FACTORS INFLUENCING THE INTEGRATION OF ICT IN TEACHING AND LEARNING IN PUBLIC PRIMARY SCHOOLS IN KITUI WEST SUB COUNTY, KENYA

Jacinta Kathini Munyoki

A Thesis Submitted in Partial Fulfillment of the Requirements for the Award of the Degree of Master of Education in the Department of Education, School of Humanities and Social Sciences of Africa Nazarene University

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DECLARATION

I declare that this thesis is my original work that has not been presented in any other university for academic purposes.

Signed:  **Date: 12/03/2024**

Jacinta Kathini Munyoki

14S01DMED002

This thesis has been conducted under our supervision and is submitted with our approval as University supervisors.

Signed  **Date: 12/03/2024**

Dr. Eng. Boniface Njuguna Mwangi

Signed  **Date: 12/03/2024**

Dr. Lucy Kirima

Africa Nazarene University

Nairobi, Kenya

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DEDICATION

I dedicate this research project to my lovely husband, Richard Mwangi Ndung'u, who has been of great help to me both financially and emotionally. He offered all the necessary support towards my education. God bless you.

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ABSTRACT

Many experts argue that simply installing technological gadgets and infrastructure will not automatically result in ICT integration in learning until the teacher, who is a significant element in ICT integration, is addressed. This study examined teachers' attitudes, computer literacy, and the availability of resources in technology integration in public primary schools' teaching in Kitui West Sub County, Kitui County, Kenya. The objectives of the study were to establish the influence of teachers' attitudes on the integration of ICT in teaching and learning, Kitui West Sub-County; to determine the influence of teachers' computer literacy on teaching and learning, Kitui West Sub-County; and to determine the influence of availability of resources on the integration of ICT in teaching and learning in Kitui County, Kitui West Sub-County. This study's findings would help education stakeholders like teachers, parents, ministry officials, donors and sponsors to help solve the identified challenges impending proper integration of ICT into teaching and learning. The findings would also be critical in policy policy-making related to integrating ICT in schools. In theory, the study was guided by The Open System Theory model. The researcher applied a descriptive study approach targeting 81 head teachers and 730 teachers in all 81 Kitui West Sub County public primary schools. A random stratified sampling approach based on 24 head teachers and 220 teachers was employed in the study. Questionnaires and interviews from teachers and head teachers were used for data collection. Test-retest was applied to ascertain the reliability of the teachers' questionnaire. Two supervisors allocated to the researcher helped ascertain content and construct validity. The researcher used descriptive and inferential statistics for data analysis and tested the formulated null hypothesis using multiple regression analysis. These tests included averages, proportions, R-statistics, ANOVA, p-values, and coefficients. The researcher also analyzed questionnaires and the consecutive presentment made via frequencies and percentages. The findings obtained after the study would be applied in formulating more pragmatic policies that would obligate primary school teachers to demonstrate and make a periodical report on the progress of ICT integration in teaching and learning in Kitui West Sub County-Kitui County. The R-Statistics results show that the R^2 of the model was 0.0214 and the model p-value was 0.1969 which was insignificant. The results also indicated that all three factors studied positively impacted ICT integration in teaching and learning, with the availability of resources having the lowest impact at a coefficient of 0.02. It was also found that the factors had an insignificant impact on the dependent variable, as indicated by their p-values, and evaluated based on a 5% significance level. The p-values obtained were 0.1400, 0.1446 and 0.6554 for teachers' attitudes, 'computer literacy, and availability of resources, respectively. The conclusion was, therefore, that the three factors had a positive insignificant impact on the integration of ICT in teaching and learning in public primary schools in Kitui West Sub-County.

LIST OF ABBREVIATIONS/ACRONYMS

ASAL	**-**	Arid and Semi-Arid Lands
DVD	-	Digital Versatile Disk
ICT	-	Information and Communication Technology
IFMIS	-	Integrated Financial Management Information System
INSET	-	In-Service Training
IoT	-	Internet of Things
IRI	-	International Radio Instruction
KCPE	-	Kenya Certificate of Primary Education
KICD	-	Kenya Institute of Curriculum Development
KIE	-	Kenya Institute of Education
KNEC	-	Kenya National Examination Council
MDG	-	Millennium Development Goals
NGOs	-	Non-Governmental Organizations
SAGA	-	Semi-Autonomous Government Agency
SAS	-	Support Application System
SDG	-	Sustainable Development Goals
TV	-	Television
UNESCO	-	United Nations Educational Scientific and Cultural Organizations

OPERATIONAL DEFINITION OF TERMS

Government Support: In this study, government support implies the support provided by the central government in Kenya towards the integration of ICT in teaching and learning, which includes the provision of computers/laptops, supply of electricity, provision of funds for the construction of computer laboratories, training of teachers, etc.

ICT refers to all technological tools supporting management, storage, and transmission of information, such as computers and laptops.

ICT Integration: Laptops and computers are used to improve school management quality during the educational process.

Preparedness: The ability of teachers to use laptops and computers in a class setting

Resource Availability: In this study, resources mean software and hardware ICT materials, e.g., computers, keyboards, whiteboards, projectors, books, teaching aids, and resource people who/ provide learning content to the learners of ICT.

Teacher Attitudes: The teachers' preconception of using ICT when teaching

Teacher Training: The preparation of teachers by giving them the necessary knowledge and making them computer literate for efficiency in their operations.

CHAPTER ONE

INTRODUCTION AND BACKGROUND OF THE STUDY

1.1 Introduction

The introduction indicates the research basis and the problem statement. It also shows the study's purpose, objectives, hypotheses, significance, scope, delimitation, limitations, and assumptions. It also concludes with an outline of the study's theoretical and conceptual framework.

1.2 Background of the Study

Information Communication Technology (ICT) integration in learning is currently a global initiative and priority. Such a move is primal to fulfilling Sustainable development goals (SDGs) and EFA's objectives. According to Kler (2020), ICT is an approach and system applicable to boosting information sharing in a classroom setting and is paramount in boosting educational outcomes. ICT is critical in knowledge construction (UNESCO, 2019), especially by promoting a method to reexamine and reconstruct educational techniques and boost student education quality.

Teaching becomes learner-centered, rather than teacher-centered, through technology, which provides students with various engaging activities that allow them to explore and build knowledge. Because technology is adaptable, it makes it easier for teachers to use data to fulfil learning objectives and satisfy the educational requirements of all students (Groff & Mouza (2018). Many governments have started investing in ICT to improve education in schools worldwide. For example, government spending for ICT in education in the United Kingdom was £2.5 billion in 2008–09 (Raphael & Mtebe, 2017).

Also, the expenditure on ICT infrastructure in educational institutions was $6 billion and $410 million annually in 2009 in the United States and New Zealand, respectively (Teo, 2018). Africa is lagging in ICT application in education even with various strategies like investments in ICT infrastructure, equipment, and training (Groff & Mouza, 2018). Higgin (2020) concludes that the continent is left behind in ICT adoption, but it seems to be picking up the pace to integrate most of these strategies.

The Kenyan government has invested significant resources in providing ICT facilities to primary schools (Ps) to improve ICT integration in education. For example, the government plans to implement in its Vision 2030 for ICT a computer supply program for educational institutions. According to reports, 200 schools received computers in the 2012/13 fiscal year, more than 300 schools received computers in the 2010/12 fiscal year, and 145 schools received computers in the 2009 fiscal year (Muriithi, 2017). Kenya's National ICT Policy aims to provide all Kenyans with inexpensive, dependable, and accessible ICT services.

The policy provides that implementing ICT in Kenyan learning institutions will boost equity and convenience for students. In addition, it declares that it will highlight and encourage the utilization of ICT across Kenyan educational institutions to improve learning (Muriithi, 2017). ICT is essential for achieving equity, accessibility, quality, and relevance. Kenya Institute of Education (KIE) launched the Curriculum Digitization and e-Learning Strategy on September 12, 2011 (KICD, 2011). It aimed to boost e-learning in public schools and direct its implementation. The strategy lays a roadmap for how digital content such as websites, DVDs, and computers might accelerate learning in Kenyan classrooms.

Curriculum digitization for Teacher Training Colleges, Adult and Early Childhood Education, and Technical and Vocational Training Institutions is part of the concept. It also asks to distribute digital content via radio, television, mobile devices, DVDs, CDs, flash disks, and the Internet. The task group on the education sector re-positioning to the 2010 constitution saw the need ICT capability at all stages. The group also recommended the establishment of a SAGA, which would have decentralized power in the counties.

TSC developed a guide for ICT integration in teaching and learning to prepare for laptop project rollout (TSC, n.d). The technology application approach asks for the use of technological devices such as computers, laptops, and tablets to distribute digital information to all public schools. All Kenyan primary and secondary schools were urged to increase 'the application of digital tools in the classroom. The National Information, communications and Technology (ICT) policy (2019) was developed by the Ministry of ICT, and among its key objectives was to "Position the country to take advantage of emerging trends such as the shared and gig economy by enhancing our education institutions and the skills of our people, and fostering an innovation and start-up ecosystem that can lead on a global scale". The government-funded Sh.17.4 billion for the schools' laptops initiative in the 2013/14 National Budget was used to develop technological material, increase teacher capacity, and build computer labs in public schools nationwide (Business Daily, 2013).

The Kenya Institute of Curriculum Development (KICD) prepared content based on the digital framework for grades 1-3 and aimed to convert it to an inclusive platform in September 2015. The Kenyan government is also taking steps to raise the number of computers. Thus it has issued a tender for acquiring over 1 million computers for all grade one students (Kenya Government, 2020). Research shows that in most Kenyan counties, including Kitui County, ICT

implementation in public schools is moving at a disorganized rate despite the government's efforts to invest and allocate considerable resources for making ICT integration strong in primary schools (Alazam & Bakar, 2017).

According to research by Robertson and Al-Zahrani (2017) and Wanga (2017), teachers' training and development in ICT can improve school effectiveness and performance output. There is a need to concentrate on the root cause of the issue rather than amassing technological tools like hubs, routers, laptops, computers, and connected peripherals. Such a move will not offer positive outcomes, but the government should solve teacher aspects that significantly impact ICT integration in schools (Afshari, 2015). According to Bikos and Tzifopoulos (2017), tutors are necessary to implement digital programs. However, the Kenyan government's ICT did not consider teachers and their skills or preparedness while making ICT available for schools. Such a move can harm its sustainability and implementation. In light of this, this study examines whether public school educators have what it takes to use ICT in teaching and learning.

1.3 Statement of the Problem

The Kenyan government has adopted various methods to increase ICT integration in schools. These initiatives aim to offer proper and quality education. The government uses various methods, such as laptop distribution programs for class one, computer delivery to schools (GoK, 2015), and digital content provision (KICD, 2013). KICD, Longhorn, and the KLB have also put much effort and money in developing and disseminating digital content for public primary school classes 1-3.

However, there are still deficiencies in the integration of ICT in public primary schools. This should not be misconstrued as a lack of ICT capabilities in teacher preparation and training in

these countries. Yamamoto and Yamaguchi (2016) found that most African teacher studies focus on the abilities required for ICT integration in various courses. In these studies, preparation and training of these abilities are advised as one of the approaches to mitigate these issues, as well as full ICT integration in education. The issue has not been recently researched in Kitui, and the gaps to fill are in providing relevant information and theory on the matter. The study seeks to provide statistical gaps and resolve issues from a lack of awareness.

Despite these efforts, research shows that ICT is still not commonly employed in Kenya's public primary schools (Robertson & Al-Zahrani (2017). According to this research, teacher factors substantially impact ICT integration, not the continuous provision of technical and ICT components in schools. Teachers are crucial in ICT incorporation since they bring all educational infrastructures to build teaching-learning environments. However, in Kenya, particularly in Kitui County, where little research has been undertaken to define the preparedness of tutors to integrate ICT in teaching-learning contexts, their preparedness is mainly unknown.

This study examined the factors that influence the ability of public primary schools in Kitui County, Kitui West Sub-County, to integrate ICT into teaching and learning in their schools. Due to a constant shortage of teaching and learning materials, inadequate staffing, insufficient ICT training for teachers, and a lack of government assistance in the instructional process, approximately 1,200 public primary schools in Kitui County are designated with low achievers status, notably standard eight candidates in the KCPE (KNEC, 2019).

In addition to being locked in computer illiteracy, an estimated 129,000 pupils in Kitui County were expected to not fulfil the SDGs by 2020 unless this trend of poor performance in KCPE and lack of ICT skills in our Kenyan teachers is fundamentally reversed (KNEC, 2019). According to

research conducted in Kenya, no clear criteria enumerate the skills and knowledge that instructors need to possess to handle ICT resources (Wachiuri, 2020). With the proven importance of ICT in attaining the SDGs, there is a need to determine factors that can limit its applicability in schools. This would help solve the challenges and bring up pupils who can facilitate the attainment of the SDGs. It would also help bridge the gap between rural and urban schools in terms of application of ICT in their learning. To "achieve this, this study would seek to answer the question: How does teachers' attitudes, teachers' computer literacy and availability of resources impact ICT integration in teaching and learning in Kitui County, Kitui West Sub-County?

1.4 Purpose of the Study

The study' aims to examine the factors that influence ICT integration in public primary schools in Kitui West Sub-County. Specifically, it would focus on teachers' attitudes, 'teachers' computer literacy, and the availability of ICT resources in public schools in Kitui West Sub-County to generate information that would invigorate key stakeholder's efforts in enhancing the ICT learning process as envisaged in Kenya Vision 2030.

1.5 Objectives of the study

i. To establish the impact of teachers' attitudes on ICT integration in teaching and learning in Kitui County, Kitui West Sub-County.

ii. To examine the impact of teachers' computer literacy on ICT integration in teaching and learning in Kitui County, Kitui West Sub-County.

iii. To determine the impact of the availability of resources on ICT integration in teaching and learning in Kitui County, Kitui West Sub-County.

1.6 Hypotheses of the Study

The following null hypotheses guided the study.

$H_0$1: Teachers' attitude has no statistically significant influence on ICT integration in teaching and learning in public primary schools in Kitui West Sub-County

$H_0$2: Teachers' level of computer literacy has no statistically significant influence on ICT integration in teaching and learning in public primary schools in Kitui West Sub-County

$H_0$3: Availability of ICT resources has no statistically significant influence on ICT integration in teaching and learning in public primary schools in Kitui West Sub-County.

1.7 Significance of the study

A study's importance is based on its benefit to others partially or as a whole (Yamamoto & Yamaguchi, 2016). This study will help many stakeholders, including the Ministry of Education (MOE), policymakers, curriculum authors, and teacher trainers, by disclosing teachers' appropriateness in integrating ICT in primary public schools. This study's findings and recommendations will help in making well-informed judgments.

The Ministry of education and the ministry in charge of ICT, would use the results of this study to align policies for ICT integration in public primary schools with the best practice. By realigning them, there is a greater possibility of success in ICT adoption, which would allow the public primary schools to reap the ICT benefits. The MOE, would also establish an effective mechanism for ICT integration in education. The study findings can be used as a reference point in integrating ICT in teaching and learning for the students interested in this area.

