SCHOOL-BASED FACTORS INFLUENCING INTEGRATION OF INFORMATION AND COMMUNICATION TECHNOLOGIES IN TEACHING AND LEARNING AT PUBLIC SECONDARY SCHOOLS IN KWANZA SUB-COUNTY, KENYA

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DECLARATION

I declare that this project report is my original work and has not been submitted for a degree in this or any other university or for any award.

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DEDICATION

This work is dedicated to my children Kevin, Natasha and Brian, who rejoiced and sweated with me throughout the whole course, and to the memory of my late father Henry Odhiambo Ogam, who believed in me.

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TABLE OF CONTENTS

Content **Page**

CHAPTER TWO

LITERATURE REVIEW

CHAPTER THREE

RESEARCH METHODOLOGY

CHAPTER FOUR

DATA ANALYSIS, PRESENTATION AND INTERPRETATION

CHAPTER FIVE

SUMMARY, CONCLUSIONS AND RECOMMENDATIONS

APPENDICES

LISTS OF TABLES

LIST OF FIGURES

ABBREVIATIONS AND ACRONYMS

FPE	Free Primary Education
FDSE	Free Day Secondary Education
ICT	Information Communication Technology
INSET	In-Service Training
KCPE	Kenya Certificate of Primary Education
KCSE	Kenya Certificate of Secondary Education
KICD	Kenya Institute of Curriculum Development
MOE	Ministry of Education
MOEST	Ministry of Education Science and Technology
QASO	Quality Assurance and Standards Officer
SMASSE	Strengthening Mathematics and Science in Secondary Education
TTC's	Teacher training colleges
SCDE	Sub-County Director of Education
SPSS	Statistical Package for Social Science
ROK	Republic of Kenya
UNESCO	United Nation Education, Scientific, and Cultural Organization

ABSTRACT

The purpose of this study was to investigate the school-based factors influencing integration of ICT in teaching and learning in public secondary schools in Kwanza sub-county. The study was guided by the following objectives: to examine the influence of school type, teachers' skills, schools' support, and students' attitude on integration of ICT in teaching and learning in public secondary schools in Kwanza Sub-county. The study was guided by the model of ICT integration process. The study employed descriptive survey research design. The study targeted 43 principals, 826 teachers and 2,458 students. Purposive sampling technique was used to 13 select public secondary schools, 13 principals and 18 teachers that integrate ICT in teaching and learning. The 162 students were sampled by use of stratified random sampling as per gender. The research instruments were interview guides, questionnaires and observation checklists. Collected data were analyzed both qualitatively and quantitatively. The findings showed that school type played a crucial role in effective integration of teaching and learning in secondary school education. A majority of the principals (75%), teachers (60%) and students (55.1%) indicated that school type influence integration of teaching and learning to a large extent. Majority of the principals (91.7%) and teachers (66.7%), said that principals in their school encourage teachers to collaborate with their peers on integration of ICT in teaching and learning. A majority of the principals (75%) and most teachers (46.7%) stated that teachers' skills were very beneficial for integration of ICT in teaching and learning. This implies that teachers consultation and engagement of each other to integrate of ICT in teaching and learning. The information from the study findings showed that 66.7 percent of the principals indicate they support in-service training for teachers on integration of ICT in teaching and learning. The study results also indicated that majority of the secondary schools did not offer students facilities to use during their free time thus influencing their positive attitude towards using ICT resources for learning. It was recommended that the Ministry of Education and other policy makers need to consider putting ICT as a core subject in the curriculum of secondary schools because it is an important element in vision 2030. Making ICT a core subject will help improve students' attitude towards ICT because it will be as essential to them as any other subject they learn in school. Thus, the eagerness of students to learn ICT concepts will help realize effective integration of ICT in teaching and learning. The researcher suggested that further studies to be conducted comparing ICT integration in public and private schools in teaching and learning.

CHAPTER ONE

INTRODUCTION

1.1.Background to the Study

Information and Communication Technology (ICT) plays an important role in the education sector. Integration of ICT is considered the key to unlocking the skills and knowledge of our learners (Younie, Leask, & Burden, 2014). It is also considered the gateway for learning of the 21st century skills. According to Younie, et al. (2014), ICT is defined in education as a diverse set of technological tools and resources used to communicate, create, disseminate, store, and manage information. ICT has the capability to make a real difference to learning, which takes place both in school and out of school. When pupils learn about ICT or learn with ICT, they are equipped to participate in a constantly developing world; a world where work and leisure time are continually adapting to keep in step with the progress of technology (Shimasaki, 2015). Children are developing real, transferable life skills through their use of ICT (Kanematsu & Barry, 2015).

Mingaine (2013) notes that ICT can enhance teacher's efficiency and enthusiasm, encourage their planning and cooperation, help them adopt student-centered teaching strategies, reduce their workload, and improve the relationship between teachers and students. Shimasaki (2015) observed that in New Zealand, students confidently used ICT (including, where appropriate, assistive technology) to access and provide information and to communicate with others. In addition, effective pedagogy process where teacher's actions

promoting student learning. In the New Zealand curriculum, Shimasaki (2015) states that ICT and e-learning have a major influence on students' learning. In the current New Zealand Curriculum, ICT has become one of the key competencies' central to all curriculum areas.

