engaging learners, and assessing learning through technology. A short training programme may therefore introduce teachers to ICT without providing adequate opportunities for mastery. The officer's uncertainty about whether teachers "actually gained meaningful knowledge and skills" or whether the training enabled them to implement digital learning is particularly significant. It points to a possible gap between training attendance and classroom application. Training effectiveness should not be measured only by the number of teachers who attend workshops but also by the extent to which teachers apply the acquired knowledge and skills in their teaching. This calls for follow-up, classroom observation, mentorship, and assessment of ICT integration after training.

The excerpt further emphasizes the need for regular and continuous ICT professional development. The officer's recommendation for more frequent training reflects the rapidly changing nature of digital technologies and the increasing expectations placed on teachers to integrate ICT into instruction. Regular training would enable teachers to strengthen their existing competencies, learn new digital tools, and address practical challenges encountered during classroom implementation. These observations are consistent with the broader findings of the study. Earlier findings indicated that many teachers had only basic or limited knowledge of using ICT software, while a substantial proportion identified lack of knowledge as a challenge to ICT integration. Teachers also recommended frequent and focused ICT training as one of the measures that could improve digital learning. The convergence of evidence from teachers and education officials strengthens the conclusion that inadequate professional development was a significant barrier to effective ICT utilization. This shows that the government-sponsored training was a positive step, but its impact was potentially limited by short training periods, inadequate monitoring, and lack of continuity. For digital

learning to be effectively implemented, teacher training should be regular, practical, curriculum-oriented, and supported by follow-up and mentorship. Such an approach would help transform ICT training from a one-time exposure into an ongoing professional development process that builds teachers' competence and confidence in integrating technology into classroom teaching and learning.

In relation to adequacy of ICT aids and software some of the interviewed head teachers complained of inadequate ICT aids especially the laptops that were meant to be used by learners. They said that due to FEPA, there is yearly increase in number of learners in their schools which demands that every year the government needs to supply more laptops and other ICT aids to meet the increased population. Thus, in relation to the challenges associated with the availability and utilization of ICT resources, Head Teacher B explained:

> My school received 80 laptops from the government. Currently, we have a population of about 2,000 learners. Unfortunately, some of the laptops failed upon arrival, and I estimate that only about 50 are currently in working condition. Even among the laptops that are functional, the available software does not adequately cover all subjects. Some subject content is missing, which presents a challenge to teachers and, I believe, is one of the major reasons why the laptops are not being effectively used in classrooms. The government needs to establish a regular maintenance programme for the laptops and provide replacements for those that become faulty. There is also a need to provide additional devices to meet the demands of the increasing learner population. If the situation remains as it is, the implementation of digital learning will take a long time to become fully effective (Head Teacher B, 2022).

Head Teacher B highlights several resource-related and institutional challenges that hinder the effective implementation of digital learning. The challenges identified include

inadequate numbers of functional laptops, lack of relevant subject-specific software, absence of regular maintenance, and the failure to replace faulty equipment. These findings demonstrate that the mere provision of ICT devices does not guarantee their effective utilization in teaching and learning. A major concern is the inadequate number of functional laptops in relation to the learner population. The school received 80 laptops for approximately 2,000 learners, but only about 50 were reportedly functional. This represents an already low level of access, which is further reduced by equipment failure. The situation limits learners' opportunities to interact directly with digital technologies and makes it difficult for teachers to organize effective hands-on digital learning activities. This finding is consistent with the quantitative results in which 76.8% of teachers identified insufficient ICT aids for learners' use as a major challenge.

The head teacher also draws attention to the problem of faulty ICT equipment. The head teacher noted that some laptops failed upon arrival and that there was no adequate mechanism for replacing them. This suggests weaknesses in quality assurance, maintenance, and after-sales technical support. When ICT equipment remains unrepaired or unreplaced for long periods, the number of usable devices progressively declines, reducing the capacity of schools to sustain digital learning. It may also discourage teachers from planning ICT-supported lessons when they cannot be certain that sufficient functional equipment teachers cannot find digital materials relevant to the lesson they intend to teach, they may consider the technology less useful and revert to conventional teaching methods. Thus, the availability of appropriate software is important in ensuring that ICT becomes integrated into everyday classroom will be available.

Another important challenge is the inadequacy of digital learning software and content. Head Teacher B reported that the software available did not cover all subjects and that some subject content was missing. This indicates that effective digital learning requires not only hardware but also relevant, curriculum-aligned digital content. Teachers may have laptops but still be unable to use them effectively if appropriate learning materials are unavailable. The finding supports the earlier quantitative evidence in which 75.8% of teachers identified inadequate software covering different subject content as a challenge. The absence of subject-specific content may also affect teachers' willingness to use ICT. When teachers cannot find digital materials relevant to the lesson they intend to teach, they may consider the technology less useful and revert to conventional teaching methods. Thus, the availability of appropriate software is important in ensuring that ICT becomes integrated into everyday classroom practice rather than being used only occasionally.

The head teacher's recommendation for a regular maintenance programme is particularly significant. ICT equipment requires continuous maintenance, software updates, troubleshooting, and replacement of damaged components. A structured maintenance system would help ensure that devices remain functional and available for teaching and learning. It would also reduce the likelihood of schools accumulating unusable equipment, as suggested by the statement that some laptops were simply no longer operational.

The call for the government to provide replacement devices and increase the number of laptops further highlights the need for ICT provision to correspond with changing learner populations. As enrolment increases, the number of ICT devices should also be reviewed to ensure that access does not become progressively inadequate.

Sustainable digital learning therefore requires ongoing investment rather than a one-time distribution of equipment. From the head teacher's perspective ICT integration is affected by the entire digital learning ecosystem, including hardware, software, maintenance, technical support, and learner numbers. The experience of Head Teacher B reinforces the broader findings that inadequate ICT resources and software are significant barriers to digital learning. It also demonstrates that government interventions should move beyond initial equipment distribution to include regular maintenance, timely replacement of faulty devices, provision of adequate equipment, and development or supply of curriculum-relevant digital content.

Thus, I suggest that the sustainability of digital learning depends on functional and sufficient ICT resources supported by appropriate digital content and continuous institutional support. Without these conditions, schools may possess ICT equipment but remain unable to translate that investment into meaningful and consistent classroom practice.

In relation to the adequacy of ICT aids in schools, Sub-County Education Officer D explained that the local education office had limited information regarding the distribution and availability of ICT resources. The officer stated:

> Concerning the adequacy of ICT aids in schools, I cannot say much because the Ministry did not involve us in the receipt of the ICT equipment, nor did we receive any documentation concerning the distribution from the Ministry. However, under the Free Education Policy Approach (FEPA), the government is expected to supply ICT aids annually to accommodate the yearly increase in learner enrolment in schools. Some schools have reported that the ICT aids provided are inadequate, while others have reported challenges related to the maintenance of the equipment. Since this is a government programme, our role is mainly to relay the information we receive from

schools and wait for the Ministry to take the necessary action (Sub-County Education Officer D, Kajiado North, 2022)

The Sub-County Education Officer D highlights important institutional and administrative challenges affecting the adequacy, distribution, and maintenance of ICT aids in schools. The officer's account suggests that although the government had a responsibility to provide ICT resources, there were weaknesses in communication, coordination, monitoring, and follow-up at the sub-county level. One of the key issues emerging from the excerpt is the limited involvement of the sub-county education office in the distribution of ICT equipment. The officer indicated that the Ministry did not involve the local education office in receiving the equipment and did not provide documentation concerning its distribution. This lack of information makes it difficult for the sub-county office to establish how many devices were allocated to individual schools, whether the distribution corresponded with learner populations, and whether schools received the equipment they required. It also limits the ability of local education officials to effectively monitor the implementation of the digital learning programme.