The study findings are essential as relations between teacher training and ICT integration may equip students with the right skills needed as they can offer the necessary ICT training. Other studies can use this research to support their arguments for ICT integration in teaching. It can also be used to identify other critical research gaps which would form a basis for further research. More importantly, the study findings might lead to more pragmatic policies that would obligate school heads to demonstrate and make periodic reports on the application of ICT in learning.

1.8 Scope of the Study

Scope in research sets the study's parameters, giving both the depth and the breadth of the project (University of Mount Olive, 2017). The researcher was based in Kitui West Sub-County in Kitui County, and data was adduced from 24 of the existing 81 public primary schools in the region. A total of 24 head teachers and 220 teachers were involved in the study.

1.9 Delimitations of the Study

A study's delimitation shows the boundaries in the research indicated by inclusionary choices and cognizant exclusionary regarding the area of interest (Simon & Goes, 2013). Although there could "be other factors influencing the integration of ICT in teaching and learning, this study was confined to the influence of teachers' attitude, computer literacy and the availability of ICT resources.

1.10 Limitations of the Study

Limitations in a study are deficiencies that can negatively affect the research and the researcher might not have control over. They narrow the extent of the research and may affect the final results (Chege, 2019). Bikos and Tzifopoulos (2017) noted that respondents dislike talking much about the negative aspects but exaggerate the positives when using a self-assessment survey.

This would have been a possible limitation in the study, but the researcher encouraged the study participants to give their best while participating in the study. The study's objectives were also explained thoroughly to ensure that the participants appreciated the need for accurate answers.

Another limitation would have been the failure of respondents to cooperate in filling the questionnaires, while others would also have failed to return questionnaires for analysis at the appropriate time. The researcher convinced the respondents to fill out the questionnaires and also assured them of the confidentiality of the information collected. There was also no identifying information collected. The researcher also produced a letter from the institution to illustrate the study's application, which is solely academic.

1.11 Assumptions of the Study

This makes up the researcher's held ideologies, which are trusted, and their proof is not tangible (Simon, 2011). These background facts that are essential to the research and form a basis for its implementation and development. The researcher assumed that primary schools experience similar environments and that the study results would be applicable beyond Kitui County to other regions with similar geographical conditions.

1.12 Theoretical Framework

According to Creswell (2018), the theoretical framework supports a theory of research explaining why the research problem being studied is present. The last five decades have witnessed extraordinary growth in the planning of primary school administrators to integrate ICT into the classroom. Preparedness aims to scheme a plan to help determine where an organization wants to go, what is required, and how to get there. The researcher used the open system theory

as the study's basis. According to Aydin (2016), an organization's environment predominantly affects it.

An open system is an organization such as a school. They take diverse inputs from the environment, convert them, and then offer the results. The organization of a school exemplifies an open social system. The school accepts pupils from the community and receives teachers and financial means to operate and teach the students. To complete the cycle, students graduate with information, skills, and a shift in attitude that they may apply to themselves and the community. The school is a social system, and many aspects of the system may be seen in the various individuals who make up the overall community (Bastedo, 2004).

1.13 Conceptual Framework

This system of variable interrelationships promotes logic in solving the research problem (Mugenda & Mugenda, 2012). The approach offers a definition and comprehension of the independent and dependent variables and, consequently their inter-relations in a move to tackle the research problem.

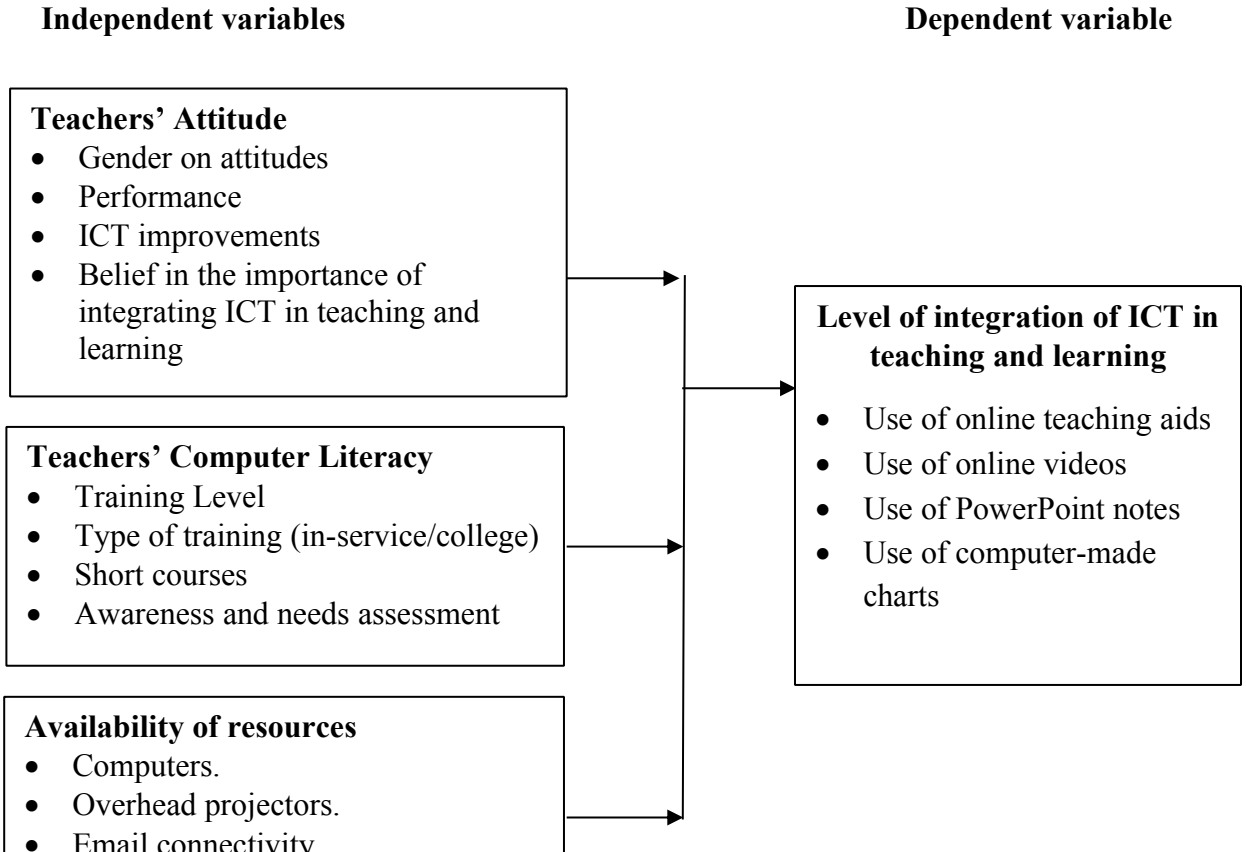


Figure 2.1 Conceptual model for improved **Level of integration of ICT in teaching and learning**

CHAPTER TWO

LITERATURE REVIEW

2.1 Introduction

The literature review shows what other researchers have done concerning the study. The chapter discusses teachers' attitudes and their impact on the integration of ICT. The study would also investigate the extent to which teachers' computer literacy affects the application of ICT in class management and government support, and how the availability of resources affects their Use of ICT in a classroom setup for learning and teaching.

2.2 Integration of ICT in Teaching and Learning

When global education standards are deteriorating, experts have claimed that incorporating ICT can assist in revitalizing both students and instructors (Chai & Lim, 2018). Interactive whiteboards, e-conferences, educational software, and education portals, among other things, increase classroom engagement, learning motivation, and general curiosity (Chain & Lim, 2018). According to The World Bank Development Report, as cited by Chuttur (2019), ICT-enabled teaching and learning have boosted knowledge acquisition and accumulation, reduced the

sensation of isolation and opened access to knowledge. Some researchers claim that using technology in education makes learning and teaching easier.

A primary justification for ICT integration in schools is to offer relevance. That is, with the rising application of technology, schools need to start preparing children at an early stage to take advantage of future opportunities. Also, there are evident challenges in using technological advancement, which necessitates including such an approach in education (Chege, 2019). Technology literacy among students and teachers and the capacity to use ICT skills efficiently and effectively to solve real-world problems and requirements are competitive advantages in today's more globalized world (Brannigan, 2017).

Another critical benefit of ICT-enabled education is that it allows it to be accessed from any location and anytime. According to Ayub and Bakar (2015), ICT can rise above time and space, allowing for real-time knowledge transfer across different regions without needing learners and instructors to be in the same place simultaneously and at any time of day. For example, via teleconferencing, ICT enables learning to be delivered in a form that may be received by various, unconstrained, and geographically scattered people simultaneously. Teachers can use modern ICT capabilities to collaborate on projects with their peers, form partnerships within a field, and establish successful intervention change techniques for their students (Alazam & Bakar, 2017).

In a world where technology has reshaped the global economy powered by technology, fueled by information, and propelled by knowledge, researchers have suggested that ICT integration in teaching and learning is necessary for the academic preparation of contemporary students (Afshari, 2015). Without a history of ICT use, Kenya has always prioritized education in its

development policies and plans, pushing it as a significant indicator and means of social and economic growth at all levels (Ayub & Bakar, 2015). MOE is tasked with education regulation.

However, such is strongly influenced and governed by government decisions and policies, and as a result, it shifts in response to socioeconomic and political trends. In light of the preceding, the MOE spearheaded several initiatives, such as ICT policies. This strategy aimed to facilitate and coordinate ICT uptake and use in education. A countrywide ICT policy adoption in the country, specifically the MOE, ensured that ICT users in education activities had a consistent framework. ICT development in the sector is now a steering committee tasked with its progression and quality assurance (Bikos & Tzifopoulos, 2017).

2.3 Review of Empirical Studies

2.3.1 Teacher's Attitudes Towards ICT Integration in Teaching and Learning

From an international perspective, Bingimlas (2019) studied the impact of teachers' perceptions on technology integration in Kazakhstan's public schools. This research used a mixed-methods approach and convenience sampling of teachers and students. According to the findings, teachers have favorable attitudes toward ICT in school administration, owing to the benefits of technology, such as remote learning and content visualization.

Another study by Agbatogun (2016) examined the elements influencing teachers' attributions regarding using ICT in education. A sample of 186 mathematics teachers was chosen randomly from a stratified cluster sample in the Malaysian state of Selangor. According to the data, teachers' perceptions of ICT application in teaching and learning were positively related (Bingimlas, 2019). On the other hand, years of negative teaching correlated with views about adopting ICT in schools.

In the Kondoa District of Tanzania, Aydin (2016) investigated teachers' attitudes toward using ICT as a necessary tool in elementary schools. Questionnaires, in addition to interviews, were used to collect data. Eighty teachers were recruited through random sampling from 10 schools during the initial data collection phase, and ten instructors were recruited through purposeful sampling from two schools during the second phase. The findings indicated that ICT is a pedagogical tool, but its incorporation in teaching was poor.

Brannigan (2017) used an African perspective in the eyes of in-service teachers and their views on ICT usage in learning. The sample size was 177 and included kindergarten to high school in-service teachers. The study used a pre-and post-test design and a significant non-randomized study group (n=85) to look for differences before and after training. The findings reveal that instructors have a good perception of ICT but that their application in the classroom is limited and subject to innovative approaches.

Chege (2019) conducted an East Africa study showing that teachers are crucial in ICT integration. As a result, teachers' dedication to using ICT determined their feelings toward applying ICT. Therefore, the same result in the mode of progress and application of the approach directly impacts the curriculum and performance. Teacher attitude is vital for proper ICT integration (Chuttur, 2019). ICT application is based on its value, relevance to the teacher, and enhancement of learning outcomes (Davis, 2018).

According to Dogan (2015), teachers' preconception impacts their acceptance of employing ICT in management learning. He deciphered that teacher perception and ICT use are linked. According to Kounenou and Roussos (2015), teachers who had a favourable opinion of ICT's ability to help them teach more effectively, provide an ideal platform for students, and improve

their performance and pedagogy were more willing to include it in their classroom. Teachers must be instructed on the application of technology and see it as a valuable tool for them and their students if they establish positive perceptions toward integrating ICT as a management technique (Mustafina, 2016).

Research on the integration of ICT in Kenyan classrooms has found that the critical factor influencing teacher adoption and usage of ICT is teacher perception of ICT. According to the research, teachers' perceptions are essential; thus, they need time to interact and familiarize themselves with the technology. According to Afshari (2015), teachers must know how to use technology to create favourable perceptions. In general, a study by Kamaruddin and Abdullah (2017) that looked into "the relationship between instructors' views and their usage of ICT" discovered many contradictions between the two.

According to the report, other factors influencing ICT adoption and use include school administration support, skills inadequacies, digital device availability, and ICT infrastructure. These aspects must be available to boost ICT delivery and integration regardless of instructors' beliefs (Kamaruddin & Abdullah, 2017). Even though the Kenyan government is committed to improving ICT integration in P.S. education by supplying schools with ICT devices and components, little is known about teachers' perceptions regarding ICT use in the classroom. Analyzing teacher decisions about ICT is critical to ensure effective IOICT in the primary curriculum.

Most of these studies were done in the pre-COVID-19 time, and it is expected that things may have changed. With greater emphasis on e-learning and other forms of ICT adoption in schools, there are possibilities that past perceptions about ICT adoption by teachers may not be the case

today. Additionally, different regions have different conditions, which may cause ICT adoption to be perceived differently. Kitui West sub-county has its own specific environment, which may play a part, making studies outside the sub-county less reliable in policy formulation there. These are some of the existing gaps that will be exploited by this study.

2.3.2 Computer Literacy and Integration of ICT in teaching and learning

Robertson and Al-Zahrani (2017) show that educational innovations and their effectiveness depend on the teachers' competence. The lack thereof was associated with negative results, which hindered or acted as obstacles to ICT progression in schools in Saudi Arabia. The quality of skills is thus directly associated with the level of ICT implementation and the impact on student achievement in the United States, Raphael and Mtebe (2017) predicted. According to their concept, educators with more incredible experience, expertise, and tools would have more technology integration in the classroom.

Yamamoto and Yamaguchi (2016) investigated the relationship between ICT abilities and classroom computer use. The researcher found that skills are essential, and those who trusted their capabilities had high confidence while using the devices. As a result, teachers should refine their skills in light of the educational goals they intend to achieve using ICT. Related findings were made by (Sanchez, 2017), who studied teachers' ICT usage when teaching math and found that technology education impacts technology use. Teachers' technology training dramatically impacts how they use ICT in their classrooms.

Ozen (2019) conducted a study with primary teachers in Turkey to look at online education for technological empowerment in ICT collaboration. The researcher used 70 school teachers from the local In-Service Training (INSET) programs for ICT assimilation into their classroom

operations during the 2007-2008 academic year semester. The data was analyzed using content analysis and continuous comparison techniques. Teachers reported increased ICT knowledge, skills, opinions, and usage of these technologies, as well as increased academic success, use of these devices, and engagement in classroom activities.