ICT is not treated as a subject in itself (as in the previous curriculum) but it is integrated as a goal. Students must now be competent in ICT across curriculum areas. This may demonstrate a Swedish Ministry of Education intention to integrate ICT throughout the curriculum. According to Hanson and Holmberg (2017), many Swedish pupils already have access to laptops and out of 49 schools considered, at least 43 schools accounting for 88% had provided computers for all their pupils. Most of these schools were secondary or upper secondary schools.

According to Agbo (2015), the governments in sub-Saharan Africa countries like Egypt use of ICT to enhance teaching and raising educational standards for effective literacy. Moreover, ICT integration is primarily an individualized approach to teaching, which allows students to work independently developing self-independence, which encourages mastery of learning. Nigeria recognizes the pivotal roles of ICT in the revitalization and development of the country's education system (Nwosu et al (2018). Teachers perceive ICT as very useful and using computers makes teaching and learning easier.

Botswana Information For All Program (IFAP) Committee, (2016) observed that the Government of Botswana introduced its national ICT policy, called 'Maitlamo', which provides a roadmap to drive social, economic, cultural, and political transformation through the effective use of ICTs. 'Maitlamo' aims to provide a communications network that meets high international standards and ensure the country has the skills to be an ICT leader. Its key goals are for Botswana to become a sub-Saharan ICT hub, to create an enabling environment for the growth of an ICT industry in the country, and to provide universal service and access to information and communication facilities in the country. To achieve this, Botswana needs to integrate ICT in the teaching and learning at all levels of education. Botswana has made a commendable effort to provide resources for its junior secondary schools; however, many schools struggle with their effective use. Computers, while available in most schools, often are not connected to the Internet, precluding their use in cross-curricular instruction. While libraries exist in most schools, they do not have current collections and do not yet operate as vibrant centres of learning (Mafuraga & Moremi, 2017).

In Kenya, the integration of ICT in education is essential to the mandate of developing a skilled human resource. Sessional Paper No. 14 of 2012 states that education shall be transformed to meet the 21st century needs for education and training through equipping the labour force with requisite skills to participate and compete in the knowledge economy and at the same time attain Kenya's education goal (ROK, 2012). Vision 2030 stipulates Kenya's

goal to transform into a globally competitive and prosperous nation with a high quality of life. To achieve this goal, the education sector is expected to help deliver this objective in all the three pillars (social, economic, and political) of Kenya's Vision 2030. There are currently 8,000 public secondary schools in Kenya and the massive increase in primary school enrolment is putting pressure on the demand for and access to secondary school (MOEST, 2018). The Ministry of Education Science and Technology (MOEST, 2011) remains concerned with the quality of secondary education, which is characterized by poor performance in core subjects such as Mathematics and Science. There are obvious benefits for integrating computers into secondary schools as students at this age need to focus on subject-specific content, greater critical thinking skills, scientific inquiry, and mathematics, science, and languages. Students will benefit greatly with the analytical, creative, and collaborative power of computer technology to map out and analyze assumptions, present ideas, and participate in projects with peers from around the country and around the world (UNESCO, 2017).

The lack of ICT in classrooms, lack of knowledge, technical support and insufficiency of in-service training can explain why teachers do not use ICT in their lessons. However, the integration of ICT into teaching/learning process is a complex and multidimensional task including many dynamics such as ICT tools, teachers, students, school administration, educational programmes and school culture (Ali, Haolader, & Mohamed, 2017)

According to Wangili (2015), many secondary schools in Trans Nzoia West and East Sub-counties have tried to integrate ICT into their teaching and learning but Kwanza Sub-county is still lagging behind compared to the other two in Trans Nzoia County.

Table 1: Number of Schools that have Integrated of ICT in Teaching and Learning in Trans Nzoia County

Sub-County	Total number of schools	Number of schools without ICT facilities	Percentage
Trans Nzoia West	63	52	82.54%
Kwanza	26	7	26.92%
Trans Nzoia East	47	26	55.32%

Source: Kwanza Sub-County Education office, (2018)

Information contained in Table 1.1 shows that Kwanza Sub-County still lags behind in the integration of ICT into teaching and learning. This call for an evaluation into school-based factors that influence the integration of ICT in secondary schools face which are yet to be documented, hence the need for this study.

1.2.Statement of the Problem

The pace of ICT integration in Kwanza sub-county secondary schools has not been fast enough as in other sub-counties (Trans Nzoia East and Trans Nzoia West) in TransNzoia County. This implies that secondary school teachers in Kwanza sub-county are still utilizing the traditional instructional forms and

not making any efforts to integrate ICT in teaching and learning. This is despite the government's effort to improve integration of ICT into various subjects in various schools. This includes initiatives such as in-servicing of teachers through workshops organized by various stakeholders in the Ministry of Education.