The excerpt indicates that ICT provision needs to be responsive to changes in learner enrolment. The officer observed that government support was expected to accommodate annual increases in school populations. This is important because a fixed number of ICT devices may become inadequate as enrolment increases. The findings therefore suggest that ICT resource allocation should be periodically reviewed based on school population and changing instructional needs rather than being treated as a one-time intervention. The officer's observation that some schools reported inadequate ICT aids reinforces the quantitative findings of the study. In Table 20, 76.8% of teachers identified insufficient ICT aids for learners' use as a challenge. The qualitative evidence therefore confirms that shortages of ICT resources were experienced at

the school level. Inadequate devices may restrict learner access and make it difficult for teachers to conduct practical and interactive digital learning activities.

Another important issue is maintenance of ICT equipment. The officer reported that some schools had experienced maintenance problems. This demonstrates that the challenge is not simply the initial provision of ICT devices but also their continued functionality. ICT equipment requires regular servicing, repair, software updates, and replacement of damaged components. Where maintenance systems are weak, the number of functional devices may decline over time, thereby worsening the problem of inadequate ICT resources. It also reveals a passive administrative response to reported ICT challenges. The statement that the sub-county office's role was to "relay the information and wait for the Ministry to act" suggests that local education officials had limited authority or resources to address problems directly. This may result in delays in resolving equipment shortages and maintenance issues. Such delays can negatively affect teachers' willingness and ability to use ICT consistently in classroom instruction. The findings further point to a coordination gap between national and local levels of education administration. Effective implementation of a government ICT programme requires communication between the Ministry, county and sub-county education offices, school administrators, and teachers. Local officers need information about resource allocation and implementation guidelines so that they can monitor progress, identify gaps, and provide timely feedback. The lack of such coordination may contribute to disparities in ICT access and utilization across schools.

The excerpt demonstrates that adequacy of ICT aids is influenced by resource allocation, learner enrolment, maintenance, and administrative coordination. The findings suggest that government provision of ICT equipment should be accompanied by a clear distribution

framework, regular assessment of school needs, maintenance and replacement mechanisms, and stronger involvement of local education authorities. In conclusion, the excerpt reinforces the broader finding that sustainable digital learning requires continuous government support rather than one-time provision of ICT equipment. To improve ICT integration, education authorities should establish mechanisms for regularly assessing ICT needs, allocate additional devices as enrolment increases, provide timely maintenance and replacement services, and strengthen communication between national and local education offices. These measures would help ensure that ICT resources remain adequate, functional, and accessible to both teachers and learners.

Concerning the clarity of ICT policy, head teachers expressed concern about the absence of clear guidelines governing the implementation of the digital literacy programme. Some head teachers indicated that there was no specific policy outlining how the programme should be implemented, monitored, and supervised at the school level. As a result, individual schools appeared to implement the programme according to their own discretion.

The lack of clear policy guidance was also perceived to contribute to teachers' limited participation in government-sponsored ICT training and the inadequate utilization of ICT aids in schools. One of the head teachers explained:

> The supervisory role in digital learning implementation is an uphill task for most of us head teachers. The Ministry of Education simply delivered the ICT aids without providing a clear and tangible ICT policy to guide and mandate us in carrying out our supervisory role over their use. Consequently, each school implements the programme differently and according to its own discretion. Even holding teachers accountable to ensure that the ICT aids are used in line with the Ministry’s objectives is a challenge. Most government programmes have clearly stipulated policies that guide their implementation.

The excerpt highlights the absence of a clear and comprehensive ICT policy as a major institutional barrier to the implementation of digital learning in schools. The head teacher's account suggests that although the Ministry of Education provided ICT equipment, the provision of devices was not accompanied by sufficient policy guidance to explain how the resources should be implemented, monitored, and utilized. This created uncertainty among school administrators regarding their responsibilities in supervising the programme. A major concern emerging from the excerpt is the limited capacity of head teachers to exercise their supervisory role. The head teacher describes supervision of digital learning implementation as an "uphill task," indicating that school administrators lacked a clear mandate and framework for holding teachers accountable for ICT use. In the absence of specific policy directives, head teachers may find it difficult to require teachers to attend ICT training, use ICT aids, or incorporate digital resources into classroom instruction. This may consequently contribute to inconsistent implementation across schools.

The excerpt reveals that schools implemented the digital literacy programme according to their own discretion. This suggests a lack of standardization in the implementation process. Where schools develop their own approaches without common guidelines, substantial differences may emerge in teacher participation, utilization of ICT equipment, training, maintenance, and monitoring. Consequently, some schools may make greater progress in digital learning than others despite receiving similar government interventions. The absence of clear policy guidance may also explain the low participation in ICT training and limited use of ICT aids reported in other findings of the study. Teachers may be less likely to prioritize ICT training when attendance is not formally required or linked to their professional responsibilities. Similarly, where there is no policy specifying expectations for ICT utilization, teachers may

continue using traditional teaching methods without facing institutional pressure to integrate technology.

The finding is strongly supported by the quantitative results presented in Table 19, where the majority of teachers reported the absence of policies relating to ICT professional development, mentorship, subject-specific ICT use, regular ICT discussions, learner preparation, and innovation. The qualitative evidence from the head teacher therefore provides an explanation for these quantitative results by showing how the absence of policy affects school-level supervision and accountability.

Another important issue is the disconnect between ICT resource provision and policy implementation. The head teacher notes that the Ministry delivered ICT aids but did not provide a corresponding policy framework. This suggests that digital transformation was approached largely as a matter of equipment provision rather than as a comprehensive institutional change requiring policy, training, supervision, technical support, and monitoring. ICT equipment can remain underutilized when schools lack clear procedures governing its use. It raises the issue of accountability. The head teacher's difficulty in holding teachers responsible for ICT utilization indicates that clear policy is necessary to establish expectations and responsibilities at different levels. A well-defined policy could specify the roles of the Ministry, education officers, head teachers, and teachers, as well as mechanisms for monitoring implementation and evaluating progress. It could also provide guidelines on teacher training, maintenance of equipment, allocation of ICT resources, and integration of digital technologies into curriculum delivery. The excerpt shows that policy clarity is fundamental to the successful implementation of digital learning. The problem was not merely the absence of ICT equipment but the lack of an institutional framework to ensure that available resources were effectively utilized. The findings

suggest that providing ICT devices without clear implementation guidelines may result in fragmented practices, weak supervision, limited accountability, and underutilization of resources. Thus, the study points to the need for a clear, comprehensive, and enforceable digital literacy policy that defines the responsibilities of education authorities and schools, establishes expectations for teacher ICT use and professional development, and provides mechanisms for supervision, monitoring, and evaluation. Such a policy would give head teachers the authority and guidance needed to ensure that ICT resources are translated into meaningful improvements in teaching and learning. In relation to this, the Sub-County Education Officer (D) stated:

> To date, my office has not received any guidelines on the implementation of the digital literacy programme. I would assume that the guidelines were provided to schools at the time the ICT equipment was delivered. However, if this was the case, we should have been informed by the head teachers of the respective schools. The absence of these guidelines has made it difficult for us to effectively carry out our supervisory role in the implementation of the programme. We hope that the government will soon provide our office with the policy guidelines to guide the implementation of the programme (Sub-County Education Office D, 2022).