Davis (2018) investigated the elements supporting teacher skills, teacher morale, and student learning in technology-enabled classrooms. The study concluded that professional development was vital in ICT application in classrooms. The findings agree with later presumptions by Chuttur (2019). Teachers' familiarity with the technology is essential, and they should have the chance to interact with it during these programs, which boost their learning and comprehension (Chuttur, 2019). ICT application in the class is crucial for the teacher when they know what it is about and how to use it, and they can share the same and collaborate with their colleagues.

There, however, has never been optimization of ICT use, even in the international arena. This study sought to understand the reasons for this from a local perspective. It complements studies like Singhavi & Basargekar, (2019) who found that lack of time and ICT tools, even where teachers have the confidence and skills, precipitated lower ICT use in classrooms.

Regionally, a study by Ndibalema (2019) in Tanzania concluded that any effective technology program starts with high-quality professional development and ICT training. The study was also supported by Twinomujuni and Kampala (2020), who found that ICT knowledge and skills inadequacies caused poor confidence and competence in using technology in education. Teachers only deliver to students how and what is learned via their training. Therefore, teachers require proper ICT literacy through training and development, making it easy to add value to the learners using ICT.

The most necessary matter of organizing and echoing students on the application of the tools becomes worrisome as teachers are reluctant to use the tools available (Graham, Stols & Kapp, 2020). There are many places in Africa, like Keno, where teachers are equipped with the necessary and convenient tools to promote the teaching model and fail to implement them. Perception of most teachers due to a lack of ICT skills is also a problem related to the nature of the tools accruing to them (Munje & Jita, 2020). The study seeks to gather information necessary gather information to determine how the teacher's perception has marred their development. The current teachers in most institutions are between the age set of 35-55 years and are mostly averse to applying necessary technological skills as they embark on empowerment (Bariu, 2020).

Locally, Mwangi and Khatete (2017) aimed to determine the factors that influenced ICT placement in public primary schools in Kajiado North Sub-County. The target population contained 399 teachers, 14 public elementary schools, and 1,545 students. Five schools, 78 teachers, and 155 students were chosen randomly. The most common data collection tools were questionnaires. According to the findings, matching skills are essential, and training is critical for school ICT implementation. Also, poor ICT policies are undermining ICT progress in schools. Bariu (2020) found that most relevant studies have investigated the integration of technology in education systems but not specifically on how teachers and learners can properly apply ICT.

Orodho (2018) studied ICT implementation issues in Kabale District's higher education institutions. The researcher used a self-administered questionnaire administered to 60 lecturers and 173 students. Twenty administrators from the four schools were also interviewed. The majority of respondents had low ICT skills, according to the survey. Stakeholders were then encouraged to concentrate on proper equipping instead of the operational aspect to boost

teaching. Munje and Jita (2020) defined gaps in research as most of the teachers in primary and secondary schools in Africa ,especially in Kenya, lack the confidence to apply the ICT tools.

According to Wanga (2017), educators become effective in ICT based on their skill level. Wachiuri (2020) also supports these analogies by showing that training is significantly related to ICT application. Hence, because teachers are significant participants in implementation, excellent ICT training should be provided, and teachers should be given more significant consideration because they are "idols" for pupils (Wachiuri, 2020). Groff and Mouza (2018) show that Kenyan primary and secondary school teachers lack effective ICT integration abilities. This is most likely to have impacted ICT integration in Kitui West Sub-County teaching. This study would determine the current position, which would seal the knowledge gap in that area.

2.3.3 Availability of Resources and Integration of ICT in Teaching and Learning

Resources provide aid, support, and comfort when needed (Rainer, 2020). Education in Kenya needs to be rethought on the part of resource needs required to survive in the 21st-century developments. ICT has a severe lack of equipment and such needs resolution. Ndibalema (2019) argues that an ICT infrastructure, electric board, audio cassette, video/TV-learning, computer, and radio for IRI and SAS make part of essential resources. The lack of digital technology at nearly all levels of schooling is a crucial issue for this component. There is a variance in the accessibility of resources in developed and developing countries. For instance, a ratio of 15:1 in developed countries in secondary school students compared to 150:1 in Kenya's secondary schools.

For ICT integration to be successful, many skills must be acquired across the educational system. Such needs to have particular applications, integrative aspects to the curriculum, capacity to

adapt alter teaching tasks, and theoretical foundations. Teachers need to understand the reasons for ICT application and the methodological approach in its application to reduce the obstacles. Most teachers' training concerns teaching theory and not using practical courses. However, the ICT policy and E-government strategy implemented by Kenya's government are critical in laying the foundation for changing the status quo. The government recognized that it is critical to boosting ICT as it s fosters literacy and adequately prepares a relevant workforce (Ozen, 2019).

The Kenyan government has made some financial investments recently, which have been aided by other development partners to boost ICT infrastructure. Regarding technology, the foreign finance component accounts for most of the investment. The government frequently contributes support through personnel and amenities such as buildings. Under the Executive Network, the Government Information Technology Investment and Management Framework has connected all ministries to the Internet (Higgin, 2020). The government also links departments in order, which is essential in running IFMIS and IPPD.

Mwangi and Khatete (2017) surveyed 1163 teachers to learn about the challenges they face when using computers. According to the respondents to their study, the major impediments to its implementation were concerns involving computer hardware. It dealt with the constraints of computer labs and the scheduling of computer time. According to Muriithi (2017), computers should be placed in classrooms where students can easily access and use them meaningfully and pragmatically. Unstable ICT resources emphasize ICT applications that support traditional administrative and functional activities rather than effective information processing and distribution within and outside government agencies (Roussos, 2015).

According to El-Daou (2016), most schools in Kitui County had not obtained ICT gear. However, the teachers were ready for ICT to integrate their teaching (El-Daou, 2016). Kamaruddin and Abdullah (2017) state that primary schools need suitable software to boost ICT integration. Software resources are related to teachers' difficulties and potential hurdles to ICT implementation. Also, it is essential to ensure that there are no software shortages. The current study looked into the convenience of hardware and software in Kitui County schools and discovered that most schools lacked both (Raphael & Mtebe, 2017).

As Robertson and Al-Zahrani (2017) advised, the Kenyan government should proceed with caution when providing educational software to schools and consider the type of software and its availability. It should also consider the software's educational content, the digitized content scarcity relevance, and software with capabilities for extraction from school textbooks. This presumption was supported by Twinomujuni and Kampala (2020) who noted that appropriate software acquisition and maintenance is critical in ICT integration in schools.

A related study in Kitui County by Yamamoto and Yamaguchi (2016) found that most schools lacked both software and hardware resources and that teachers had a positive outlook toward incorporating ICT into the instructional process. However, there are some challenges, like the high installation cost and inflexibility due to licensing restrictions (Sanchez & Marcos, 2017). Institutions can, however, use open-source software with permission to allow access to source code, which can be modified and used for free (Teo, 2018). Open-source software is cheaper than proprietary software and provides more features. Most of the teachers, not only in Kenya but in other African nations, lack the required training (Singhavi & Basargekar, 2019).

Due to increased pressure to apply technology and students more aligned with ICT, teachers have faced challenges in their work. Most teachers have cited a lack of empowerment and alignment to ensure they have ICT knowledge (Aydin & Gürol, 2019). The use of ICT in most schools, especially public schools, is marred by a lack of support from local communities and the teacher's unpreparedness. The power of teaching with ICT has become a challenge as teachers are faced with more skill requirements to improve their use of It. Dynamics and trends that have changed the teaching model due to the rise of digital technologies further make it challenging for teachers. The improperness and lack of requisite development of teachers limited their application. The extensiveness of the obstacles further makes it hard for teachers to communicate and teach correctly.

Whereas most of the previous studies have very informative findings, they still lack in terms of their possible application in Kitui West Sub-County, as it is a particular region with its own set of challenges and strengths. The previous studies have also focused on specific areas, which leaves gaps in knowledge of how various factors are interrelated with each other in influencing a variable. This study would combine three factors, and part of the analysis is how the factors are related amongst themselves and their overall impact on ICT integration in schools.

2.4 Summary of Literature Review and Research Gaps

Bingimlas (2019) found that teachers have favorable attitudes toward ICT in school administration owing to technology's benefits, such as remote learning and content visualization. Whereas similar results had been obtained by Agbatogun (2016), a study by Aydin (2016) found that, although ICT is a pedagogical tool, its incorporation in teaching was poor. Brannigan (2017) confirmed these observations, who found that instructors have a good perception of ICT, but its application in the classroom is limited and subject to innovative approaches. Also, according to

Robertson and Al-Zahrani (2017), innovations in the educational realm and their effectiveness depend on the teachers' competence. Raphael and Mtebe (2017) implied that educators with more incredible experience, expertise, and tools would have more technology integration in the classroom. Davis (2018) found that certain factors influence teachers' computer literacy. On the aspect of access to resources for ICT intergration, Mwangi and Khaete (2017) noted that accessibility of computer labs and computer time were some challenges around ICT resource availability. According to El-Daou (2016), most schools in Kitui County had not obtained ICT gear, though teachers were ready for ICT to integrate into their teaching. This study would employ a composite approach and not only look at the availability of resources but also explore ways of improving the situation. Most of these studies were done in the pre-COVID-19 time, and it is expected that things may have changed. With greater emphasis on e-learning and other forms of ICT adoption in schools, there are possibilities that past perceptions about ICT adoption by teachers may not be the case today. Additionally, different regions have different conditions, which may cause ICT adoption to be perceived differently. Kitui West sub-county has its own specific environment, which may play a part, and, therefore, make studies outside the sub-county less reliable in policy formulation there. These are some of the existing gaps that will be exploited by this study.

CHAPTER THREE

RESEARCH METHODOLOGY

3.1 Introduction

This chapter shows how the researcher carried out the study. The methodology section outlines the research design, target population, sample size, data collection, and data analysis methodologies, which are all explained in detail in this chapter.

3.2 Research Design

A research design is a combination of methods and procedures describing variables. The research design outlines how a study's questions are answered (Mugenda & Mugenda, 2012). The researcher used the descriptive research approach, and its application was based on its ability to depict the phenomena by interviewing people about their values and perceptions. Using a descriptive study strategy allows the researcher to describe where the population come from. The

research design formed the basis for collecting, measuring, and analyzing data. As a result, the descriptive research design collects and methodically presents data to provide a clear picture of the condition under investigation. The approach also answers questions about what, where, when, and how. As a result, this design was considered appropriate for the study, which sought to determine if primary school administrators were equipped to integrate ICT into teaching and learning.

3.3 Research Site

This is where the study is carried out (Aydin, 2016). The researcher used Kitui West Sub-County, Kitui County, Kenya, as the site. The county's schools census report of 2019 (MOE, 2018) indicates that most public primary schools are in rural areas and are characterized by high population and low teacher-to-pupil ratios. ICT integration in education is one of the techniques for academic standards management and enhancement in overcrowded classes (Ismail & Kinchin, 2019). The Kitui County schools report disliked the slow progression in teachers' ICT integration in learning in the area, which led to the impetus for the proposed study.

3.4 Target Population

The target population indicates a particular set or group of individuals who possess similar features (Robertson & Al-Zahrani, 2017). The population in this research would be all public schools that are located in Kitui West Sub-County. The county 's census report for 2019 shows that 81 public primary schools exist in the region (MOE, 2018). The report further showed that there are 81 head teachers and a total of 730 teachers. The two categories of respondents were important in this study, as indicated by (Alemu, 2015). Headteachers gave information regarding the integration of ICT in management, and teachers possessed first-hand knowledge of ICT progress in the schools.

3.5 Sample and Sampling Techniques

According to Alazam and Bakar (2017), a sample is a portion of the targeted individuals the researcher considers to perform the actual study. Sampling is thus the process of choosing members from the target population. Agbatogun (2016) postulates that the researcher can sample the entire population for a small target population. Mills and Gay (2009) indicate that a researcher can use a size of 10-30 per cent, which is reliable. Therefore, 24 public primary schools, at least 30% of 81 schools, wersampled for the study.

The researcher selected the 24 schools through a stratified simple random sampling technique. The stratification would be based on zones in Kitui West Sub-County so that all areas in the Sub-County are well represented in the sample chosen. There are a total of 4 zones in Kitui West Sub County, and each zone would be represented by six head teachers and 55 teachers. The sizes chosen would ensure that the samples are at least 30% of the population, which is sufficient, as shown in Table 3.1. The researcher used interviews to collect responses from all the head teachers in the sample schools. In order to gather well-triangulated views from each school, 220 teachers were selected from all the sampled schools. The sample size distribution is depicted in Table 3.1.

Table 3.1 Distribution of the Sample Size Table

Category of Respondents	**Population**	**Sample**	**Sampling Technique**
Head Teachers	81	24	Stratified simple random sampling
Teachers	730	220	Stratified simple random

			sampling
Total	**811**	**244**	

3.6 Data Collection Measures

According to Bikos and Tzifopoulos (2017), research instruments are used to collect or gather data from the field. The data is then used to determine and solve the research questions. The researcher used a questionnaire and interviews with the head teachers to collect data from the teachers.

3.6.1. Teachers Questionnaire

A questionnaire is a quantitative tool used to collect data from the subjects based on various questions (Chuttur, 2019). The researcher prepared a semi-structured questionnaire for data collection from the teachers. The first section (section A) was used to collect demographic information on respondents' profiles, while section B sought information on how teachers are prepared to integrate ICT in educating students.

The section unearthed things like knowledge of ICT developments in the educational sector, how teachers like use of technology in classes, and whether teachers were willing to improve their ICT skills if given a chance. The questionnaires contained open-ended and closed-ended questions for optimal efficiency. The questionnaire items were structured according to the study's three objectives. The researcher also required the respondents to rate their preparedness levels for ICT integration in education.

3.6.2 Head Teachers' Interview Schedule

Using an interview schedule allowed the researcher to pose probing questions to the interviewee. It thus generates more enriching data, unlike using the questionnaire (Chege, 2019). Through the head teachers' interview schedule, the researcher aimed to gather comprehensive information on the preparedness levels of these administrators for ICT integration into teaching and learning, as well as the reasons behind such levels.

3.7 Pilot Testing of Research Instruments

Pilot testing is essential as it upholds the validity and reliability of research instruments (Alazam & Bakar, 2017). Through pilot testing, the clarity of the language, duration, layout of the tools, and the process of administering were ascertained. According to Samah (2015), 10% of the sample size is essential and enough for a pilot test. Thus, the pilot involved 3 head teachers and 22 teachers. This piloting was done in Matinyani Sub-County, which is closer to the Sub-County of study, and therefore offered an ideal evaluation of the validity and reliability of the study instruments. Random sampling was done to pick those to be involved in pilot testing. The researcher encouraged the participants to comment and suggest improvements to the various items. Therefore, the researcher used the pilot study to enhance the validity and reliability of the data collection instruments.

3.8 Validity of the Data Collection Instruments

Validity shows the correctness, meaningfulness of inferences, and soundness of the conclusions to the research findings (Chai & Lim, 2018). The researcher sought expert opinion to boost content and construct validity. The questionnaire was availed to two university supervisors before and after piloting to review the instruments' items. Before commencing data collection,

comments solicited from supervisors ere then used to enhance the validity of the research instruments.