The government, through the Ministry of Education, has also put in place initiatives to facilitate integration of ICT in teaching and learning. For instance, the Intel-Teach Getting Started Course, which aims at developing teachers' basic computer skills, integration of ICT in teaching and the 21st Century approaches into teaching. There is also support from Computer for Schools Kenya (CFSK) project, which encourages all schools to integrate ICT in teaching and learning to attain its full potential (Computer for Schools Kenya, 2018). Although all these efforts have been made in Kenya and Trans-Nzoia as a county, Kwanza Sub-county is still lagging behind in terms of ICT integration in teaching and learning. This implies there might be some school related factors that might be hindering the integration of ICT into the teaching and learning, hence the need of the study.

1.3.Purpose of the Study

The purpose of the study was to investigate the influence of school-based factors on integration of information and communication technologies in teaching and learning in public secondary schools in Kwanza Sub-County, Kenya

1.4.Objectives of the Study

The study was guided by the following objectives:

i. To determine influence of school type on integration of ICT in teaching and learning in public secondary schools in Kwanza Sub-County.

ii. To establish influence of teachers' skills on integration of ICT in teaching and learning in public secondary schools in Kwanza Sub-County, Kenya.

iii. To determine the extent to which schools' support influence integration of ICT in teaching and learning in public secondary schools in Kwanza Sub-County.

iv. To establish influence of students' attitudes on integration of ICT in teaching and learning in public secondary schools in Kwanza Sub-County, Kenya.

1.5.Research Questions

The study sought to answer the following research questions;

i. What is the influence of school types on integration of ICT in teaching and learning in public secondary schools in Kwanza Sub-County?

ii. What is the influence of teachers' skills on integration of ICT in teaching and learning in public secondary schools in Kwanza Sub-County?

iii. To what extent do schools' support influence integration of ICT in teaching and learning in public secondary schools in Kwanza Sub-County?

iv. What is the influence of students' attitudes on integration of ICT in teaching and learning in public secondary schools in Kwanza Sub-County?

1.6. Significance of the Study

This study purposed to investigate the influence of school based factors on integration of ICT in teaching and learning in public secondary schools in Kwanza sub County of Trans Nzoia County. It is hoped that the study may provide insights on integration of ICT especially in public secondary schools. Nwosu & Kamaruddin (2018) says that no country can operate in the 21st century without a 21st century policy embracing computers, data communication, and other new data. The researcher hopes that the results of this research will inject the much-needed knowledge, attitudes, and skills necessary to spur ICT integration in teaching and learning in our schools.

It is hoped that this study might provide data and information on school based factor and their influence on integration of ICT on learning and teaching in public secondary schools. This information could be useful to other researchers in the fields of educational administration, planning, and curriculum and instruction in secondary schools to foster further research. The findings of the study would give valuable information to institutions within the Ministry of Education, such as, the Kenya Institute of Curriculum Development (KICD), teacher training colleges (TTC's) and the inspectorate, on the school based factors that hamper integration of ICT in the teaching and

learning in secondary in public secondary schools. Thus, the findings of the study too may encourage teacher educators to develop or structure new strategies to integrate of ICT in the teaching and learning in secondary in public secondary schools.

The findings of this study may create ICT awareness and sensitivity in secondary schools, which may help practicing teachers explore the effectiveness of their own teaching techniques and, therefore devise strategies aimed at improving the standards of teaching their subjects using ICT. This will enhance students' performance in public secondary schools.

1.7.Delimitations of the Study

The study was carried out in public secondary schools in Kwanza Sub-county, Trans Nzoia County. Kenya. The study was limited to teachers, students, and head teachers of public secondary schools and the Quality Assurance and standards officers (QASO) in the sub-county. The study focused on the school-based factors and their influence on the integration of ICT in the teaching and learning in public secondary schools in Kwanza Sub-county.

1.8.Limitations of the Study

Parents and other stakeholders may have opinions on school-based factors affecting the implementation of ICT in schools; it was not possible to cover them, as this required considerable time and resources. In addition, respondents were not free to express their views. The researcher used a research assistant from the locality to enable respondents to be free to offer their information. The issue of insecurity in the study area was mitigated by looking for protection from security personnel when collecting data.

1.9 Assumptions of the Study

The study was based on the following assumptions:

i. That the respondents co-operated and were truthful in answering the questions presented in the questionnaire.

ii. The teachers, students, and head teachers in the sampled public secondary schools were aware of ICT integration into teaching.

iii. In addition, intervening variables had minimal or no effect on the findings of this study.

1.10 Definition of Significant Terms

The following are key terms as used in the context of the study;

ICT Integration refers to the use of ICT to introduce, reinforce, supplement, and extend skills in the teaching and learning process.

Information and communication technologies (ICT) refer to the technologies, which are being used for collecting, storing, editing, and passing on information in various forms.

ICT support refers to administrative policies with regards to ICT within the school.

Integration refers to the system used to facilitate children with disabilities to attend ordinary schools that provide minimal modifications to accommodate the learners with special needs in education.

School-based factors refer to physical, human and financial resources within the school setup that influence the use of ICT in the teaching and learning in schools.

School type refers to the nature/category of school in terms of gender of learners and either boarding or day. In this case, Boys' school type, Girls' school type, mixed day school type, Boys' boarding, or Girls' Boarding.

Student's attitudes refers to perceptions and beliefs learners have on the integration of ICT in learning, perceptions and beliefs influence their behavior towards learning.