The excerpt highlights a significant institutional challenge affecting the implementation and supervision of the Digital Literacy Programme. The Sub-County Education Officer's statement indicates that the education office had not received the necessary implementation guidelines, despite the delivery of ICT equipment to schools. This suggests a possible communication and coordination gap between the government agencies responsible for developing and disseminating programme guidelines and the structures responsible for implementation at the local level.

The absence of clear guidelines also appears to have constrained the supervisory role of the Sub-County Education Office. Effective supervision requires education officers to have adequate

information on programme objectives, implementation procedures, roles and responsibilities, and expected standards. Without such guidance, officers may find it difficult to assess whether schools are implementing the programme as intended or to provide appropriate technical and administrative support. The officer's reference to relying on head teachers for information further suggests that communication about programme implementation was not sufficiently institutionalized.

Furthermore, the excerpt points to a disconnect between the provision of ICT infrastructure and the provision of the policy framework required to support its effective use. Delivering ICT equipment to schools alone does not necessarily guarantee successful implementation of a digital literacy programme. Schools and education officers require clear operational guidelines to understand how the equipment should be integrated into teaching and learning, how implementation should be monitored, and what responsibilities different actors should assume.

The officer's expression of hope that the government would provide the necessary policy guidelines indicates that the local education office recognized the importance of policy direction but lacked the authority or resources to address the gap independently. This finding therefore points to the importance of strengthening communication, policy dissemination, and coordination across different levels of the education system. In the context of the study, the excerpt demonstrates that institutional and administrative support was an important factor in determining the effective implementation of the Digital Literacy Programme.

4.9 Inferential Statistics

The inferential statistics assist in making conclusions or inferences about a population on the basis of the sample results. They help us infer whether observed data are significant or not. In our investigation, regression analysis is used to measure the effect of independent variables on

the dependent variable, whereas used to determine whether there is a statistically significant association or difference between categorical variables.

4.9.1 Regression for Teachers' Expertise in Using Education ICT Aids and Digital Literacy Policy Implementation

The study did a regression analysis for table 5 for research question one on teachers' expertise in using ICT aids for digital implementation. The results are as shown below.

Table 21: *Model Summary of Teachers' Expertise in Using Education ICT Aids on ICT policy Implementation*

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.141[a]	.020	.010	.450

a. Predictors: (Constant), Expertise in Using Education ICT Aids

b. Dependent Variable: Implementation of digital literacy policy

As can be seen from the model summary materials presented in Table 21, it has been determined that there is a weak positive linear relationship between teachers' expertise in using educational ICT aids and digital literacy policy implementation, as indicated by a coefficient equals .141. Since it has been established that the R Square value for correlations between factors is .020, it is clear that an explanation of only 2.0% of digital technology policy implementation could be attributed to expertise among teachers in using ICT aids, as indicated by an adjusted R Square (.010) that is actually very minimal when adjusting for sampling errors. The high standard error of estimate, which is equal to .450, further serves to illustrate a point that, although it is clear that expertise in using ICT aids has a degree of impact on policy implementation, it is a relatively small degree, in spite of there being a degree of variability in

correlation between values. The findings suggest that teachers' expertise in using educational ICT aids has a positive but weak association with implementation of the digital literacy policy. However, the model summary alone does not establish whether this relationship is statistically significant.

Thus, to determine whether teachers' ICT expertise significantly predicts policy implementation, the ANOVA table and regression coefficients table, particularly the F-statistic and p-value for the model and the coefficient p-value for teachers' expertise, was examined in table 22 below.

Table 22: ANOVA

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	.399	1	.399	1.965	.164[b]
	Residual	19.682	97	.203		
	Total	**20.081**	**98**			

a. Dependent Variable: Implementation of digital Literacy policy

b. Predictors: (Constant), Expertise in Using Education ICT Aids

The ANOVA table 22 shows that the regression model for testing the impact of teachers' expertise in the use of educational ICT aids on the implementation of the digital literacy policy is not statistically significant at the conventional level of 0.05 because the F-test for regression model significance is low at $F(1, 97) = 1.965$, $p = .164$. In other words, teachers' expertise in ICT aids is not sufficient to explain the statistically significant prediction of the implementation of a digital literacy policy at the conventional level of 0.05 significance; that is, teachers' expertise in ICT aids is not sufficient to explain the implementation of a digital literacy policy at

a level of significance of 0.05. However, a considerable proportion of the variance is accounted for by teachers' expertise in ICT aids (Regression SS = .399) compared to a greater proportion of the variance being explained by teachers' expertise that remains to be explained in the Residual SS = 19.682.

Table 23 Coefficients

Model		Unstandardized Coefficients		Standardized Coefficients		
		B	Std. Error	Beta	t	Sig.
1	(Constant)	1.556	.200		7.766	.000
	Expertise in Using Education ICT Aids	-.078	.055	-.141	-1.402	.164

a. Dependent Variable: Implementation of digital Literacy policy

The coefficients in Table 23 indicate that the constant term, or intercept, is 1.556, which was found to be statistically significant, Ts = 7.766, $p < .001$, showing the basic level of digital literacy policy implementation when teachers' expertise in using ICT aids was at zero. The unstandardized coefficient of teachers' expertise in using ICT aids was -0.078, with a t-value of -1.402, which was found to be non-significant, $p = .164$, showing that it was not associated with digital literacy policy implementation in a significant manner. The negative sign is associated with a low standardized coefficient of -0.141. All of the above lead us to a conclusion that teachers' ICT expertise does not play a role in determining the implementation of digital literacy policy.

A contradicting finding and some similarities were outlined in the work of Ruijia, Andersson, and Brown (2025) who in their study on the adoption of ICT in early childhood and

primary level education indicated an impact of ICT on learning outcomes (d = 0.42, p < .01). It showed that the implementation of ICT policies, along with teacher training, can enhance learner-centered approaches aligned to CBE, although evidence on sustained teacher adoption long-term remains sparse. Thus, I conclude that teachers' expertise in using ICT aids does **not** have a statistically significant effect on the implementation of digital literacy policy. This is further supported by the coefficient results ($\beta = -0.078,\ p = 0.164$), which are not statistically significant.

4.9.2 Chi-Square Test for Teachers' ICT Professional Training and Digital Literacy policy Implementation

The study did a chi-square test for table 5 for research question two on teachers' ICT professional training and digital implementation to determine whether there is a statistically significant association or difference. The results are as shown below.