3.9 Reliability of Data Collection Instruments

Reliability indicates the level of the research instruments to uphold consistency even after consecutive trials (Bingimlas, 2019). When a research instrument meets the criteria above, then it is said to be reliable. It can be used severally similar outcomes irrespective of the environmental setup. The researcher used the test-retest technique to measure the reliability of teachers' questionnaires. The questionnaire was administered to the respondents during pilot testing after two weeks. The researcher then used the Pearson Product-Moments correlation method to correlate the data from the two sets of questionnaires, which was determined to be 0.78. The researcher gauged using a reliability coefficient of 0.7 and found the questionnaire reliable, in line with Alazam & Bakar's (2017) assertion that such is sufficient.

3.10 Data Collection Procedures

The researcher secured an introduction letter from Africa Nazarene University. The introduction letter was crucial in aiding the research in gaining a research permit from the National Council for Science and Technology and Innovation (NACOSTI). The researcher then presented the same to the Kitui West Sub County Education Officer, who issued a clearance letter for data collection using the specified instruments. The researcher later visited the sampled institutions and commenced data collection after presenting the official permission letters to head teachers and creating rapport.

The researcher actively collected the data from the field and personally administered the questionnaires to the participants. The researcher conducted the interviews Face-to-face. The

interviews were carried out in varied places as found convenient. Before each Interview, the respondents were requested to read and respond to the contents of the consent form (Appendix V). The researcher recorded the interview responses using a personal smartphone to save time and transcribed them for analysis.

3.11 Data Processing and Analysis

Aydin (2016) regards data analysis as organizing the collected raw data to establish meaning or specific trends. The process started by editing to identify omissions and errors. The data from the questionnaire was codded, and then analyzed using the Excel Software Data Analysis Tool Pack. Data analysis followed descriptive and inferential techniques about the study's objectives. The researcher used descriptive statistics (percentages, means, and standard deviation) and inferential statistics (multiple regression) for hypothesis testing. Qualitative data was put into themes and, where necessary, converted into quantitative data. Some data generated from head teachers' interview schedules was reported verbatim and used to augment the quantitative data.

3.12 Legal and Ethical Considerations

The introductory letter also indicates and prove that the study will be carried out according to research ethics. The researcher followed the same process to uphold ethics by using the letter to gain a permit from NACOSTI to conduct the research by the law. The permit offered by NACOSTI is crucial for gaining clearance from the County Commissioner and Director of Education. The researcher used such while visiting the schools and creating rapport with the participants in the study. The researcher upheld research ethics by ensuring anonymity, confidentiality, and informed consent.

The researcher also provided all details pertinent to the study, like the purpose, use, rights, and other relevant details, ensuring that there was no coercion and that all the participants had the required details. The researcher then oversaw the filling of consent forms, enabling the researcher to use audio and visual recording devices. The researcher also informed them of the preserved right to withdraw from the study at any stage, go through their responses, and remove details they did not want to share. The researcher upheld confidentiality and anonymity by ensuring personal details were destroyed immediately after the exercise. The researcher also appreciated and acknowledged the input of other researchers by citing next to their assertions and providing a reference list.

CHAPTER FOUR

DATA ANALYSIS AND FINDINGS

4.1 Introduction

In this section, the results of the data analysis are presented, together with a discussion of the study's findings. The section is divided into three sections, with the first one discussing the characteristics of the sample used in the study, followed by the findings of each independent variable. Lastly, there is a discussion of the regression to relate the independent and dependent variables.

4.2 Background Information of the Respondents

All questionnaires issued in the study were collected back and were found to have been sufficiently completed. The return gave a response rate of 100% which. The following section highlights the participants' distribution in terms of their gender, age, education level and years of experience. It would denote the fair representation of the population in the sample and ensure that all population characteristics are well represented. On gender, it was noted that both males and females were equally represented, each forming 50% of the sample, as shown in Figure 4.1. This representation ensures that the population is well represented, and therefore, the data collected represents the views of both male and female teachers.

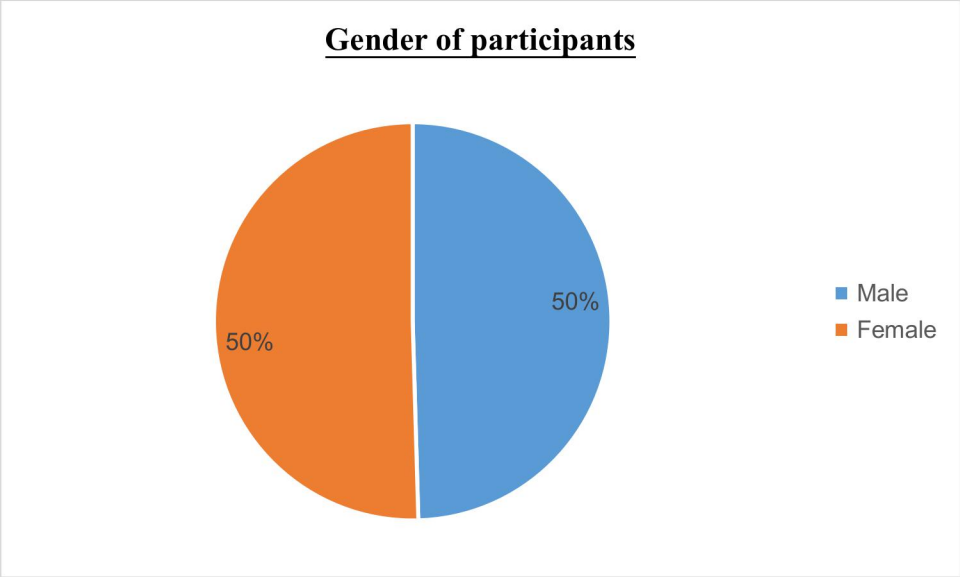


Figure 4.1: Gender of participants

For the age of participants, classifications were made for below 21 years, 21 – 30 years, 21 – 40 years, 41 – 50 years and then 50 and above years. As shown in Figure 4.2, all age groups were represented, with the majority of the participants being from the age group of 21 – 30 years, followed by 31 – 40 years. The lowest was from 50 years and above age group. The

representation in the table also tells us about the distribution of the population, and it is expected that most of the teachers are from the 21 – 30 age group, while the least fall in the 50-years-and-above age group.

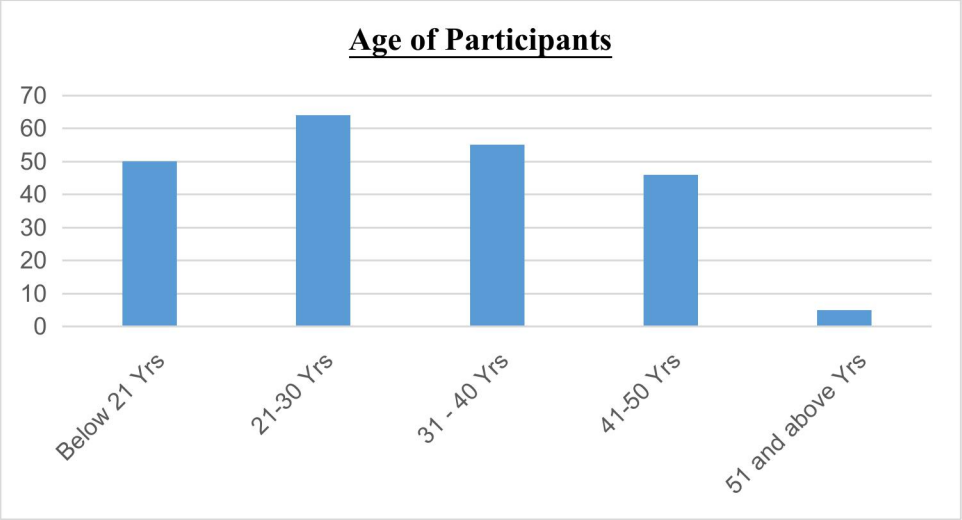


Figure 4.2: Age of Participants

Regarding their education, it was noted that all education levels were represented except the level. This was understood as most of those with high qualifications are expected to be promoted to senior positions and, therefore, Most of the teachers were found to have a certificate qualification, while a few (below 10 in number) were found to have master's degree qualifications. The distribution is shown in Figure 4.3.

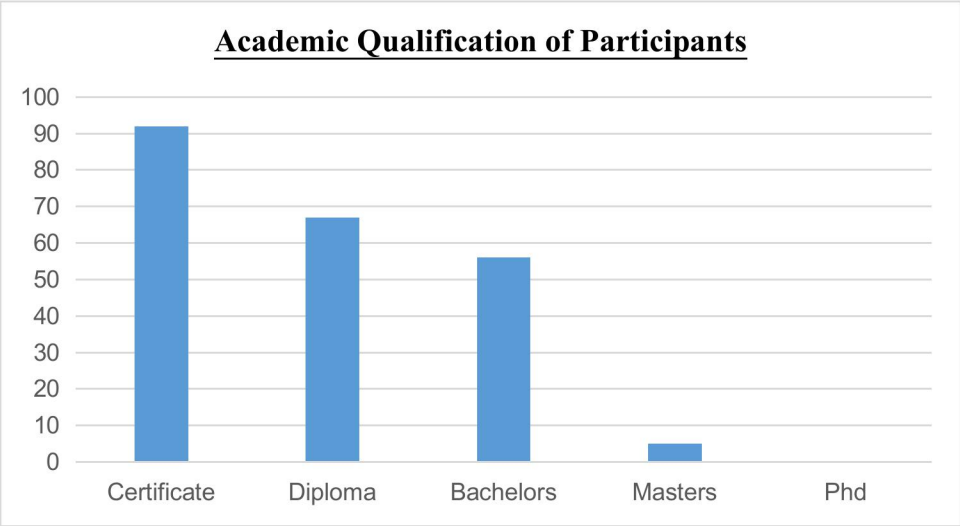


Figure 4.3: Academic qualification of participants

For work experience, the classification was based on below three years, between 3 – 5 years of experience and above five years of experience. It was noted that most of the participants had more above 5 years of experience, but all classifications were represented, as shown in Figure 4.4. This was good for the study as the responses were then collected from people who have been in the sector for quite a while. Some had less than three years of experience and would also give their input, and they are expected to be more computer literate and the assumption is made that they completed schooling recently, where ICT was embedded.

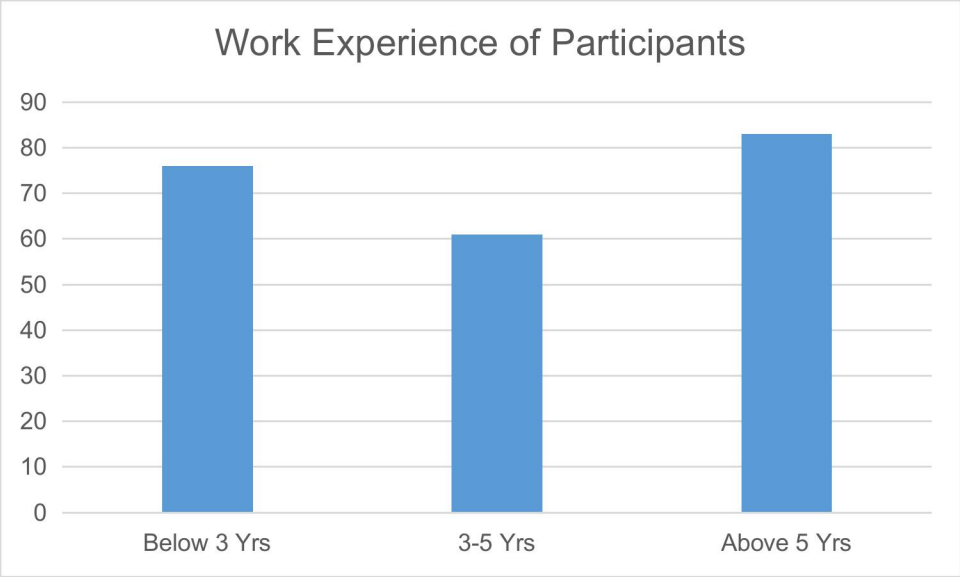


Figure 4.4: Work Experience of Participants

4.3 Teacher's Attitude to the Integration of ICT in Teaching and Learning

Teachers' attitude was measured using nine parameters, all of which were geared toward understanding how teachers feel about the use of ICT in schools. From the analysis of the results tabulated in Table 4.1, it was noted that only 50 (23%) of the teachers strongly regularly follow developments in ICT. Also, 22% follow the developments, while 39% do not follow the developed, as noted from their response of disagreeing or strongly disagreeing with the statement that they follow developments in ICT use in teaching and learning.

On teacher discontentment on the use of ICT, it was observed that 20% disagree and another equivalent proportion strongly disagrees having observed some discontentment from their colleagues on the use of ICT. Additionally, 92 (42%) agree or strongly agree to have noted some discontentment on the use of ICT from their colleagues. A greater proportion have noted some discontentment compared to those who have not.

Teachers were also assessed on their enjoyment the use of noted projection. It was observed that only 26% either enjoy or strongly enjoy projecting notes, with another 25 being undecided on the same. A greater proportion of 108 (49%) did not enjoy or strongly never enjoyed the same. It, therefore, shows that a greater proportion desires traditional teaching methods and has a bad attitude toward adopting modern ICT in teaching and learning.

On the impact on the risk of data misuse, 65% of the respondents felt that LMS posed a risk of data misuse. Only 55 disagreed or strongly disagreed with whether LMS posed a risk of data misuse, which translates to only 25% of the respondents. 10% seemed unbothered with data misuse risk as they were undecided in their response. It also tells a lot about knowledge of ICT among teachers and how conscious they are of the developments in their field.

A negative attitude was also noted regarding the risk that ICT could expose learners to the internet, which is disadvantageous considering their age. 34% agreed, while 43% strongly agreed with the statement that ICT posed such a risk. Only 4% and 8% strongly disagreed and agreed to the same statement, respectively. It shows that teachers have a fear that ICT may expose learners and that it could be harmful.

Regarding scheming and lesson planning, 46 (21%) and 37 (17%) strongly disagreed and disagreed, respectively, with the idea that computers made their lesson planning and scheming easier. Combined, it shows that 38% of the respondents do not feel like computers make their work easier. On the other hand, a total of 41% feel that it is useful. There is also a worry that 22%, as shown in Table 4.1, were undecided, meaning that they were uninformed on how and whether computers could help them in scheming and lesson planning. Storage devices did not seem to be preferred, as only 18% agreed, and 19% strongly agreed that ICT storage devices

helped. This was a smaller proportion considering that a total of 45% either disagreed or strongly disagreed with that, and 18% were undecided.

Automatic marking was also assessed, and it was found that 24% strongly feel that it makes teachers lose touch with pupils. This shows that 24% have a negative attitude towards the use of ICT in automatic marking. Another 18% agreed that the automatic marking made teachers lose touch. 19% were undecided, while a total of 37% disagreed or strongly disagreed that they could lose touch with students due to automatic marking. The diverse responses to the attitude show that teachers do not have the same feeling towards ICT use in teaching and learning, and therefore, it is hard to pull strings towards the same direction. Looking at the proportion of those who felt that they could upgrade their ICT skills, there are indications that most of them feel that their skills are lacking. A total of 70% would upgrade their skills if given the opportunity, as shown in Table 4.1.