1:11. Organization of the Study

The study was organized into five chapters. Chapter one which is introduction, lays down the background of the study from global, regional and local perspective, statement of the problem, objectives of the study, research questions, significance of the study, limitations, delimitation and definition of terms. Chapter two which is literature review highlights on the concept of antisocial behavior, focusing on each objective relative to the dependent variable, summary of literature review, knowledge gap, theoretical and conceptual frameworks.

Chapter three is the research methodology covering the research design, target population, sample size, sampling procedure, research instruments, data collection procedure, data analysis techniques and ethical considerations. Chapter four consists of findings including presentation, analysis, and discussion of the research findings. Chapter five focuses on the summary of the study, conclusions, recommendations and suggestions for further study.

CHAPTER TWO

LITERATURE REVIEW

2.1Introduction

The literature review is based on the objectives of the study. The literature review highlights on a number of essential issues including: ICT Integration in Kenya Education Sector; availability of ICT tools used for teaching and learning; professional development needs of teachers regarding ICT use in teaching and learning; schools support of ICT integration in teaching and learning; students' attitudes to ICT integration into teaching and learning. Summary of literature, research gaps, theoretical and conceptual framework are also presented.

2.2 ICT Integration in Kenya Education Sector

Information Communication Technologies is seen as an important instrument to support new ways of teaching-learning process. Information and communication technology (ICT) is being integrated into the teaching-learning process in various educational institutions in the world (UNESCO, 2017). The Ministry of Education (MoE) in 2005 developed a Kenya Education Sector Support Program (KESSP), which recognized technology as one of the crucial factors in enhancing the educational process. Thus, in June 2006 the MOE developed the National ICT Strategy for Education and Training document, referred to as the ICT policy for the education sector. The MoE headed the monitoring and evaluation of the planned implementation, with guidance of the government regulations on education system and ICT. The monitoring also referred to strategic education documents for implementing, and global

objectives such as Education for All (EFA) and the Millennium Development Goals (MDGs) (Ministry of Education, Science and Technology, 2018). There was also the teacher education and professional (TEPD) focusing on teacher capacity, and Global teenager project (GTP-Kenya) which uses ICT as a means of connecting learners globally.

According to MoHEST (2011), majority (about 85%) of the surveyed institutions wants the teachers to use ICT facilities, about 15% of them do not have such requirements and almost 20% of the teachers do not use ICT facilities in the process teaching and learning at their institutions. Most of the teachers do not use ICT facilities for doing research in their studies and getting access to information (CEMASTEA, 2018). The little resources available are mainly used by teachers to develop their skills and knowledge and not teaching (MoHEST, 2011). There exist gap between the ICT management systems at the national, regional and individual institution levels. The teachers and management at these institutions have not been trained on the utilization of the information that is readily available due to technology. This study seeks to fill the gap by establishing the influence teacher development on ICT skills on teaching and learning and from the results, appropriate mitigation strategies will be put in place to address the key issues underlying the study. Notably, teachers will enhance their abilities to integrate ICT technology and teaching.

2.3School Type and Integration of ICT in Teaching and Learning

According to Mutisya (2017), there is significant difference in ICT adoption and school type which are either day or boarding schools. Most of the day

schools used both traditional and modern ICT related aspects in teaching and learning process thus integration of ICT is reported to be slower. But, a slight difference is observed where more boarding schools seem to adopt and use modern ICT as compared to day secondary schools in Kitui County. Similar results were realized by Abubakar (2016) who stated that in public secondary schools in Nigeria more boarding secondary schools have higher level of adoption and use of ICT.

Wangili (2017) established that there is a difference in ICT adoption and use among day and boarding secondary schools in Trans-Nzoia County. Results from Wangili's study show that boarding schools adopted and used ICT for a longer period of time than day schools. According to the study by Mutisya (2017) boarding schools have better facilities with modern ICT as compared to day schools. This is mainly because most of the boarding schools are well established with good infrastructural facilities and have been in existence for a longer period as compared to day schools. Thus, the current study sought to establish whether school type influence integration of ICT in teaching and learning in public secondary schools.

Mwikya (2014) observed that 56.3% of schools had less than five computers, 10.4% had ten to fifteen computers, 14.6% had fifteen to twenty computers while 18.8% of the total number of the schools sampled had 20 67 computers and above. Most of the day schools sampled falls in the 56.3% which worsen the situation given that majority of the schools in the Sub-county are day

schools. Although the schools had computers they are too few compared to the users in the schools. This not only limits the access but it also becomes difficult to rely on them in teaching and learning. Further, Abubakar (2016 states that types of schools with higher adoption of ICT use have integrated the utilization of ICT in their day-to-day teaching more easily. The study therefore sought to establish the relationship between type of school and integration of ICT in teaching and learning process in secondary schools.

2.4 Teacher's ICT Skills and Integration of ICT in Teaching and Learning

Enhancing pedagogy through ICT can also be a powerful means to improve equity in education and thus can be an important mechanism for inclusive education (UNESCO, 2014). In Europe only 25% of students in Grade 8 and 11 and 30% in Grade 4, respectively, are taught by teachers for whom ICT training is compulsory (European Commission, 2013). However, while many ICT skills are acquired outside of the formal teacher training system, additional effort needs to be made to make ICT a mandatory rather than optional part of the curriculum. Many national curricula in Europe include ICTs and it is increasingly becoming an examined subject in Africa and Asia as national strategic development documents recognize the importance of ICTs in teacher capacity-building and professional development. Despite the increased emphasis on training teachers on the use of ICT, decisions to make such training compulsory are not always certain.