Table 24: *Chi-Square Test for Teachers' ICT Professional Training and Digital Literacy Implementation*

	Value	df	Asymptotic Significance (2-sided)
Pearson Chi-Square	20.142[a]	8	.009
Likelihood Ratio	18.927	8	.011
Linear-by-Linear Association	6.872	1	.004
N of Valid Cases	99		

a. 2 cells (11.1%) have expected count less than 5. The minimum expected count is 1.13.
b. Significant at p <0.05

The result of Pearson Chi-Square statistics showed a statistically significant relationship between teachers' knowledge of ICT skills and the effective implementation of digital literacy policies. It is clear that an increased level of teachers' ICT skills is associated with a greater extent of policy implementation. An increased level of teachers' knowledge of ICT is likely to promote the effective implementation of digital technology policies, as shown by a statistically significant Linear by Linear Association of 8.251, p = .004. The elimination of low expected cells strengthens the result. With result is in agreement with that of Omutange (2025) investigated the use of ICT in learning institutions used regression analysis ($R^2 = .37$, $p < .05$), whore result indicated that despite the policies guiding the integration of ICT in the country and institutions being effective for its adoption, teachers' ICT literacy was inadequate to facilitate effective learner-centered and CBE-based pedagogical practices.

4.9.3 Chi-Square Test for teachers' competence upon professional training and the Implementation of the Existing Digital Policy

The study did a chi-square test for teachers' competence and the implementation of the existing digital policy in relation to question two table 11

Table 25: *Chi-Square Test for Teachers' Competence Upon Professional Training and Implementation of the Existing Digital Literacy Policy*

	Value	df	Asymptotic Significance (2-sided)
Pearson Chi-Square	22.385a	8	.004
Likelihood Ratio	21.974	8	.005
Linear-by-Linear Association	9.812	1	.002
N of Valid Cases	99		

a. 2 cells (11.1%) have expected count less than 5. The minimum expected count is 2.11.
b. Significant at p <0.05

In order to establish the relationship between the competence of teachers in terms of ICT and the implementation of the existing policy on digital literacy in schools, the Chi-Square test was employed. From the outcome of the Chi-Square test of independence, it is clear that the relationship between the competence of teachers in terms of ICT and the implementation of the existing policy on digital literacy in schools is statistically significant at P-value .005 (value = 22.385, degrees of freedom = 8). This value is less than 0.05 and thus indicates significance. Moreover, Likelihood Ratio (value = 21.974, degrees of freedom = 8) and Linear by Linear Association (value = 9.812, degrees of freedom = 1) also show significance at .005 and .002 respectively, indicating a positive linear trend. The findings indicate that teachers who possess higher skills in the use of ICT aids are bound to execute the policy regarding digital literacy effectively. Therefore, the proficiency in the use of ICT aids can be viewed as a direct tool that supports policy implementation. Out of the total number of cells, only those which are below 5 (2 cells constitute 11.1%) are not a cause of concern, which further strengthens the reliability of the results. Therefore, the overall findings clearly indicate that teachers' proficiency in the use of ICT aids has the potential to improve the policy regarding digital literacy. In comparison, Omutange (2025) to investigate the use of ICT in learning institutions and the regression analysis ($R^2 = .37$, $p < .05$), found that despite the policies guiding the integration of ICT in the country and institutions being effective for its adoption, teachers' ICT literacy was inadequate to facilitate effective learner-centered and CBE-based pedagogical practices.

The study also did a chi square test to establish the extent at which ICT aids were being used in teaching and learning in classrooms that could indicate implementation of digital literacy policy by teachers. This was done in relation to question two table 16 and the results were as in Table 26 below.

Table 26: *Chi-Square on Observable Digital Policy Implementation*

	Value	df	Asymptotic Significance (2-sided)
Pearson Chi-Square	38.721a	25	.045
Likelihood Ratio	36.982	25	.038
Linear-by-Linear Association	10.214	1	.001
N of Valid Cases	99		

a. 5cells (10.0%) have expected count less than 5. The minimum expected count is 2.14.
b. Significant at p <0.05

Table 26 Chi-Square test results indicates that teachers' observable practices and implementation of the digital literacy policy are significantly associated. Pearson Chi-Square = 38.721 (25 df, p = 0.045) < 0.05 means observed distribution differs significantly from what would be expected under the null hypothesis. Also, the result revealed a significant relationship in the Likelihood Ratio (36.982, p = 0.038). On top of all, Linear-by-Linear Association (=10.214, p = 0.001) further showed significant trend where the increased observable use of the digital tool is supporting a better likelihood of successful implementation of the policies. The results provide evidence that teachers' practical engagement with the ICT aids is positively associated with successful implementation of the digital literacy policy. As only 10% of cells had expected counts less than 5, the test result is reliable, where minimum expected count of 2.14 for Chi-Square analysis is within acceptable limits.

Ioannou and Papadopoulos (2021 examined the factors influencing ICT adoption within learning settings where from the use of a regression analysis method, the outcome was consistent with the assertion of limited time to develop new learning skills, usage of outdated ICT equipment, too many students within a classroom, insufficient computers per student, and

insufficient technical and pedagogical support as they significantly influenced teacher self-confidence and competency in utilizing ICT ($\beta = .42$, $p < .05$). The study revealed a link between teacher collaboration and mentoring as a fundamental tool for ICT implementation within CBE settings.

CHAPTER FIVE

SUMMARY, CONCLUSIONS AND RECOMMENDATIONS

5.1 Introduction

This chapter provides a synopsis of the research, findings, suggestions, and recommendations for further study.

5.2 Summary of the Findings

This chapter presents a summary of the findings of the study on the readiness of teachers in public primary schools in Kajiado North Sub-County, Kenya, for the implementation of the ICT education policy. The study was guided by five research questions focusing on teachers' ICT expertise, ICT professional training, the extent of ICT policy implementation, challenges affecting implementation, and possible solutions to the identified challenges.

The study focused on public primary school teachers because they play a critical role in preparing learners to participate effectively in an increasingly technology-oriented society. Teachers are expected to facilitate the integration of ICT into teaching and learning and to equip learners with the knowledge and skills required in a knowledge-based economy. Although the Government of Kenya has invested substantial resources in ICT integration in education, previous studies have identified several challenges affecting its implementation, including inadequate teacher preparedness, limited infrastructure, insufficient training, and inadequate technical support.

The study specifically focused on Kajiado North Sub-County because, despite being a metropolitan sub-county, it is also home to an indigenous pastoralist community. Furthermore, the literature reviewed indicated that teacher preparedness for ICT integration had been

examined in various counties in Kenya, but limited attention had been given to Kajiado North Sub-County. The study therefore sought to generate empirical evidence on teachers' readiness to implement ICT policy in public primary schools within the sub-county.

5.2 Summary of Findings Based on the Research Questions

5.2.1 Teachers' ICT Expertise

The first research question sought to establish the level of ICT expertise possessed by public primary school teachers in Kajiado North Sub-County for the implementation of ICT policy in teaching and learning. The findings established that teachers' ICT expertise was generally limited. Teachers reported varying levels of competence in the use of different ICT tools and applications. The highest mean score was 2.14, with respondents rating their expertise as fair in areas such as spreadsheets, presentation software, and graphic software. The findings suggest that although teachers possessed some basic ICT skills, their level of expertise was not sufficient for the effective integration of ICT into classroom teaching and learning.

The findings further indicated that teachers' ICT competence was largely concentrated on basic computer-related activities rather than on the pedagogical integration of ICT into classroom instruction. This limited expertise affected the frequency and effectiveness with which teachers used ICT tools during teaching and learning.

5.2.2 ICT Professional Training Received by Teachers

The second research question sought to establish the nature and adequacy of ICT professional training received by teachers in relation to the use of ICT tools in teaching and learning. The findings revealed that teachers had acquired ICT knowledge through school-based workshops and personal initiatives. However, the training received was inadequate for enabling teachers to effectively integrate ICT into classroom teaching and learning. Some teachers

indicated that the training they received mainly addressed immediate administrative requirements, such as completing TPAD forms online, rather than developing pedagogical ICT competencies.