Table 4.1: Teachers' Attitude on use of ICT in Teaching and Learning

	SD		D		U		A		SA	
	F	%	F	%	F	%	F	%	F	%
I regularly follow all new developments in ICT use in teaching	52	24%	32	15%	38	17%	48	22%	50	23%

and learning.

I have noted some discontentment from my colleagues when ICT use is made mandatory.	44	20%	44	20%	40	18%	54	25%	38	17%
I enjoy projecting notes and diagrams rather than dictating or having to draw.	47	21%	61	28%	54	25%	45	20%	13	6%
I feel use of learner management system poses a risk of data misuse.	20	9%	35	16%	22	10%	64	29%	79	36%
Use of ICT in schools exposes pupils to internet at their very tender age which may be disadvantageous.	9	4%	18	8%	25	11%	74	34%	94	43%
Use of computers have made my scheming and lesson planning easy.	46	21%	37	17%	48	22%	43	20%	46	21%
Use of ICT storage devices can help a teacher store class documents safely.	46	21%	53	24%	39	18%	40	18%	42	19%
Use of automatic marking ICT tools may make a teacher lose touch with their pupils.	47	21%	39	18%	42	19%	40	18%	52	24%
Given an opportunity will make an effort to upgrade my ICT skills.	3	1%	17	8%	47	21%	76	35%	77	35%

4.4 Teachers' Computer Literacy

Self-assessment of teachers revealed that 16% felt they had excellent computer skills, with another 21% feeling that they had sufficient computer skills, as shown in Figure 4.5. Of those who felt they were computer literate were 37%. This proportion was lower than those who felt

they were deficient in computer skills relevant to teaching and learning. A total of 48% of the participants felt that they did not have sufficient computer skills, while another 15% were undecided, meaning that they could not gauge the sufficiency of their computer skills. It is the feeling of the researcher that they were not competent as lack of ability to gauge yourself is due to lack of information on ICT competence.

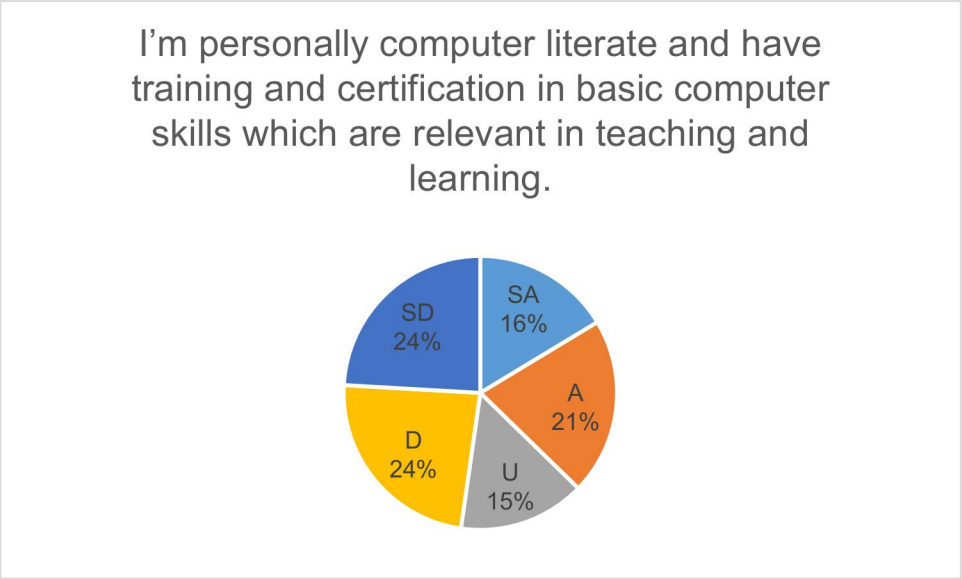


Figure 4.5: Self-assessment of teachers' feeling about their computer skills competency

An evaluation of whether schools encourage teachers to be computer literate shows that 23% strongly disagree that there is such encouragement, while 43 (20%) disagree, as shown in Figure 4.2. It was also noted that 30 (16%) and 40 (18%) agree and strongly agree, respectively, that their schools regularly encourage them to be computer literate and also does in-house training, as shown in Table 4.2. On how teachers felt about their elderly colleagues becoming computer literate, 19% strongly believed, and another 20% believed that the elderly had challenges becoming computer literate. It shows that 39% of teachers believe their elderly colleagues would have challenges becoming computer literate.

However, 21% strongly disagree, and another 20% disagree with the notion that their elderly colleagues have challenges becoming computer literate. It implies that most teachers feel that every one of them can become computer literate regardless of their age, compared to those who do not feel so. In terms of change of perception, after training24, % and 18% had their perceptions change and strongly change, respectively. This implies that training can change the perceptions of 42% of teachers, in addition to impacting them with the necessary ICT skills. However, 39% did not feel like their perceptions changed, while another 20 were undecided.

On skills, it was noted that 16% were able to diagnose fundamental computer issues while another 16% were firmly able to. The proportion was lower compared to those who are unable to, who stood at a total of 50%. On the aspect of learner management systems and the use of e-learning, it was noted that similar levels of skills were experienced. A total of 40% felt that they were proficient in both LMS and e-learning. 23% were undecided, meaning that they were actually not competent in them and most likely did not even know the use and meaning of each of them.

Table 4.2: Assessment of Teachers' Computer Literacy

	SD		D		U		A		SA	
	F	%	F	%	F	%	F	%	F	%
My school regularly encourages teachers to be computer literate and does in-house training.	51	23%	43	20%	50	23%	36	16%	40	18%
My elderly colleagues have	46	21%	45	20%	43	20%	45	20%	41	19%

challenges in becoming computer literate.										
My perception of ICT use in class management only changed after I was trained.	41	19%	44	20%	43	20%	52	24%	40	18%
I'm able to diagnose both basic hardware and software computer issues.	56	25%	54	25%	39	18%	35	16%	36	16%
I'm proficient in learner management systems	44	20%	38	17%	50	23%	44	20%	44	20%
I'm proficient in e-learning and e-examining systems	36	16%	44	20%	51	23%	45	20%	44	20%

4.5 Availability of Resources

Regarding availability of resources, it was noted that some teachers have received some support but the greater portion have not. It was noted that most of the 18.6% agree strongly that they have been attending sponsored courses, 17.7% just agree, 20.5% and 17.3% strongly disagree and disagree respectively to the statement that they have been attending in-service courses sponsored by the government. It was also found out that most schools are not connected to electricity or are poorly connected and unreliable depending on the strength to which teachers agree or disagree with the statement that the government has connected electricity in their school. A total of 37% of the teachers agree that they have electricity connections, while 43% disagree. Electricity is a key resource for ICT, and with such low levels of its connection, it can even make the other factors sub-optimal in ICT integration.

On the idea of motivation, it was observed that more than half of the teachers do not feel like the government motivates them to ICT integration. In contrast, only 15% feel strongly motivated by the government. The government has also performed better in terms of needs assessment. A total of 42% either strongly agree or agree with the statement that the government has done a needs assessment on their schools. This is a good indicator that the government facilitates ICT integration and gives hope that it is an idea on the top list of the government agenda. Similarly, it was noted that the government has created awareness among all teachers at the same levels.

Resources that were found to be significantly lacking were internet connections, computers, and resources like digital cameras and computer peripherals, among others. Some resources like the Internet were found to be completely lacking in some schools. These can be noted as areas where the government would need to invest to realize ICT integration in learning and teaching.

Table 4.3: Assessment of Availability of Resources

	SD		D		U		A		SA	
	F	%	F	%	F	%	F	%	F	%
In my school, teachers have been attending in-service courses sponsored by the government on ICT integration in teaching and learning.	45	20.5%	38	17.3%	57	25.9%	39	17.7%	41	18.6%
The government has installed electricity in this school.	50	22.7%	43	19.5%	45	20.5%	46	20.9%	36	16.4%

The government has dramatically motivated us on ICT integration.	59	26.8%	66	30.0%	8	3.6%	54	24.5%	33	15.0%
The government has done some needs assessments on ICT integration in schools.	42	19.1%	45	20.5%	41	18.6%	49	22.3%	43	19.5%
The government has created awareness among all teachers on ICT integration in this school.	42	19.1%	45	20.5%	41	18.6%	49	22.3%	43	19.5%
Our school has adequate computers to aid in learning	101	45.9%	97	44.1%	9	4.1%	12	5.5%	1	0.5%
Our school has internet connectivity	74	33.6%	95	43.2%	46	20.9%	5	2.3%	0	0.0%
Our school has adequate digital cameras, projectors, printers, scanners and other computer peripherals important for learning	79	35.9%	83	37.7%	54	24.5%	4	1.8%	0	0.0%

4.6 ICT Integration

An evaluation was done across six fronts to determine the extent of ICT integration in teaching and learning. These were ICT applications in teaching and learning, pupil evaluation, record keeping and retrieval, communication with parents, teachers and learners, evaluation of learner progress, as well as holding online meetings with school stakeholders. Generally, across all fronts, it was observed that more than 40% of the teachers do not apply ICT at all. The highest

was in application in pupil evaluation, where 51% of teachers responded that they do not apply ICT at all in pupil evaluation.

However, it was good to note that at least more than 50% of teachers apply ICT to some extent. This is a good sign and shows that ICT has gained some momentum in teaching and learning, only that it would need to be enhanced. Additionally, it is encouraging to note that almost 10% of the respondents had applied ICT across those fronts, as shown in Table 4.4. The lowest application in ICT was in communication with parents, teachers and learners, while the highest was in evaluation of learners' progress.

Table 4.4 Assessment of ICT Integration levels

	VGE		GE		SE		NA	
	F	%	F	%	F	%	F	%
We apply ICT in teaching and learning	17	8%	40	18%	72	33%	91	41%
In my school we apply ICT in pupil evaluation	17	8%	28	13%	62	28%	113	51%
We use ICT in school academic record keeping and retrieval	18	8%	31	14%	65	30%	106	48%
My school uses ICT in communication with parents, teachers, and learners	12	5%	57	26%	57	26%	94	43%
My school use ICT to monitor	20	9%	42	19%	65	30%	93	42%

and evaluate the progress of learners								
We use ICT to provide and prepare online meetings with school stakeholders	16	7%	47	21%	65	30%	92	42%

4.7 Results of Interview Schedule with Head Teachers

Upon interviewing the head teachers the researcher was able to understand deeper on strategies used by them to enhance ICT use in their schools. This helped understand the determined levels of ICT use in schools of the area of study, and would also advise recommendations for this study.

It was observed that head teachers have challenges in teachers' motivation and resources required for ICT integration. In interview, a head teacher responded:

> I have to admit it's hard to keep every teacher motivated toward integrating ICT, unless you are providing them with all the required resources. The fact is that there are a lot of challenges that hinder ICT integration. However, I always encourage my teachers and emphasize on them that the future is ICT and they would be relevant in the future if they adopt ICT in their teaching and learning. I have also taken some services like communication with staff and parents online so as to show everyone that it's doable. I have also appointed one of the teachers to be in charge of ICT integration in teaching and learning, and their responsibility is to ensure that as much as we can, we take most of the services, notes, and examining online, though step by step.

Additionally, teachers were noted to play a central role in integrating ICT. It ranged from encouraging teachers to collaborating with the government and other education stakeholders in the provision of ICT resources. On the issue of government support, a head teacher responded:

> Of all education stakeholders, the government is the biggest single source of support in ICT integration. It is also the most relied upon. We rely on it to ensure that electricity, internet infrastructure, and security, among others, are reliable. However, in our case, we sometimes have issues with our electricity especially when some electricity poles fall off and take time to be replaced. We would have opted for solar-powered laptops but our economic situation does not support that. Our internet connection is also fairly good but very expensive considering the economic activities in this region. We, therefore, feel that

> the government has so much to do to support us do good ICT integration. We feel there is a lot that the government has to do.

It was noted that some head teachers encourage the teachers to use online platforms for subjects that are easy to set and mark online but use traditional methods for those that are hard to do so. On the effectiveness of ICT integration in teaching and learning, one of the head teachers responded:

> Safe for the challenges we face, I see great potential in ICT integration in teaching and learning. For example, marking a hard copy multiple choice exam for a class of 50 students may take you up to 3 hours. There are also many chances of errors and collusion. Adopting online marking tools for multiple-choice questions eliminates all these. Results can be obtained in a fraction of a second and no room for collusion. Look at ranking also. Manual ranking involves summing up all marks for all subjects and then ranking. With the integration of LMS, this process is just a click of a button. I consider it very effective, so we just have to collaborate and remove the barriers to its full implementation.

Others were encouraging teachers to give pupils assignments that could require the use of an ICT device, like taking pictures of flowers or different types of leaves and then printing them. They take it that this would also involve the parents and force them to make provisions for improving school ICT use. One head teacher posed, “You just have to force them to participate a bit”.

It was also discovered that some schools were using online systems and bulk SMS services to communicate with parents on important school events and relying on their pupils' results to complement the traditional methods. “This is one of the best innovations. It has made communications easier”, most of the head teachers said. However, most of the head teachers felt that the government needed to do more to enhance the use of ICT. Some head teachers noted that electricity connections were inadequate, or even some transmission lines had fallen off and took about 4 months to repair. One head teacher pointed at some sagging wires, “Imagine that pole over there fell 5 months ago, and I already communicated with our MCA”. Also, head teachers felt that the ASAL area had very few economic activities which could enable parents to

participate in equipping the schools with ICT infrastructures. They felt that the government was doing something but had a long way to go to make it impactful. A head teacher said:

> Would a parent purchase food or bother with home internet for their children's online assignments? These challenges are real. We have so many poor parents who would just want their pupils to acquire education but are unable to provide for these advanced necessities. Whereas ICT brings efficiency in the delivery of education, most parents would consider it secondary since even meeting their basic needs is a problem. I know some students who even come to school on an empty stomach. That is how serious the situation is, but we cannot abandon ICT integration or defer it to the future. We are implementing it in phases to the best of our ability.

The head teachers' interview also helped the researcher discover their thoughts on what they thought was critical to improving ICT integration in teaching and learning. Some of the key suggestions were proper training and, if need be, retraining of teachers and proper distribution of such ICT proficient teachers so that there could at least be some in every school. The head teachers also suggested that there was a need for internet service providers to partner with the Ministry ofEducation to give better internet services to schools, banking on the economies of scale they could get. Similarly, the head teachers suggested that ICT device prices were quite high and needed actions to bring them down by reducing their taxation, especially for those to be used in schools. The ministry could even make special purchases for distribution to schools.