In the case of Rwanda, such courses in teacher training programs have not always been a prerequisite for teaching where it was officially considered an

optional subject within its national curriculum (Rubagiza, Were, & Sutherland, 2017). Rwanda is currently in the process of reviewing its ICT in Education Policy and UNESCO is supporting the Rwanda Board of Education in updating its ICT Essentials for Teachers Curriculum, based on the UNESCO ICT Competency Framework for Teachers (ICT CFT) (UNESCO, 2014). Compared to the studies conducted in Rwanda and Europe on ICT integration in teaching and learning, which focused on ICT Policy other than its influence in teaching and learning, this study seeks to not only focus on that influence, but also consider how teacher ICT skill development, School ICT support, students' attitude towards ICT and school type influence teaching and learning.

Inclusive education and the use of assistive technologies, however, are rarely covered in teacher training programs so teachers typically do not have the skills to support children with a number of disabilities (UNESCO, 2014) and this is especially so in developing countries. Nevertheless, some developing countries are establishing courses as part of teacher training. Ngeze (2017) for example, provides an example from the United Republic of Tanzania whereby courses are on offer at the tertiary level to train secondary education teachers on inclusive education. Meanwhile, Bangladesh also offers courses on inclusive education but there is no regulation that requires teachers to take these courses, which are considered elective (Ngeze, 2017). The training of teachers effectively to use assistive technologies also needs to be captured in new indicators. Expanding current indicators can monitor the shift from in-service teacher professional development and training programs towards the

inclusion of pre-service teacher development on ICTs in education as this study sought to establish, is the best way to ensure inclusion of ICT in training teachers and in teaching learners.

2.5 Schools' Support and Integration of ICT in Teaching and Learning

Schools' support that the study focuses on are the administrative policies towards ICT within the schools. A number of studies; (Ghavifekr, Kunjappan, Ramasamy & Annreetha (2017) state that leadership promoting change is a key factor when it comes to merging ICT and instruction. Leadership plays a key role in ICT integration in education. The integration of ICT into classroom instructions, remains far behind because of numerous inhibiting factors, such as the inadequacy of infrastructures (internet access, bandwidth, software, hardware, computers), lack of realistic policy on ICT use, lack of teacher's pre-service and in-service training, poor teachers' welfare and morale, lack of parent and community participation, political and social conflict (Agbo, 2015). Teachers, like all learners, learn new skills most readily when there is a need to do so. They generally resist technology innovations that do not match the context in which they work, especially when these technologies do not address real classroom problems, situations, and learning goals. To overcome this resistance, it is important to provide real tasks for teachers, allow them to set individual goals, acquire the skills to meet these goals and have opportunities to reflect on their learning experiences (Abubakar, 2016).

Successful ICT integration is related to actions taken at the school level, such as the development of an ICT plan, ICT support, and ICT training (Noor ul

Amin, 2013). The role of school leaders in building the capacity of teachers to support and facilitate ICT integration in teaching and learning is therefore very important. (Ali, Haolader, Muhammad, 2017). The school leader's major responsibility lies in initiating and implementing school change also in taking the right decisions to support the ICT integration into pedagogical practices. Being aware of the different developmental stages that teachers may go through in an implementation phase and knowing how to provide adequate support is essential for a successful ICT integration. This research aims at discussing the different responsibilities of a school leader and the different kinds of leadership that can support this transformation and integration, which Ali, Haolader, and Muhammad (2017), and Noor ul Amin, (2013) did not consider

Implementing ICT into schools is the responsibility of the school principal, they have to ensure that the best interests of the students are served through effective ICT infrastructure and staff professional development (Ghavifekr, Kunjappan, Ramasamy & Annreetha, 2017). Nevertheless, unfortunately many principals have not prepared for their new role as technology leaders, and have therefore struggled to develop both the human and technical resources necessary to achieve ICT outcomes in their schools. Due to this problem informal leaders in many schools have emerged from classrooms, libraries and computer labs to take up the difficult task of planning for technology integration, and supporting distributed and often uncoordinated efforts by enthusiastic teachers (Rubagiza, Were & Sutherland, 2017). Leadership is therefore a critical component in the successful integration of

ICT in Education (Thanniamalai & Raman, 2018). The importance of leadership in managing ICT integration has been revealed in many research. In order to be effective, leaders have to deploy three comprehensive categories of leadership practices: setting direction, developing people, and making the organization work (Ottestad, 2013). Another main factor, which exercises great influence on the ability of leaders to influence ICT integration, is policy and good practice. Botswana IFAP Committee (2016) claim that national policy documents that fail to make clear recommendations for practice make it hard for staff to interpret policy in practice. Schools have to develop and take specific steps to implement policies to ensure that there are commonly understood protocols and practices operating at all levels of the organization and by all staff.