The findings showed that the basic competence level recorded the highest mean score of 2.60, followed by the limited competence level, which recorded a mean score of 1.86. These results indicated that teachers' ICT competence remained inadequate. This finding was consistent with the reported frequency of ICT use in teaching and learning, where teachers indicated that they used ICT sometimes or never. The study also established that some teachers expressed a need for further training, particularly training focusing on the pedagogical use of ICT in teaching and learning. The majority of head teachers similarly reported that government-provided ICT training had been insufficient to equip teachers with the competencies required to effectively use various ICT tools in classroom instruction.

5.2.3 Extent of Implementation of the ICT Education Policy

The third research question sought to establish the extent to which the ICT education policy was being implemented by public primary school teachers in Kajiado North Sub-County. The findings established that the ICT education policy was not clearly articulated or adequately operationalized in several areas relevant to teaching and learning. These areas included ICT teacher training, follow-up and mentorship, and the use of ICT in classroom instruction. The study further established that there was inadequate policy guidance on learners' responsibilities when using ICT for learning and on school-level policies relating to innovation. This created uncertainty regarding the roles and responsibilities of teachers, learners, and school administrators in the implementation of ICT policy.

The findings from the head teachers and the Sub-County Education Office supported this observation. Specifically, 83.3% (10) of the 12 head teachers reported that they had not received an ICT policy document from the Ministry of Education providing guidance on the use of ICT in teaching and learning. Similarly, the Sub-County Education Officer reported that the office had not received an ICT policy document specifically addressing ICT instruction and education in public primary schools. The findings therefore indicate that the implementation of ICT education policy was constrained not only by teachers' preparedness but also by inadequate policy dissemination, guidance, follow-up, and mentorship at the school level.

5.2.4 Challenges Affecting the Implementation of ICT Policy

The fourth research question sought to identify the challenges faced by teachers in implementing ICT policy in teaching and learning. The findings revealed several challenges that constrained effective ICT implementation in public primary schools. These included inadequate technical support, limited time, insufficient knowledge and skills in the use of ICT tools, inadequate software for different subject areas, insufficient ICT devices for learners, lack of electricity, inadequate internet connectivity and Wi-Fi, and unclear ICT policy guidelines. Lack of technical support was identified as an important challenge because teachers and schools experienced difficulties when ICT equipment malfunctioned or when teachers required assistance in using ICT tools. Similarly, inadequate knowledge and skills limited teachers' ability to select and effectively use ICT resources for different teaching and learning activities.

Infrastructure-related challenges, particularly inadequate electricity and internet connectivity, also affected the effective use of ICT in schools. The inadequacy of subject-specific software and ICT devices further limited opportunities for teachers and learners to use technology effectively in the classroom. The findings demonstrate that the challenges affecting

ICT policy implementation were both teacher-related and institutional. They included limitations in teachers' competencies as well as deficiencies in infrastructure, equipment, technical support, and policy guidance.

5.2.5 Possible Solutions to the Challenges Affecting ICT Policy Implementation

The fifth research question sought to establish possible solutions to the challenges experienced by teachers in implementing ICT policy in teaching and learning. The findings identified several measures that could support improved ICT policy implementation. Teachers recommended that the government provide adequate technical support by deploying technicians to schools to assist with the maintenance and repair of ICT equipment. They also recommended the establishment of ICT mentorship programs through which teachers could receive continuous guidance and assistance when experiencing difficulties in integrating ICT into teaching and learning.

The participants further recommended that head teachers facilitate regular follow-up activities and refresher ICT training for teachers. Continuous professional development was considered necessary to strengthen teachers' competence and confidence in using ICT for pedagogical purposes. Regarding infrastructure, the participants recommended that the government ensure that schools have adequate electricity and, where connection to the national electricity grid is not possible, provide appropriate alternative sources of energy. They also recommended the provision of reliable internet connectivity to schools to facilitate access to digital learning resources. Teachers further recommended the provision of adequate and appropriate ICT devices and software capable of supporting different subjects and curriculum content. These interventions were considered necessary for creating an enabling environment for effective ICT integration in teaching and learning.

5.3 Overall Summary of the Findings

The findings established that teachers in public primary junior schools in Kajiado North Sub-County were not adequately prepared to implement ICT policy effectively in teaching and learning. Although teachers possessed basic ICT knowledge acquired through school-based workshops and personal initiatives, their level of ICT expertise and pedagogical competence was limited. The findings further established that the ICT professional training provided to teachers had not adequately addressed the pedagogical integration of ICT into classroom teaching and learning. Much of the training focused on basic or administrative ICT applications, while teachers expressed a need for continuous professional development focusing on the effective use of ICT in instruction.

The study also found that the implementation of ICT education policy was affected by inadequate dissemination and operationalization of policy guidelines. The absence of clear policy documents, limited follow-up and mentorship, and inadequate guidance on the roles of teachers and learners created challenges for effective policy implementation. In addition, the study identified infrastructure and institutional challenges, including inadequate technical support, insufficient ICT devices and software, limited electricity supply, inadequate internet connectivity, insufficient time, and limited teacher competence. These challenges were interconnected and collectively affected the effective integration of ICT into teaching and learning.

The findings suggest that improving ICT implementation in public primary schools requires a comprehensive approach involving continuous teacher professional development, adequate ICT infrastructure and equipment, reliable electricity and internet connectivity,

appropriate digital learning resources, technical support, mentorship, and clear policy guidelines. Strengthening these areas would provide teachers with the necessary support and capacity to integrate ICT more effectively into teaching and learning in Kajiado North Sub-County.

5.3 Conclusions

Based on the findings of the study, the following conclusions were drawn in relation to the five research questions.

5.3.1 Teachers' ICT Expertise

The first research question sought to establish the level of ICT expertise possessed by public primary school teachers for the implementation of ICT policy in teaching and learning in Kajiado North Sub-County. The study concluded that most teachers possessed basic knowledge and skills in the use of ICT tools. Although teachers had some awareness and experience in using ICT tools, their level of expertise was generally insufficient to enable them to confidently and competently integrate ICT into classroom teaching and learning. The findings indicated that teachers' competence was particularly limited in the use of applications such as spreadsheets, presentation software, and graphic software. Consequently, the limited level of ICT expertise constrained teachers' ability to effectively integrate ICT into the delivery of curriculum content.

5.3.2 ICT Professional Training Received by Teachers

The second research question sought to establish whether public primary school teachers had received ICT professional training in the use of ICT tools for teaching and learning. The study concluded that, although teachers had received some form of ICT training through school-based workshops and personal initiatives, the training was inadequate to equip them with the competencies required to effectively implement the digital literacy policy in their classrooms.

The teachers' competence was predominantly rated at the basic level, while their reported frequency of using ICT tools in teaching and learning was generally sometimes or seldom. The findings therefore suggest that the professional training provided had not adequately addressed the pedagogical integration of ICT into classroom teaching and learning. In relation to the Technological Pedagogical Content Knowledge (TPACK) framework, the findings suggest that the training received did not sufficiently develop the integration of technological knowledge with pedagogical and content knowledge. The limited duration and scope of some of the training programs may have contributed to the inadequate development of teachers' ICT competencies. The study therefore concludes that ICT professional development needs to move beyond basic computer literacy and administrative applications towards sustained, pedagogically oriented training.