Key challenges to ICT integration, discovered from the head teachers' interview, were poor ICT infrastructure, lack of ICT experts in primary schools, changing pace of ICT, poor economic conditions of the area, and inadequate resources from the county and central government. Most of the head teachers felt that some of such challenges were hard to crack but were doing their level best with available resources and capacity. Training was mostly used as a methodology to help sensitise and uptake ICT integration. One of the head teachers interviewed indicated that:

> We continue to encourage our teachers to update their ICT skills. It's no doubt that everything is going digital, and other countries have to a great extent, integrated ICT in teaching and learning. I have always offered facilitation in terms of time and organised some training in the school to ensure that my teachers are current with current trends. I consider being aware to be the first step to being able to adopt something. There are also some pieces of training organized for youths by the county government, and I encourage them to enrol, especially the young ones, since the trainings target the youths.

Also, head teachers felt training was easy to sort since it just needed to be incorporated into the curriculum for the training of teachers. "If it were in the curriculum as one of the units you have to pass to qualify as a teacher, then you have no option but to be computer literate", some head teachers indicated. The rest needed and severe intervention from sponsors and governments to sort it out.

The teachers were from diverging subjects, and it was noted that they incorporated ICT in different ways. There were those who used software for marking exams with multiple choices, which was the most used. Most of the head teachers were found to have online meetings with teachers through zoom to encourage them and show them that it was possible to incorporate available ICT platforms in teaching. "Sometimes you have to be practical to them to show them that some things work", one head teacher told me during the interview. In terms of financing for ICT in their schools, most head teachers relied on the government's intervention and some non-governmental organizations. They also relied on contributions by parents to provide some basic ICT infrastructure, though they felt that was not very viable in rural public schools. Most head teachers had an overall feeling that substantial integration of ICT would be an uphill task, but they were doing their best.

4.8 Hypothesis Testing

Regression was used for hypothesis testing to determine the linear relationship between the factors investigated and their impact on ICT integration in teaching and learning. A multiple linear regression technique was used, and the results were evaluated at a 95% confidence interval.

4.8.1 R-Statistics

The R2 of the regression was found to be 0.0213, as shown in Table 4.5. The R2 indicates that the three factors investigated do not have a strong explanation power on the dependent variable. It implies that only 2.1% of the variations in ICT integration can be explained by resource availability, the attitude of teachers, and also the teachers' ICT skills.

Table 4.5: R-Statistics Results Table.

Regression Statistics	
Multiple R	0.146215
R Square	0.021379
Adjusted R Square	0.007787
Standard Error	0.43154
Observations	220

4.8.2 ANOVA Results

ANOVA was used to test the significance of the model. The test indicated that the significance of the model was 0.19 as shown in Table 4.6. The implication is that it was insignificant, as also implies the power of the independent variables chosen in explaining the current levels of ICT integration in public primary schools.

Table 4.6: ANOVA Test Results

	df	*SS*	*MS*	*F*	*Significance F*
Regression	3	0.878749	0.292916	1.572899	0.196897
Residual	216	40.22505	0.186227		
Total	219	41.1038			

4.8.3 Coefficients of Regression

Regression coefficients indicate that the intercept of the equation explaining the ICT integration using the availability of resources, teachers' attitude, and teachers' computer literacy was found to be 0.27, and was insignificant with a p-value of 0.38. Also, all three factors studied were found to positively impact ICT integration as indicated by their positive coefficients. The coefficients were 0.09, 0.08, and 0.02 for teachers' attitudes, computer literacy, and availability of resources, respectively, as shown in Table 4.7. The coefficients show that teachers' attitude plays the biggest role compared to the other variables.

However, the p-values of these factors indicate that their impact was insignificant, as shown by the p-values being greater than 0.05, which was the threshold significant level. The p-values were 0.14, 0.14, and 0.65 for teachers' attitudes, computer literacy and availability of resources, respectively, as shown in Table 4.7. These levels of significance, therefore, imply that the three factors studied have a positive but insignificant impact on ICT integration in public primary schools in Kitui West Sub-county.

Table 4.7: Coefficients of Regression Results Table

	Coefficients	*Standard Error*	*t Stat*	*P-value*	*Lower 95%*	*Upper 95%*
Intercept	0.2731	0.3101	0.8809	0.3794	-0.338	0.8843
Teachers Attitude	0.0961	0.0650	1.4812	0.1400	-0.0318	0.2241
Teachers Computer Literacy	0.0810	0.0553	1.4641	0.1446	-0.0280	0.1900
Availability of Resources	0.0289	0.0646	0.4468	0.6554	-0.0984	0.1562

From the coefficients of regression, the equation linking ICT integration in teaching and learning in public primary schools can be deduced as;

ICT Integration = 0.2731 + 0.0961 TA + 0.0810 CL + 0.0289 AR + Ɛ

Where;

TA is the Teachers attitude

CL is a Teachers of computer literacy

AR is the Availability of resources and

Ɛ is the Error term

The hypothesis was tested based on the interpretation of both the regression coefficients and the p-values. The significance of the p-value was tested based on a significance level of 5%.

$H_0$1: *Teachers' attitude has no statistically significant influence on ICT integration in teaching and learning in public primary schools in Kitui West Sub-County*

This hypothesis was tested using the coefficients and the p-values from a multiple linear regression technique. The test shows that the coefficient of teachers' attitude is 0.0961, which indicates that for every unit increase in teacher attitude, ICT integration increases by 0.0961. It, therefore, shows that there is a positive impact on ICT integration from positive teachers' attitudes. The p-value was observed to be 0.14, indicating that the impact of teachers' attitudes on ICT integration in learning and teaching was insignificant.

$H_0$2: *Teachers' level of computer literacy has no statistically significant influence on ICT integration in teaching and learning in public primary schools in Kitui West Sub-County*

Teachers' computer literacy was found to have a coefficient of 0.0810, which indicates that it positively impacts ICT integration in learning and Teaching. The p-value of the test was 0.1446, which is insignificant at a 5% significance level. It, therefore, follows that teachers' computer literacy has a positive and insignificant impact on ICT integration in teaching and learning.

$H_0$3: *Availability of ICT resources has no statistically significant influence on ICT integration in teaching and learning in public primary schools in Kitui West Sub-County*

s show that resource availability has: The regression test shows that the availability of resources has a coefficient of 0.0289, the lowest of the three factors studied. It shows that it positively impacts ICT integration in teaching and learning. Just like the p-value for the other factors studied, the one for resource availability was also insignificant at 0.6554. It, therefore, leads to the observation that the availability of resources has a positive insignificant impact on ICT integration in teaching and learning.

CHAPTER FIVE

DISCUSSIONS, SUMMARY, CONCLUSIONS AND RECOMMENDATIONS

5.1 Introduction

This chapter will entail a discussion of the findings of the study. The chapter is divided into sections like the summary of the study's findings, the conclusions made based on the findings and finally, the study's recommendations.

5.2 Discussion of the Findings

This section would be used to discuss the results of the hypothesis tested

5.2.1 Teachers' Attitude and ICT Integration in Teaching and Learning

The first objective was to determine how teachers' attitude affects ICT integration in teaching and learning. Several parameters used to evaluate teacher's attitudes on ICT integration in teaching and learning helped in the evaluation of the factor from several fronts. It was observed that less than 50% of teachers followed the developments in ICT. This stood at 23% for those who strongly followed and 22% for those who followed. It was also found that 42% of teachers observed discontent among their peers in using ICT. It implies that 58% of teachers are comfortable with ICT developments in teaching and learning and, therefore had a positive attitude towards it. This finding agrees with Bingimlas (2019). However, it was noted that only a very small proportion of teachers, 26%, enjoyed the use of ICT like projecting notes and also a more significant number was undecided. This finding was in line with the findings by Aydin (2016).

The number of teachers who were undecided on the matter implies that there is a great need for sensitization of teachers and training them on the use of ICT, as the number was not opposed and did not have a negative attitude towards ICT use. Most of the tutors are privy to the risk of data misuse that LMSLMSLMS can cause can cause can cause. Around 65% of the respondents felt that LMS could result in data misuse and may result in lower adoption of ICT. This means that they understand the LMS well and would need proper policies on data protection. It is also important to note that 10% of the respondents were undecided on data risk, which shows that they cannot evaluate data risk from LMS. This shows that they are not well sensitized on the same, and may not know about the law's data protection requirements.

A negative attitude on ICT was observed, as it was felt that it exposes learners to the Internet, which may be harmful, as well as making teachers lose touch with learners. However, on the aspect of making work easier, a greater proportion felt that scheming and lesson planningwere made easier by use of computers. Therefore, there is a positive attitude towards ICT integration in teaching and learning, which can be capitalized according to the findings by Kounenou and Roussos (2015). However, there are valid concerns which need to be considered, especially the data misuse. The finding agrees with that of Bingimlas (2019). A positive coefficient signifying a positive correlation was established through regression. It should then be emphasized that a strong teacher attitude towards ICT leads to improved ICT integration levels in teaching and learning, agreeing with Chege (2019) and Chuttur (2019).

5.2.2 Teachers' Level of Computer Literacy and ICT Integration in Teaching and Learning

Data analysis indicated that 16% of teachers had excellent computer skills while another 21% had sufficient computer skills. It therefore follows that 37%, or 4 for every 10 teachers, felt they had good ICT skills to use in teaching and learning. This is not necessarily a low skill level, but being below average, there are implications that a good proportion of teachers do not feel competent in their computer skills. It therefore means that they would not be able to apply them, or would apply them inefficiently. Therefore, they should heedthe advice by Davis (2018) that professional development is vital in ICT application in the classroom.

It was also observed that 34% of teachers had their schools encourage teachers to become computer literate. This advances computer literacy and agrees with both Yamamoto and Yamaguchi (2016) and Sanchez (2017). However, it is a very small proportion and shows that 66% of school administrators do not care, or do not know they should care, about the computer literacy of their teachers. It can be the reason behind some of the poorest performance in ICT

integration in teaching and learning. This may reduce confidence and competence in ICT use in the classroom, as determined by Twinomujuni and Kampala (2020). Age was not found to be a key factor in the acquisition of ICT skills, as 41% of respondents indicated that their elderly colleagues did not have difficulties in becoming computer literate.

The study also found that a good number of teachers had required skills to do a simple diagnosis of a computer and were 32% in proportion. Whereas the proportion is less than those who are unable, it indicates that teachers can be equipped with such ICT skills to expert level. The finding also confirmed that 40% were proficient in LMS. It is a critical finding that the focus would not be whether public primary school teachers can be made computer literate, but when that should be done and how to do it. Using regression, teachers' computer literacy was found to have a coefficient of 0.0810, s that it has a positive impact on ICT integration in learning and teaching. Whereas the coefficient was less than proportionate, the positive finding indicates that teacher's computer literacy could be harnessed to improve ICT integration in public primary schools, as suggested by Orodho (2018). The p-value of the test was 0.1446, which is insignificant at a 5% significance level. It therefore follows that teachers' computer literacy has a positive and insignificant impact on ICT integration in teaching and learning

5.2.3 Availability of ICT Resources and ICT Integration in Teaching and Learning

Resources can be in form of tangible or intangible. Some of the resources which have been received in public schools were sponsored training, motivation of teachers, computers, electricity installations, and internet connections. However, the resources have been received at varying levels across the schools, and their optimal utilization was found to differ. On the sponsored trainings, it was established that 18.6% and 17.7% strongly agree and agree respectively to have attended sponsored ICT training. Therefore, only 36% have attended the sponsored trainings

related to ICTonly 36% have attended the sponsored training related to ICT, suggesting low levels of resource availability for commitmentto ICT improvements like training. This level shows that a great portion has not had the opportunity to get trained, which agrees with the findings by Groff and Mouza (2018). The levels are still low against the better performance, which was observed in the government's needs assessment.

The study findings also show that most schools are not connected to electricity or are poorly connected and unreliable depending on the strength to which teachers agree or disagree with the statement that the government has connected electricity in their schools. This finding agrees with the findings by Ndibalema (2019). 37% of the teachers agree that they have electricity connections, while 43% disagree. Electricity is a key resource for ICT, and with such low levels of its connection, it can even make the other factors sub-optimal in ICT integration. These low levels of resource availability limit the application of ICT in teaching and learning. Similar low levels were noted in internet connections and the provision of computers and related computer peripherals, which could inhibit ICT integration, as observed by Ndibalema (2019).

This finding shows that few resources are committed toadvancing ICT integration and it agrees with earlier findings by Mwangi and Khatete (2017) and El-Daou (2016). In some schools, the internet was completely lacking, which may inhibit some ICT integration like communications, e-learning and LMS. The fact that similarly low levels of ICT resources were noted by earlier researchers puts to question the government's support in ensuring that the impeding forces to ICT integration in teaching and learning are removed. Due to its immense capability in enhancing the education sector and the high costs involved in some of the resources, the problems would best be sorted through government support.

In summary, the study found that the resources significantly lacking were internet connections, computers, and resources like digital cameras and computer peripherals, among others. Just like the findings by Ndibalema (2019), some resources like the Internet were found to be completely lacking in some schools, which shows a dire situation. These can be noted as areas where the government would need to invest to realize ICT integration in learning and teaching. Collaborations must also be done with development partners and education stakeholders to reduce the gap between needs and resources available for ICT integration in public primary schools.

Further findings can be derived from the regression test, which shows that resource availability has a coefficient of 0.0289, the lowest of the three factors studied. It shows that it positively impacts ICT integration in teaching and learning. Like the p-value for the other factors studied, the one for resource availability was also insignificant at 0.6554. It, therefore, leads to the observation that the availability of resources has a positive insignificant impact on ICT integration in teaching and learning.

5.3 Summary of Findings

This section ill present the summary of the study's findings in line with the study objectives and hypothesis tested in the study.

The study findings show that teachers' attitudes towards ICT are not as high as they were, but they are at commendable levels. The study established that most teachers were following up on developments in ICT. Additionally, a significant proportion of teachers were found to be comfortable with the developments in the use of ICT in teaching and learning, compared to those who were discontent. The study findings also noted that many teachers could not express an

opinion on ICT matters and thus showed a lack of understanding of ICT developments. The most important to note is that teachers' attitude positively impacts ICT integration in teaching and learning, and therefore, if worked on, could lead to positive results. There are enough indications that such can be achieved. Critical measures are also needed to address two key issues raised: the exposure of pupils to the internet and the risks of data misuse.

On computer literacy, the study findings have shown that strides have been made, but more needs to be done to enable proper ICT integration. It was a good finding that most teachers came from schools where they were encouraged to become computer literate. This shows that school administrators have already embraced integrating ICT in teaching and learning. The study findings also show that the elderly are not at an absolute disadvantage. With a smaller than a proportionate number of respondents feeling that their elderly colleagues could have challenges in learning and becoming computer literate, it clearly indicates that teachers of all ages can become computer literate. Some advanced skills like projecting notes, use of LMS and primary diagnosis of ICT equipment are good indicators that teachers are ready to acquire the required ICT skills. The positive relationship between computer literacy and ICT integration is a reasonable driving force, as positive results can be achieved with improved ICT integration.