Leaders must also acknowledge the pedagogical use of ICT in education and be prepared to lead these reforms. These policies were criticized by Noor ul Amin (2013) as most of them include only ‘narrow technical plans’ which remove opportunities for discussion among educational leaders about pedagogies, school structures and the curriculum. According to Noor ul Amin (2013), it appears that teachers belonging to schools engaged in ICT planning are more likely to apply ICT in an innovative way (Kozma, 2008). Different from the aforementioned studies in this section, this study seeks to establish the role of the school head in supporting integration of ICT in teaching and learning (Dube, Nhamo, & Magonde 2018). The study purposed to establish how school heads have been able to mitigate some of the challenges faced by

the institutions, teachers and learners in an effort to integrate ICT in teaching and learning.

2.6 Students' Attitudes and ICT Integration in Teaching and Learning

Information and Communication Technology has gained recently, a lot of support; its significance has become one of the main interests of the educational field. According to Eickelman & Vennemann, (2017), the integration of such technology in classrooms depends mainly on taking account students' motivation and attitudes. Mohaned (2018) showed evidence to suggest that the attitudes of teachers toward ICT are directly related to computer use in the classroom. Success of student learning in using ICT depends largely on teachers' attitudes towards ICT (Halili & Sulaiman, 2018). If teachers show positive attitudes towards ICT then they can easily provide useful insights about acceptance and usage of ICT in teaching for students. Many researchers emphasized the dimensions of attitudes towards ICT. Some examples are perceived usefulness of ICT and confidence about using ICT, training (Tsitouridou & Vryzas, 2003), gender, anxiety and liking/disliking (Yıldırım, 2000). Integration of ICT into the teaching process can also be impeded by other barriers like lack of equipment, lack of access to the right types of technology in appropriate location, cost of technology, and poor administrative support. All these aspects can create negative attitudes towards ICT. Many explorations are focused on finding gender differences in attitudes and using ICTs. Adil, Masood & Ahmed (2013) found that males had more access to computers at home, and held favorable attitudes toward use of computers in their medical studies as compared to females. A small proportion

of students reported that they would prefer not to use computers in their studies. Males were also significantly more inclined to replace traditional teaching activities with ICT resources.

A study by Mustafa (2014) also confirmed that both men and women had similar engagement with computers and held concerns for the future effects of continuous computer use, but women were more anxious about hardware usage, and judged less positively the consequences of computers in personal and social life. Research on gender differences in ICT has shown that in most countries girls and women are often behind in ICT usage and ICT knowledge and skills. In the literature given by Adil, Masood & Ahmed (2013) there is a controversy among studies on attitudes towards ICT with respect to students' age. Although it is reported that younger pupils have more positive attitudes toward computers than the older (Mustafa, 2014). After that, narrowing down the research to how gender, age and even socio-economic status shape attitudes makes the research more systematic and empirical.

2.7 Summary of Literature and Knowledge Gap

Effective use of ICT in teaching and learning depends on the availability of these facilities and supportive factors such as availability of power supply. Most schools do not have ICT facilities and support due to their nature, that is, most are small with few students, and lack funding. Teachers ICT skills are inadequate as they are rarely covered in teacher training programs. However, this inadequacy is currently being addressed. In order to apply an effective and sustainable ICT Integration administrator must be competent in it and

understand the technical, financial, and social dimensions of ICT use in education.

Study by Thanniamalai and Raman (2018) focused on leadership factors influencing integrating ICT in school; however, the study failed to consider school-based factors influencing integration in teaching and learning in ICT in schools. Although Studies by Dube, Nhamo and Magonde (2018) and Ali, Haolader and Muhammad (2017) delved on the integration of ICT in teaching and learning in schools, they were focused in Nigeria and Uganda respectively and not Kenya as this study.

Studies by Semerci and Aydin (2018), Shimasaki (2015), Mafuraga and Moremi (2017), Nwosu, Mohd Daud and Kamaruddin (2018), Abubakar, (2016), Rubagiza, as well as Were and Sutherland (2017) were focused on the integration of ICT in secondary schools, but each failed to narrow down on school types, perception of students, and skills of teachers as this study. From all these studies there is evidence that none of them focused on the school-based factors facing the ICT integration into teaching and learning, which is the main concern of this study.

2.8 Theoretical Framework

This study was guided Diffusion of innovations theory proposed by Everett Rogers in 1962. It is a theory of how, why and at what rate new ideas and technology spread through cultures. The theory indicates that innovations are communicated through certain channels over time and within a particular social system (Rogers, 1995) According to this theory individuals adopt innovation with varying degrees of willingness. Thus, the theory classifies

individuals into five segments of innovativeness namely; innovators, early adopters, early majority, late majority, and laggards (Rogers, 1995). Therefore, this theory enabled this study better understand how teachers integrate ICT into their teaching in schools. This theory will be of interest to the study because of the difficulty that people and organizations have had in getting a new idea adopted, even when it has obvious advantages. Rogers (1995) observes that many innovations endure a long period from when they are available to when they are fully integrated. The use of diffusion of innovation theory to examine ICT integration by teachers teaching in public secondary schools should prove useful to identify school based factors encountered in the integration process. Early research in diffusion in education found that there was a considerable time lag in the integration of new educational ideas (Rogers, 1995).