5.3.3 Implementation of the ICT Education Policy

The third research question sought to establish the extent to which the ICT education policy was being implemented by public primary school teachers in Kajiado North Sub-County. The study concluded that the ICT education policy was not sufficiently clear, disseminated, or operationalized at the school level. The findings showed that teachers and school administrators lacked adequate guidance on important aspects of ICT implementation, including teacher professional development, the duration and content of ICT training, follow-up and mentorship, and the integration of ICT into classroom teaching and learning.

The study also established that most schools did not have clearly articulated school-level policies or guidelines governing the use of ICT tools in teaching and learning. There was also limited evidence of structured engagement between education managers, school administrators, and teachers concerning ICT integration. Furthermore, the findings indicated inadequate policy

guidance on preparing learners to use ICT tools effectively and responsibly in learning. There was also limited evidence of scheduled opportunities for teachers to collaborate, develop and evaluate ICT-based instructional resources, share experiences, and promote innovation in teaching and learning. The study therefore concludes that the implementation of ICT education policy in public primary schools in Kajiado North Sub-County was constrained by inadequate policy clarity, dissemination, operational guidance, follow-up, and mentorship. Although ICT-related provisions are contained in various national policy and strategic documents, the findings suggest that the provisions were not sufficiently translated into clear and practical school-level implementation guidelines.

5.3.4 Challenges Affecting the Implementation of the Digital Literacy Program

The fourth research question sought to establish the challenges faced by teachers in implementing the digital literacy program in public primary schools in Kajiado North Sub-County. The study concluded that teachers faced several significant challenges that constrained the effective implementation of digital learning. Time constraints were the most frequently reported challenge, with 81% (81) of the teachers identifying time as an important constraint. The movement of learners between classrooms and digital learning rooms was identified by participants as one factor contributing to time constraints. This made ICT-supported lessons more demanding to organize and, in some cases, encouraged teachers to rely on traditional teaching methods.

Lack of internet connectivity was the second most frequently reported challenge, identified by 79% (79) of the participants. Unclear ICT policy was reported by 78% (78) of the participants, while lack of ICT skills and knowledge was identified by 75% (75) of the participants. Other challenges identified included inadequate technical support, insufficient ICT

devices and software, and inadequate electricity supply. The study therefore concludes that the challenges affecting digital literacy implementation were multifaceted and included time, infrastructure, teacher competence, technical support, and policy-related challenges. Addressing these challenges requires coordinated interventions by the national government, county government, education managers, school administrators, and other relevant stakeholders.

5.3.5 Possible Solutions to the Challenges Affecting ICT Implementation

The fifth research question sought to identify possible solutions to the challenges experienced by teachers in implementing ICT policy in teaching and learning. The study concluded that effective implementation of ICT policy requires continuous professional development, adequate ICT infrastructure, reliable internet connectivity, sufficient ICT devices and appropriate digital learning resources, technical support, and clear implementation guidelines.

Teachers emphasized the need for practical and continuous ICT training focusing on pedagogical integration rather than training limited to basic ICT skills or administrative functions. They also recommended the provision of technical personnel and ICT mentors who could support teachers and schools in addressing technical problems and improving ICT integration. The study further concluded that adequate electricity and reliable internet connectivity are essential for sustainable digital learning. The provision of sufficient ICT devices and appropriate software was also identified as necessary to ensure that both teachers and learners have meaningful opportunities to use technology in teaching and learning.

5.4 Recommendations

Based on the findings and conclusions of the study, the following recommendations are made to the relevant stakeholders.

5.4.1 Recommendation to the National and County Governments

The national government, in collaboration with the county government and relevant education agencies, should provide continuous and adequately structured ICT professional development programs for public primary school teachers. The training should move beyond basic computer literacy and administrative applications and focus on the pedagogical integration of ICT into different subjects and curriculum areas. The training programs should be sufficiently long, practical, and continuous to enable teachers to develop and sustain the competencies required for effective ICT-supported teaching and learning.

5.4.2 Provision of Adequate ICT Infrastructure and Devices

The national and county governments should ensure that public primary schools in Kajiado North Sub-County are adequately equipped with appropriate ICT devices and digital learning resources. The distribution of ICT devices should take into account the number of learners in each school to promote equitable access and meaningful use of the available technology. The study found that some schools had inadequate ICT devices, with participants reporting ratios such as one tablet for approximately 13 learners. Adequate provision of devices would increase opportunities for learners to interact directly with digital learning resources.

5.4.3 Improvement of Internet Connectivity

The government should ensure reliable internet connectivity in public primary schools in Kajiado North Sub-County. Schools should be provided with reliable wireless internet infrastructure that enables teachers and learners to access online educational resources and digital learning platforms. Reliable connectivity would also support teachers in accessing teaching resources, professional development opportunities, and other digital materials relevant to curriculum delivery.

5.4.4 Provision of Electricity and Alternative Energy Sources

The government should ensure that all public primary schools have reliable electricity to support the effective and continuous use of ICT in teaching and learning. Schools that cannot readily access the national electricity grid should be considered for appropriate alternative energy solutions, such as solar power. Reliable energy would reduce interruptions to digital learning and improve the sustainability of ICT infrastructure already provided to schools.

5.4.5 Provision of Technical Support and Mentorship

The Ministry of Education and other relevant government agencies should establish mechanisms for providing technical support to schools. Schools should have access to qualified ICT technicians who can assist with the maintenance and repair of ICT equipment. In addition, an ICT mentorship program should be established to provide teachers with continuous pedagogical support. ICT mentors could assist teachers in planning ICT-supported lessons, selecting appropriate digital resources, addressing challenges encountered during implementation, and sharing effective practices.

5.4.6 Clarification and Dissemination of ICT Policy

The Ministry of Education should provide clear and accessible ICT policy implementation guidelines to schools. These guidelines should clearly specify expectations regarding teacher training, ICT use in teaching and learning, learner responsibilities, school-level ICT policies, mentorship, monitoring, evaluation, and innovation. The policy guidelines should be effectively disseminated to education officers, head teachers, and teachers to ensure that all stakeholders have a common understanding of their roles and responsibilities in implementing ICT policy.

5.4.7 Strengthening School-Level ICT Planning

Head teachers should develop and implement school-level ICT plans and guidelines aligned with national education policy. Schools should establish opportunities for teachers to collaborate, share experiences, prepare digital instructional resources, evaluate ICT-supported teaching practices, and develop innovations in teaching and learning. Such collaborative practices would help teachers move from individual experimentation with ICT towards more systematic and sustainable integration of technology into classroom practice.

5.4.8 Monitoring and Follow-Up

Education officers and school administrators should strengthen monitoring and follow-up mechanisms for ICT implementation. Regular school visits, teacher support, mentorship, and refresher training should be incorporated into ICT implementation programs. Monitoring should focus not only on the availability of ICT equipment but also on how effectively teachers and learners are using the available technology to support teaching and learning.

5.5 Suggestions for Further Study

Based on the findings of the study, the following areas are suggested for further research:

- A study should be conducted on the implementation of the digital literacy program in public primary schools in other metropolitan sub-counties in Kajiado County and in other counties with similar socio-economic, cultural, and geographical characteristics.
- Further research should examine the role and contribution of education supervisors in the implementation of the digital literacy program in public primary schools in Kajiado County.