The study results show that there is a bigger problem in the availability of resources. There are some very critical resources in ICT integration, like electricity, internet, and computer labs, which are lacking in most of the schools in the region. The unavailability of such resources limits the integration of ICT in teaching and learning to a very great extent, even if all other factors were to remain favourable. Other types of resources, like those needed to facilitate training were found to be relatively available, as a good number of the respondents indicated that they had attended sponsored ICT training. This could be complimented well with the availability of other

resources. Teachers also felt that the government needed to provide for most of the resources, owing to the economic conditions of Kitui West Sub-County. They felt that parents in the area could not afford ICT equipment and were calling upon the government and sponsors to consider increasing their resource provision efforts. Regardless of all the challenges, a positive relationship was noted between the provision of resources and ICT integrations, which can be optimized with aggressive strategies for resource provision.

5.4 Conclusions of the Study

The study analysis concluded that teachers' attitudes were positive, but they had reservations about some aspects, like the exposure of children at an early age to the internet. The teachers also had a reservations about the risk some ICT developments like LMS poses to possibilities of data misuse. Overall, it is concluded that teachers' attitudes were found to have a positive and insignificant impact on ICT integration in teaching and learning.

The study also found that teachers' computer literacy was low but improved compared to previous studies' findings. It can also be concluded that teachers' computer literacy had a positive but insignificant influence on ICT integration in teaching and learning.

On the availability of resources, it was found that the situation was still wanting. There are many schools without electricity connections, computers, or internet, among other ICT infrastructure. It can be concluded that resource availabilityhas a positive but insignificant effect on ICT integration in teaching and learning.

5.5 Recommendations of the Study

Based on the findings of the study, several recommendations can be made. First, it can be recommended that teachers should be retrained in ICT skills to improve their ability to help in

the integration of ICT in teaching and learning. Teachers would be more comfortable using ICT infrastructure if they have the required skills. Their training should be tailor-made to help them acquire the best skills in ICT use for classrooms.

Another recommendation is that the government should develop programs that help enhance computer literacy among teachers in primary schools. These may include computer skills clinics that would keep them up to date with current developments in ICT, as well as their involvement in the development of innovations needed for the future. These programs would help integrate teachers well in ICT use in teaching and learning and make them appreciate and adopt it better. They would be more comfortable with ICT applications if they were made part of the whole process.

Based on some concerns raised about data protection, it is also recommended that the Ministry of Education develop data protection policies specifically related to ICT use in educational centers. The policies should be guided by the types of data collected and all possible ways of its misuse. These policies would help build confidence among the people whose data is being collected, and would thus make them appreciate ICT and easily give out their data.

Additionally, resources have been found to be lacking. It is recommended that the government invest more in ICT infrastructure, which would help make facilities available to public primary schools. Some of the key facilities include computers, electricity installations, reliable internet connections, and software like LMS systems. Due to the nature of the facilities, it is also recommended that the government helps construct computer laboratories to help secure the ICT facilities and facilitate shared use.

5.6 Suggestions for Further Research

The following suggestions for further research can be made;

i. A study can be made on the factors contributing to lower ICT skills among teachers in primary schools

ii. It can also be studied on the factors leading to the low availability of ICT resources for use in primary schools across Kitui West Constituency.

iii. A study can also be conducted on factors influencing teachers' attitudes towards ICT integration in teaching and learning.

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APPENDICES

Appendix I: Introductory Letter

Dear respondents,

I am a student at Africa Nazarene University. I am conducting academic research on "factors influencing the integration of ICT in teaching and learning in public primary schools in Kitui West Sub-County, Kenya".

I respectfully request your support in honestly answering all interview questions or questionnaire items. All information provided will be kept private and used only for the research. Kindly do not indicate your name anywhere in this questionnaire.

I am looking forward to positive responses.

Thank you in advance.

Yours Faithfully,

Jacinta Kathini Munyoki

Cell Phone: 0722910799

Email: munyokijacinta@gmail.com

Appendix II: Questionnaire for Teachers

Questionnaire for respondents

Please respond by either ticking (√) or explaining what was requested in the questionnaire below.

Section A: Personal Data

Please tick (√) the appropriate boxes

1. Gender

Male

Female

2. Age bracket

Below 21 years

21-30 years

31-40 years

41-50 years

51 years and above

3. Academic qualification

Certificate

Diploma

Degree

Masters

4. Experience on the job

Less than three years

3-5 years

Five years and above

Section B: Teachers' Attitude

Indicate the extent you agree with the following statements on ICT integration in teaching-learning; please circle your correct choice." Key: S.A. – Strongly Agree, A – Agree, U – Undecided, D –Disagree and SD – Strongly Disagree.

Statement		SA	A	U	D	SD
(a)	I regularly follow all new developments in ICT use in teaching and learning.					
(b)	I have noted some discontentment from my colleagues when ICT use is made mandatory.					
(c)	I enjoy projecting notes and diagrams rather than dictating or having to draw.					
(d)	I feel use of learner management system poses a risk of data misuse.					
(e)	Use of ICT in schools exposes pupils to internet at their very tender age which may be disadvantageous.					

(f)	Use of computers have made my scheming and lesson planning easy.					
(g)	Use of ICT storage devices can help a teacher store class documents safely.					
(h)	Use of automatic marking ICT tools may make a teacher lose touch with their pupils.					
(i)	Given an opportunity will make an effort to upgrade my ICT skills.					

Section C: Teachers Computer Literacy

Indicate the extent to which you agree with the following statements on computer literacy and ICT integration in teaching and learning; please circle your correct choice. Key: S.A. – Strongly Agree, A – Agree, U – Undecided, D –Disagree, and SD – Strongly Disagree.

Statement		SA	A	U	D	SD
(a)	I'm personally computer literate and have training and certification in basic computer skills which are relevant in teaching and learning.					
(b)	My school regularly encourages teachers to be computer literate and does in house training.					
(c)	My elderly colleagues have challenges in becoming					

	computer literate.					
(d)	My perception on ICT use in class management only changed after I was trained.					
(e)	I'm able to diagnose both basic hardware and software computer issues.					
(f)	I'm proficient in learner management systems					
(g)	I'm proficient in e-learning and e-examining systems					

Section D: Availability of Resources

Indicate the extent you agree with the following statements on ICT integration in teaching - learning; please circle your correct choice. Key: S.A. – Strongly Agree, A – Agree, U – Undecided, D –Disagree, and SD – Strongly Disagree.

Statement		SA	A	U	D	SD
(a)	In my school, teachers have been attending in-service courses sponsored by the government on ICT integration in teaching and learning.					
(b)	The government has installed electricity in this school.					
(c)	The government has dramatically motivated us on ICT integration.					

(d)	The government has done some needs assessments on ICT integration in schools.					
(e)	The government has created awareness among all teachers on ICT integration in this school.					
(f)	Our school has adequate computers to aid in learning					
(g)	Our school has internet connectivity					
(h)	Our school has adequate digital cameras, projectors, printers, scanners and other computer peripherals important for learning					

Section E: ICT Integration in School Teaching.

To what extend do you agree with the following statements?

Areas of Integration	Very great extent	Greater extent	Some extent	Not at all
We apply ICT in teaching and learning				
In my school we apply ICT in pupil evaluation				

We use ICT in school academic record keeping and retrieval				
My school uses ICT in communication with parents, teachers, and learners				
My school use ICT to monitor and evaluate the progress of learners				
We use ICT to provide and prepare online meetings with school stakeholders				

Appendix III: Head Teachers' Interview Schedule

The following questions will guide the head teachers' Interviews;

i. How do you maintain teachers' positive attitudes towards integrating ICT in teaching and learning?

ii. To what extent does government support influence ICT integration in teaching and learning in your school?

iii. How do we ensure in-service training for teachers in ICT skills and integration in teaching and learning?

iv. How would you rate the effectiveness of the integration of ICT in teaching and learning in your school?

v. What do you think would be done to enhance the preparedness for the integration of ICT in teaching - learning?

vi. What challenges do you face in the integration of ICT in school teaching - learning?

vii. What subject do you teach? As a role model, how do you integrate ICT into your teaching?

viii. How have you been acquiring your school's ICT infrastructure/resources?

ix. What would be the best strategies to enhance ICT integration in your school and the entire Kitui West Sub-County?

Appendix IV: List of Primary Schools in Kitui West Sub-County

1. Kangungi Primary
2. Matinga Primary
3. Kasue Primary
4. Kivani Primary
5. Kyenge
6. Muthi AIC Primary
7. Sangala
8. Kwa-Mwambi
9. Kiumoni
10. Mutanda
11. Kathiani
12. Kyeni

13. Katutu
14. Ngengekani
15. Kavoo
16. Ngunguuni
17. Kataa
18. Komu
19. Kasakini
20. Miwongoni
21. Emivia
22. Kauwi
23. Kwa Mukoo
24. Katheka
25. Mwatuni
26. Nzinia
27. Katine
28. Kakumuti
29. Kiseveni
30. Mutini
31. Ngong
32. Kangondi
33. Kyondoni
34. Kyamutimba
35. Kitundumo
36. Kisayani
37. Kamulu
38. Muthale
39. Mutonguni
40. Tulia
41. Ngengi
42. Kaluni
43. Nzemeli
44. Kivulu
45. Kwa Nyingi
46. Mangelu
47. St Marks
48. Ivulya Muu
49. Kombu
50. Kalinditi
51. Musengo
52. St Augustine
53. Kiukuni
54. Kitundumo
55. Mutulu
56. Kitamwiki
57. Kakeani
58. Kakulunga
59. Kangii
60. Kathumula
61. Kaumoni
62. Kavalo
63. Kavonge
64. Kutha
65. Kavuti
66. Kwandondo
67. Mavalo
68. Mwangya
69. Nguuni
70. Nyuani
71. Nzinia
72. Ukuni
73. Tulia Special
74. Utoo
75. Usiani
76. Uvaani
77. Yalatani
78. Ngesu
79. St. Andrew Mwala
80. Mateta
81. Mwatate

Appendix V: Recommendation letter from University



AFRICA NAZARENE
UNIVERSITY

P.O.Box: 53067 – 00200
Nairobi Kenya
Tel: 020 252 7170/1 – 5
Email: vc@anu.ac.ke
www.anu.ac.ke

1st March 2023

RE: TO WHOM IT MAY CONCERN

Munyoki, Jacinta Kathini (14S01DMED002) is a bonafide student at Africa Nazarene University. She has finished her course work and has defended her thesis proposal entitled: -

"Factors Influencing the Integration of ICT in Teaching and Learning in Public Primary Schools in Kitui West Sub County, Kenya"

Any assistance accorded to her to facilitate data collection and finish her thesis is highly welcomed.

Dr. Simon Obwatho
Ag. DVC, Academic & Student Affairs

Council Members: Dr. Gabriel Benjiman (Chair), Mrs. Emily Chege (Vice Chair) Dr. Stanley Makhasi Bhebhe (Vice Chancellor), Dr. Angela Maria Pereira Barreto Da Veiga Moreno, Mrs. Sibongile Ncala, Dr. James Coppin, Dr. Kevin Ulmet, Dr. Musa Kunene, Dr. Shiboh Gitau, Mr. Mike Mucho Agang'o

Board of Trustees: Rev. Donald W. Gardner (Chair), Mrs. Marie M. M. Manuel (Vice Chair), Dr. Daniel A. K. L. Gamis, Dr. LuVerne S. Ward Jr., Prof. John P. Marangu, Dr. Eugenio Duarte, Dr. Stanley M. Bhebhe (Vice Chancellor), Mr. Cornelius Muthuri, Dr. Gabriel Benjiman

Appendix VI: Request for Research Authority to the County Director of Education



KAIUIU PRIMARY SCHOOL
PO BOX 38-90203.
KABATI-KITUI
2/5/2023.

TO THE COUNTY DIRECTOR OF EDUCATION,
KITUI COUNTY
PO BOX
KITUI.

DEAR SIR/MADAM.

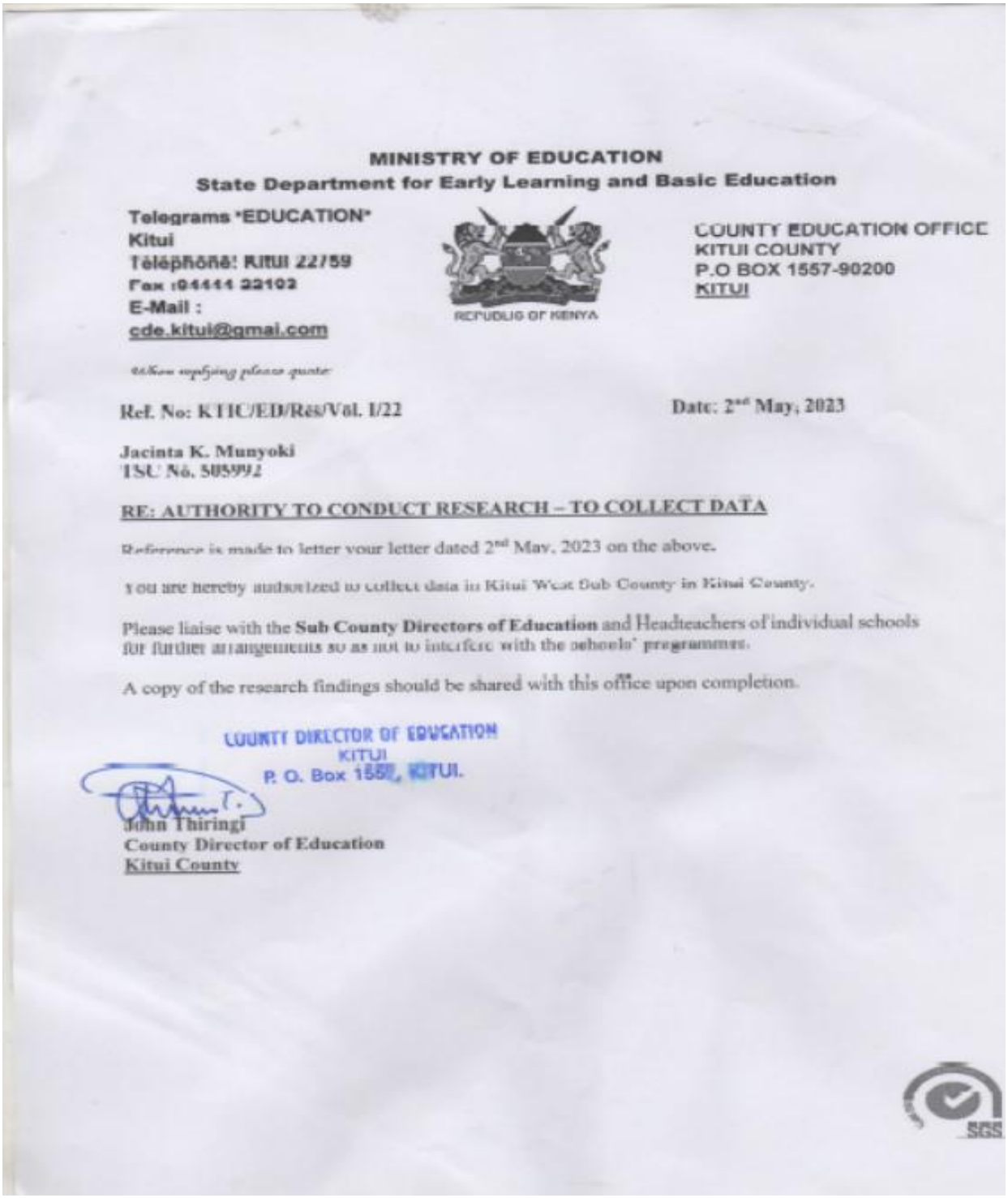
RE:REQUEST FOR RESEARCH AUTHORITY.