2.9 Conceptual Framework

This study was based on the conceptual framework in Figure 2.1.

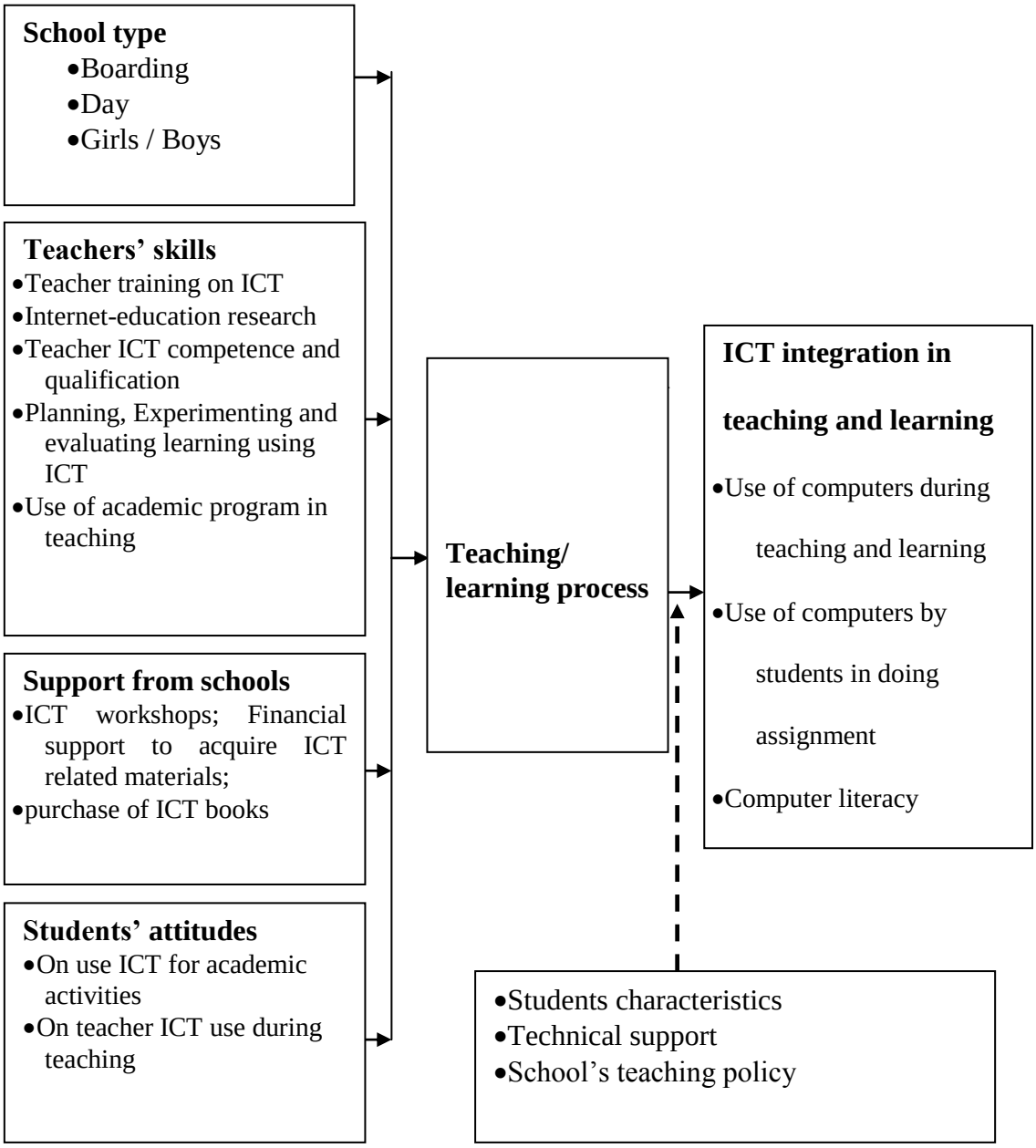

Figure 2.1: Conceptual Framework Showing the Relationship between Variables

This study assumes that a number of school-based factors might influence the integration of ICT in the teaching and learning in schools. In this study, school

type, teacher's ICT skills, Schools' support of ICT and students' attitude towards ICT may influence integration of ICT in teaching and learning in secondary schools.

CHAPTER THREE

RESEARCH METHODOLOGY

3.1.Introduction

This chapter deals with the research design adopted by the study, location of the study, target population, sample size and sampling procedures, research instruments used in data collection, validity and reliability of instruments, data collection procedures, data analysis procedures, and ethical considerations

3.2.Research Design

This study adopted a descriptive survey research design because it involves collecting quantitative and qualitative data in order to answer questions or test hypotheses concerning the status of the subjects of the study (Kerlinger, 2000). According to Mugenda and Mugenda (2003), Kothari (2009) and Kerlinger (2000), the design seeks to identify the nature of factors involved in a given situation, determine the degree in which they exist and discover the links that exist between them. The choice of this research design is because the researcher will not manipulate the variables. The survey method is also chosen because the findings of this study were generalized over a large population (Best and Khan, 2005). The design therefore aided the researcher in examining the attitudes, opinions, perception and characteristics of the head teachers, teachers, students and the QASO concerning the school based factors affecting integration of information and communication technologies the teaching in public secondary schools in Kwanza sub-county.