- A study should be conducted to examine the contribution of County ICT Offices to the implementation of digital literacy programs in public primary schools in Kajiado County and other counties in Kenya.
- Further research could examine the effectiveness of ICT professional development programs in developing teachers' technological, pedagogical, and content knowledge for ICT integration in primary school teaching.
- A comparative study could be conducted to examine ICT policy implementation in schools with different levels of access to electricity, internet connectivity, ICT devices, and technical support.
- Further research could investigate learners' experiences and perceptions regarding the use of ICT in teaching and learning in public primary schools in Kajiado North Sub-County.

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APPENDICES

Appendix I:

QUESTIONNAIRE FOR PUBLIC JUNIOR SCHOOL TEACHERS

AN INQUIRY INTO PUBLIC JUNIOR SCHOOL TEACHERS' PREPAREDNESS IN IMPLEMENTING ICT POLICY IN USING TABLETS TO ENHANCE EFFECTIVE LEARNING

Dear Participant,

I am a postgraduate student at the Catholic University of Eastern Africa. I am undertaking a study on public junior school teachers' preparedness in implementation of information communication and education policy in using ICT aides in learning to enhance effective learning. The study is in partial fulfillment for the award of a Doctoral degree at the aforementioned university. I kindly request you to answer the questionnaire with utmost honesty and sincerity. Your responses will be used for this study only and your identity will be held with utmost confidentiality.

Instructions: Please tick ( ) in front of the most appropriate response and where comments are required, use the spaces provided.

Section A: Demographic Information.

1. Indicate your age bracket

   Below 20 years [ ] 21 – 25 years [ ] 26 – 30 years [ ] 31 – 35 years [ ]

   36 – 40 years [ ] Over 40 years [ ]

2. Indicate your highest professional qualification.

   P1 [ ] DIP [ ] PGDE [ ] B.Ed [ ] MA [ ] PhD [ ]

   Others (specify) …….

3. Indicate your teaching experience

1 – 5 years [ ] 6 – 10 years [ ] 11 – 15 years [ ] 16 – 20 years [ ] Over 20 years [ ]

4. Indicate your ICT aide experience

1 – 5 years [ ] 6 – 10 years [ ] 11 – 15 years [ ] 6 – 20 years [ ] Over 20 years [ ]

Section B: Teacher Expertise in Using ICT (Put a tick only on a column that rates you)

5. How would you rate your expertise on the following?

Statement	**Excellent**	**Very Good**	**Good**	**Fair**	**Poor**
Use of spreadsheet					
Use of presentation software					
Use graphics software					
Knowledge in trouble shooting					
Use of internet effectively and efficiently to search for information					
Evaluation of reliability and credibility on online sources of information					
Knowledge of ethical and legal issue surrounding access to and use of digital information					

Section C: Teachers' ICT Professional trainings in the use of ICTs Aides (Tick only one answer. In the blank spaces, give your answer in brief)

6. Are you trained in ICT usage in learning?

   Yes [ ] No [ ]

7. If yes in (7) above, where did you receive your training?

   Commercial college [ ] School organized [ ] TTC/University [ ] Self-taught [ ]

   Others (specify)…….

8. What level of training did you receive?

   Computer packages [ ] Certificate level [ ] Diploma [ ] Degree [ ]

   Others (specify)……..

9. How long was the training;

   Several weeks [ ] Some months [ ] One year [ ] More than one year [ ]

10. How relevant can you rate the ICT training in terms of equipping you with knowledge and skills on lesson planning, lesson delivery, class monitoring and evaluation, etc. using ICT tools?

    Very relevant [ ] Relevant [ ] Slightly relevant [ ] Not relevant [ ]

11. How would you rate your ability in the following ICT competencies? (Put **a tick in the column where appropriate**)

COMPETENCE	Expert	Advanced	Proficient	Basic	Limited
Connect computer cables to electricityand switch ON or OFF a computer					
Open, close, save and rename a file					
Search online for educational reference materials					
Use the internet for e-mailing other teachers, parents and pupils on issues related to teaching and learning					
Scan for viruses and fix basic faults(trouble shoot)					
Use Word Processor e.g., MS Word totype lesson notes, exam etc.					
Use Spreadsheets e.g., MS Excel to perform Arithmetical calculations andplot graphs					
Use databases e.g., Access to store pupils personal and performance records					
Use any software for classroom presentation					

(**Put a tick for an appropriate answer and provide an answer in brief on the provided spaces)**

12. Have you used any educational software during your teaching-learning process?

Yes [ ] No [ ]

If yes, name them

……
…… ……...

……

……

In addition, please indicate the frequency of use:

Always [ ] Often [ ] Sometimes [ ] Seldom [ ] Never [ ]

13. How would you evaluate the contribution of knowledge on educational software which you were taught for your own personal improvement and your development as a teacher?

Very Positive [ ] Positive [ ] Indifferently [ ] Negative [ ] Very Negative [ ]

14. Specify other initiatives your school has taken towards the use of ICT aides in teaching and learning?

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15. If you were given the opportunity to attend a similar training course in the future, which specific area would you prefer more emphasis to be given?

Areas to be Emphasized	**Tick where appropriate**
Pedagogical use of ICT	
The same course you were trained	
Programming	
Use of operating systems	
Use of specific software	
Multimedia	
Telecommunication	
The acquisition of specialized dexterities inICT (e.g., website development)	
Others (please specify)	

Section D: ICT use in learning (Put a tick where appropriate)

16. Occasions of ICT aides usage in classrooms by teachers

Item	Very Often	Often	Sometimes	Seldom	Never
Teaching-learning specific subject content					
Teaching learners on ICT aide skills					
Finding and accessing information and educational materials Online					
Preparing lessons					
Making class presentations					
Giving instructions to learners					
Monitoring and evaluating learners' progress performance					
Preparing class reports					

Section E: ICT policy on use of ICT aides in learning

	Tick Yes or No	
Existing strategy	**Yes**	**No**
A specific policy for a teacher to undergo in ICT professional development training		
Presence of a Policy on follow ups and mentorship on using tablets in teaching and learning		
School's own written statement on the use of tablets in learning		
A policy to use tablet in teaching and learning in specific subjects		
Regular discussion with teachers on the use of tablets for pedagogical purposes		
A specific policy /program to prepare pupils for responsible behavior while handling tablets		
Scheduled time for teachers to meet to share, monitor and evaluate or prepare instructional materials and approaches		
An official policy statement about innovation within the school in teaching and learning		

Section F: Obstacles Faced by the Teachers in using ICT aides in learning

17. **Tick YES OR NO** in any of the following challenges teachers face when using ICT aides in learning.

Item	**Yes**	**No**
Lack of technical support		
Lack of enough time in school		
Lack of knowledge on how to make full use of tablet in learning process		
Inadequate software that cover different subject content		
There is insufficient tablets for learners		

What are other possible challenges you face in using ICT aides in learning that are not mentioned above?

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18. What possible recommendations would you make towards increasing the preparedness of teachers in using ICT aides in learning in public junior schools in Kajiado North-Sub County?

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THANK YOU

APPENDIX II:

AN INTERVIEW GUIDE FOR PUBLIC PRIMARY SCHOOL HEADTEACHERS

An investigation into public primary school teachers' preparedness in implementation of information communication and education policy in using ICT aides in learning to enhance effective learning

Section A: Demographic Information.