Upon successful completion of master's defence, I hereby request for authority to collect data in Kitui –west sub county in Kitui county. Kindly attached find NACOSTI licence and university introductory letter. Looking forward for a positive response. Thanks in advance

Yours faithfully

JACINTA K. MUNYOKI
TSC NO.505992
EMAIL:munyokijacinta@gmail.com

Appendix VII: Authority to Conduct Research from the County Director of Education



MINISTRY OF EDUCATION
State Department for Early Learning and Basic Education

Telegrams "EDUCATION"
Kitui
Telephone: Kitui 22759
Fax :04444 22102
E-Mail :
cde.kitui@gmai.com

REPUBLIC OF KENYA

COUNTY EDUCATION OFFICE
KITUI COUNTY
P.O BOX 1557-90200
KITUI

When replying please quote

Ref. No: KTIC/ED/Res/Vol. I/22

Date: 2nd May, 2023

Jacinta K. Munyoki
TSC No. 505992

RE: AUTHORITY TO CONDUCT RESEARCH – TO COLLECT DATA

Reference is made to letter your letter dated 2nd May, 2023 on the above.

You are hereby authorized to collect data in Kitui West Sub County in Kitui County.

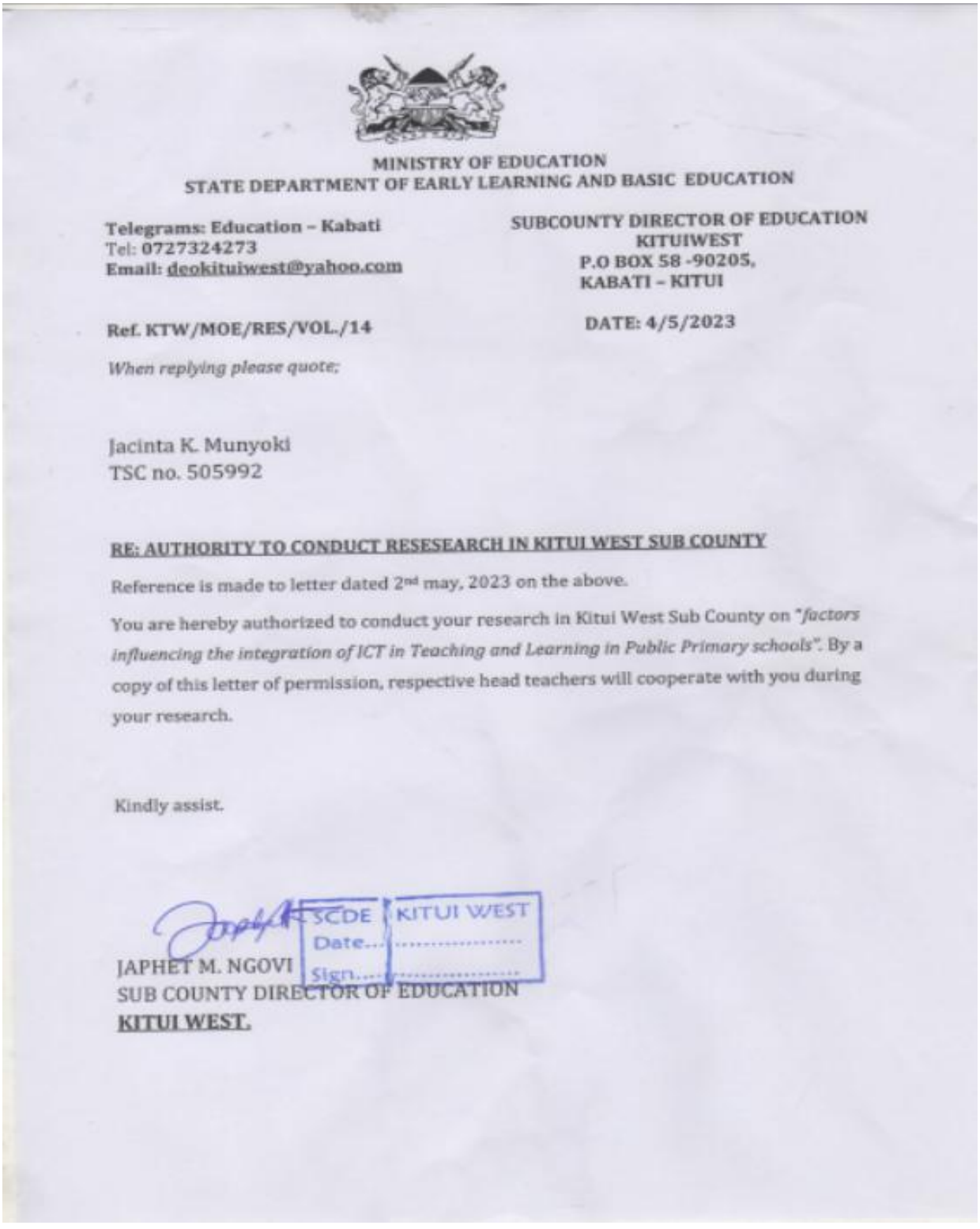
Please liaise with the **Sub County Directors of Education** and Headteachers of individual schools for further arrangements so as not to interfere with the schools' programmes.

A copy of the research findings should be shared with this office upon completion.

COUNTY DIRECTOR OF EDUCATION
KITUI
P. O. Box 1557, KITUI.

John Thiringi
County Director of Education
Kitui County

Appendix VIII: Authority to Conduct Research from the Sub-County Director of Education



MINISTRY OF EDUCATION
STATE DEPARTMENT OF EARLY LEARNING AND BASIC EDUCATION

Telegrams: Education – Kabati
Tel: 0727324273
Email: deokituiwest@yahoo.com

SUBCOUNTY DIRECTOR OF EDUCATION
KITUIWEST
P.O BOX 58 -90205,
KABATI – KITUI

Ref. KTW/MOE/RES/VOL./14

DATE: 4/5/2023

When replying please quote;

Jacinta K. Munyoki
TSC no. 505992

RE: AUTHORITY TO CONDUCT RESESEARCH IN KITUI WEST SUB COUNTY

Reference is made to letter dated 2nd may, 2023 on the above.

You are hereby authorized to conduct your research in Kitui West Sub County on *"factors influencing the integration of ICT in Teaching and Learning in Public Primary schools"*. By a copy of this letter of permission, respective head teachers will cooperate with you during your research.

Kindly assist.

SCDE KITUI WEST
Date.....
Sign.....

JAPHET M. NGOVI
SUB COUNTY DIRECTOR OF EDUCATION
KITUI WEST.

Appendix IX: Research License from NACOSTI



REPUBLIC OF KENYA

NATIONAL COMMISSION FOR SCIENCE,TECHNOLOGY & INNOVATION

Ref No: 345835

Date of Issue: 05/April/2023

RESEARCH LICENSE

This is to Certify that Ms.. JACINTA KATHINI MUNYOKI of Africa Nazarene University, has been licensed to conduct research as per the provision of the Science, Technology and Innovation Act, 2013 (Rev.2014) in Kitui on the topic: FACTORS INFLUENCING THE INTEGRATION OF ICT IN TEACHING AND LEARNING IN PUBLIC PRIMARY SCHOOLS IN KITUI WEST SUB COUNTY, KENYA for the period ending : 05/April/2024.

License No: NACOSTI/P/23/24794

343833

Applicant Identification Number

Director General
NATIONAL COMMISSION FOR SCIENCE,TECHNOLOGY & INNOVATION

Verification QR Code

NOTE: This is a computer generated License. To verify the authenticity of this document, Scan the QR Code using QR scanner application.

See overleaf for conditions

THE SCIENCE, TECHNOLOGY AND INNOVATION ACT, 2013 (Rev. 2014)
Legal Notice No. 108: The Science, Technology and Innovation (Research Licensing) Regulations, 2014

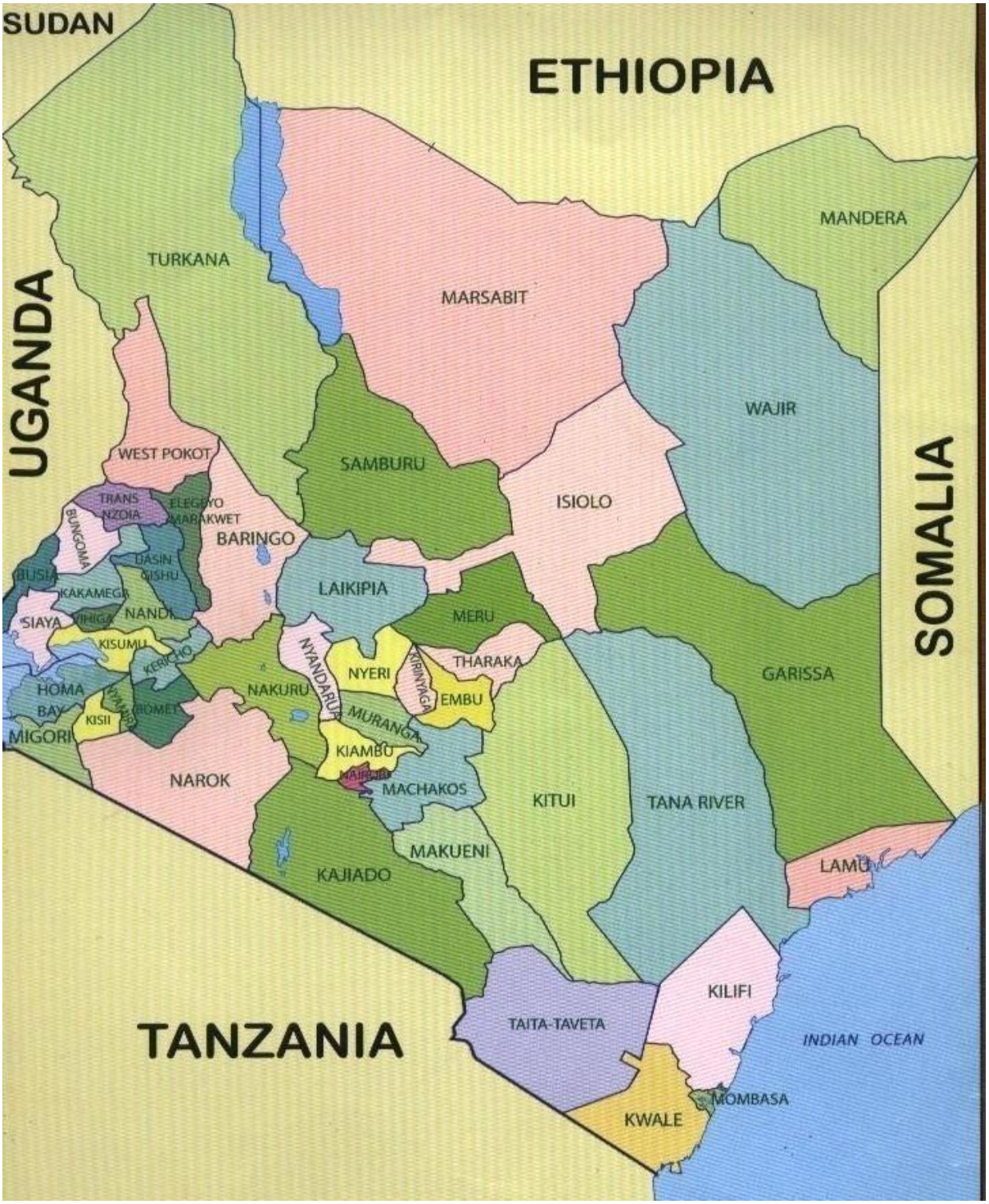
The National Commission for Science, Technology and Innovation, hereafter referred to as the Commission, was established under the Science, Technology and Innovation Act 2013 (Revised 2014) herein after referred to as the Act. The objective of the Commission shall be to regulate and assure quality in the science, technology and innovation sector and advise the Government in matters related thereto.

CONDITIONS OF THE RESEARCH LICENSE

1. The License is granted subject to provisions of the Constitution of Kenya, the Science, Technology and Innovation Act, and other relevant laws, policies and regulations. Accordingly, the licensee shall adhere to such procedures, standards, code of ethics and guidelines as may be prescribed by regulations made under the Act, or prescribed by provisions of international treaties of which Kenya is a signatory to
2. The research and its related activities as well as outcomes shall be beneficial to the country and shall not in any way;
   i. Endanger national security
   ii. Adversely affect the lives of Kenyans
   iii. Be in contravention of Kenya's international obligations including Biological Weapons Convention (BWC), Comprehensive Nuclear-Test-Ban Treaty Organization (CTBTO), Chemical, Biological, Radiological and Nuclear (CBRN).
   iv. Result in exploitation of intellectual property rights of communities in Kenya
   v. Adversely affect the environment
   vi. Adversely affect the rights of communities
   vii. Endanger public safety and national cohesion
   viii. Plagiarize someone else's work
3. The License is valid for the proposed research, location and specified period.
4. The license any rights thereunder are non-transferable
5. The Commission reserves the right to cancel the research at any time during the research period if in the opinion of the Commission the research is not implemented in conformity with the provisions of the Act or any other written law.
6. The Licensee shall inform the relevant County Director of Education, County Commissioner and County Governor before commencement of the research.
7. Exhumation, filming, recording, and collection of specimen are subject to further necessary clearance from relevant Government Agencies.
8. The License does not give authority to transfer research materials.
9. The Commission may monitor and evaluate the licensed research project for the purpose of assessing and evaluating compliance with the conditions of the License.
10. The Licensee shall submit one hard copy, and upload a soft copy of their final report (thesis) onto a platform designated by the Commission within one year of completion of the research.
11. The Commission reserves the right to modify the conditions of the License including cancellation without prior notice.
12. Research, findings and information regarding research systems shall be stored or disseminated, utilized or applied in such a manner as may be prescribed by the Commission from time to time.
13. The Licensee shall disclose to the Commission, the relevant Institutional Scientific and Ethical Review Committee, and the relevant national agencies any inventions and discoveries that are of National strategic importance.
14. The Commission shall have powers to acquire from any person the right in, or to, any scientific innovation, invention or patent of strategic importance to the country.
15. Relevant Institutional Scientific and Ethical Review Committee shall monitor and evaluate the research periodically, and make a report of its findings to the Commission for necessary action.

National Commission for Science, Technology and Innovation(NACOSTI),
Off Waiyaki Way, Upper Kabete,
P. O. BOX 30623 - 00100 NAIROBI, KENYA
Telephone: 020 4007000, 0713788787, 0735404245
E-mail: dg@nacosti.go.ke
Website: www.nacosti.go.ke

Appendix X: Map of Kenya Showing Kitui County



Appendix XI: Map Showing Kitui West Sub-County