1. What is your age bracket?

   Below 20 years [ ] 21 – 25 years [ ] 26 – 30 years [ ] 31 – 35 years [ ]

   36 – 40 years [ ] Over 40 years [ ]

2. What is your highest professional qualification **(arranger in ascending or descending order)**

   PhD [ ] PGDE [ ] MA [ ] DIP [ ] B.Ed [ ] P1 [ ]

   Others (specify) …….

3. How long have you been in the teaching profession?

   1 – 5 years [ ] 6 – 10 years [ ] 11 – 15 years [ ] 16 – 20 years [ ] Over 20 years [ ]

4. Have ever used any ICT aide Yes ( ) No ( ). If yes, for how long?

   1 – 5 years [ ] 6 – 10 years [ ] 11 – 15 years [ ] 16 – 20 years [ ] Over 20 years [ ]

Section B: ICT expertise of Teachers

5. How many teachers are there in your school? How many of these teachers are trained in ICT aide skills?

6. What is the expertise possessed by teachers using ICT aides in their classrooms in relation to: switching on and off, giving instructions, content presentations, lesson preparations, analyzing assessments, keeping records of work, monitoring and evaluation of learners, etc.

7. Which Software do they mostly use in their presentation? (probe on spreadsheet, presentation software, graphics, others)

8. ICT aides maintenance (do the teacher do it alone or ask for assistance and how long does it take to have it done and during the time what happens to the learning process, etc)

9. Access to the internet (probe on access to internet information in terms of availability of ICT facilities such as smart boards, smart TV, computers, etc, access to internet, its efficient andeffectiveness, its effects on teaching and learning process,)

10. What ICT aides are equipped in your school (probe on: types of ICT aides, the number andthe rate of use).

Section C: ICT Professional training teachers have received.

11. Have your teachers attended any ICT courses? (Probe: - by who, where, what were they comprised of, for how long and the effectiveness of the training, etc)

12. How would you evaluate the contribution of the training your teachers received towards their performance in learning using ICT aides (Probe on: - effectiveness in lesson plans, subject content presentation, tracking learners' progress, class management, instructions and general performance of learners, etc.)

13. What strategy is in place as far as the use of ICT aides in learning is concerned? (Areas to probe: (policy on teacher ICT professional development training, training follow-ups and mentorship, policy on using of ICT aides in learning as far as subjects are concerned, ways in which the tablets are used, future plans on tablet use in learning in the school)

14. If you were given the opportunity to have your teachers attend an ICT training course in the future, which specific area would you prefer more emphasis to be given?

15. What are possible challenges your teachers are facing in using ICT aides in their classrooms?

THANK YOU

APPENDIX III:

AN INTERVIEW FOR KAJIADO NORTH SUB-COUNTY EDUCATION OFFICER

An investigation into public primary school teachers' preparedness in implementation of information communication and education policy in classrooms

Section A: Demographic Information.

1. What is your age bracket?

   Below 20 years [ ] 21 – 25 years [ ] 26 – 30 years [ ] 33 – 35 years [ ]

   36 – 40 years [ ] Over 40 years [ ]

2. What is your highest professional qualification

   PhD [ ] PGDE [ ] MA [ ] DIP [ ] B.Ed [ ] P1 [ ]

   Others (specify) …….

3. What is your supervisory experience

   1 – 5 years [ ] 6 – 10 years [ ] 11 – 15 years [ ] 16 – 20 years [ ] Over 20 years [ ]

4. Have you ever used ICT aide? Yes ( ) No ( ). If yes, for how long

   1 – 5 years [ ] 6 – 10 years [ ] 11 – 15 years [ ] 16 – 20 years [ ] Over 20 years [ ]

Section B: ICT expertise for teachers

5. What is the expected expertise to be possessed by teachers to use ICT aide (tablet) in their schools in relation to giving instructions, content presentations, lesson preparations, analyzing assessments, keeping records of work, monitoring and evaluation of learners, etc.

6. What Software must a teacher be an expert in? (probe on spreadsheet, presentation software, graphics, others)

7. ICT aides maintenance (do the teacher do it alone or ask for assistance and how long does it take to have it done, etc)

8. Are public junior schools equipped with internet facilities? (probe on: - Public junior schools with access to internet, efficient and effectiveness of ICT aides usage in those schools, its current effects on teaching and learning in schools, etc)

Section C: ICT Professional Training for Teachers and Policy.

9. What ICT courses have been offered to teachers in readiness to use ICT ide(s) as a learning tool? (Probe: - by who, where, what were they comprised of, for how long and the effectiveness of the training, etc)

10. What strategy is in place as far as the use of ICT aides in learning is concerned? (Areas to probe: (policy on teacher ICT professional development training, training follow-ups and mentorship, policy on using of tablets in learning in schools, monitoring and evaluation on ICT aides use in schools, future plans on tablet use in learning in schools in the sub county)

11. What measures have been put in place by the sub-county education office to curb challenges that may arise in schools as a result of using ICT aides in learning?

12. What ICT training courses have been organized by the government for the teachers in the future? Given opportunity which specific area would you prefer to be emphasized?

THANK YOU.

APPENDIX IV:

AN INTERVIEW GUIDE FOR KAJIADO NORTH SUB-COUNTY TSC OFFICER

An investigation into public primary school teachers' preparedness in implementation of digital literacy policy in classrooms

Section A: Demographic Information.

1. What is your age bracket

   Below 20 years [ ] 21 – 25 years [ ] 26 – 30 years [ ] 34 – 35 years [ ]

   36 – 40 years [ ] Over 40 years [ ]

2. What is your highest professional qualification

   PhD [ ] PGDE [ ] MA [ ] DIP [ ] B.Ed [ ] P1 [ ]

   Others (specify) …….

3. What is your supervisory experience

   1 – 5 years [ ] 6 – 10 years [ ] 11 – 15 years [ ] 16 – 20 years [ ] Over 20 years [ ]

4. Have you ever used ICT aide? Yes ( ) No ( ). If yes, for how long

   1 – 5 years [ ] 6 – 10 years [ ] 11 – 15 years [ ] 16 – 20 years [ ] Over 20 years [ ]

Section B: ICT expertise for teachers

5. What is the expected expertise to be possessed by teachers to use ICT aide (tablet) in their schools in relation to giving instructions, content presentations, lesson preparations, analyzing assessments, keeping records of work, monitoring and evaluation of learners, etc.

6. What Software must a teacher be an expert in? (probe on spreadsheet, presentation software, graphics, others)

Section C: ICT Professional training for teachers and policy.

7. What ICT courses have been offered to teachers in readiness to use ICT ide(s) as a learning tool? (Probe: - by who, where, what were they comprised of, for how long and the effectiveness of the training, etc)

8. What strategy is in place as far as the use of ICT aides in learning is concerned? (Areas to probe:(policy on teacher ICT professional development training, training follow-ups and mentorship, policy on using of tablets in learning in schools, monitoring and evaluation on ICT aides use in schools, future plans on tablet use in learning in schools in the sub county)

9. What measures have been put in place by the sub-county TSC office to curb challenges that may arise in schools as a result of using ICT aides in learning?

10. What ICT training courses have been organized by the government for the teachers in the future? Given opportunity which specific area would you prefer to be emphasized?

THANK YOU.