3.3.Target Population

According to Zikimund, Babin, Carr and Griffin, (2013), target population is the entire group of individuals, objects, item, cases, articles or things with common attributes or characteristics from which samples are taken for measurements. The target population that was studied comprised of 43 head teachers, 2458 form four students, 1 QASO and 826 teachers in Kwanza Sub-county. According to Kwanza Sub-county Education Report (2016), there are 43 head teachers, 2458 form four students, 1 QASO and 826 teachers in the sub-county. Therefore, the total target population was 3328.

3.4.Sample Size and Sampling Procedures

Stratified sampling was employed in order to have homogeneous sub groups (and head teachers, Form Four students and teachers) in various strata (types of schools) and the QASO for subsequent analysis that would make it easy to make comparisons and draw conclusions (Kombo & Tromp, 2006). Therefore, 30 percent of the target schools used to sample the number of schools used in the study, which was 13 schools. All the 13 head teachers in the sampled schools were sampled using census sampling technique. Simple random sampling was used to select 6 teachers and 18 form four students in each sampled school. Table 3.1 shows the sampling frame.

Table 3.1: The Distribution of the Sample Size in the Different Strata

Type of school	No of Schools	Number of Head teachers	Number of teachers	Number of students
Single sex boarding	2	2	2	42
Single sex day	1	1	8	23
Mixed day schools	7	7	1	57
Mixed boarding	1	1	7	17
Mixed boarding/day	2	2	10	29
Total	**13**	**13**	**18**	**162**

The total sample for the study comprised of 13 head teachers, 18 teachers and 162 form four students, adding up to 192 respondents.

3.5. Data Collection Instruments

Questionnaires and interview schedules were used to solicit data from the respondents. The study used three types of instruments, questionnaires for teachers and Form Four students and interview schedules for the head teachers and observation checklist for ICT infrastructure and facilities.

A questionnaire has the ability to source information associated with the intensive inquiry nature of the research, it is found to be convenient, cost effective and highly dependable (Kothari, 2009). It is also able to allow the respondent's time to respond objectively. The questionnaire that was used to collect data from the teachers and students consisted of a number of both

open-ended and closed-ended questions. The questionnaire was enable the researcher to collect data within a shorter time since most of the information was easily described in writing. Thus the questionnaire was used to collect teachers and students views on the school based factors affecting the integration of ICT in public secondary schools Kwanza sub-county.

This study also made use of interview schedules on head teachers to collect the required information on the school-based factors affecting the integration of ICT in the teaching in schools. Mugenda and Mugenda (2003) define an interview schedule as a set of questions that the interviewer asks when interviewing. The interview schedule tool enabled the researcher to collect information that supplemented the questions covered in the questionnaire.

This study made use of observation checklist to collect data on ICT facilities and infrastructure. An observation checklist is a form prepared prior to data collection that delineates the behavior and situational features to be observed and recorded during observation (Mugenda and Mugenda, 2003). According to Kothari (2009), the merits of this method is that there is no fear of the research being biased, there is no subjectivity.

3.6 Validity of Research Instruments

Kraska-Miller (2013) defines validity as the ability of a research instrument to give results that reflect what it purports to measure, results that reflect or are related to the topic. According to Murray (2003), piloting is important because it helps to identify ambiguities of the items and vague questions for improvement. Through a pilot study, the researcher was able to establish the content, construct and face validity of the instruments. A pilot study was

conducted before the main study. For this purpose, 10% of the sample (Connelly, 2008), five (5) secondary schools in Trans Nzoia East, was used in piloting the instruments of the study. Given that Kwanza and Trans Nzoia East are rural sub-counties, their schools' characteristics are nearly the same. Thus, 5 head teachers, 60 teachers, and 120 students were involved in the exercise.

Establishing the content, construct and face validity is meant to assess the accuracy, meaningfulness, appeal, and appearance of the instruments for data collection. Thus, the researcher's supervisors assisted in ensuring that the instruments are in relation to the set objectives and content area under study. Their suggestions and comments were used as a basis to modify the research items and make them adaptable to the study. Basing on the feedback from the experts, the wordings of the instruments were modified appropriately.

3.7 Reliability of the Research Instruments

According to Kraska-Miller (2013) reliability is the measure of a research instrument to give consistent results even if the process is repeated. Data collected from the pilot study was used to compute the reliability of the instruments' items. The reliability of students and teachers' questionnaire was done using the test re-test method. This was done by administering the research tools to the pilot sample at a time difference of two weeks. It was conducted over two time points over a relatively short period of time to mitigate against age related changes. The correlation coefficient of the scores from two sets of scores were calculated using Pearson's Product Moment Formula (Mugenda & Mugenda, 2003). A correlation coefficient of between -

1 and +1 mean that the reliability of the research instrument is high and that the research instrument can give consistent results upon been repeated to the same population. For all the instruments, a coefficient of above 0.70 was realized where the principals' interview schedule guide scored a coefficient correlation of 0.73, teacher's questionnaire, 0.81, and student's questionnaire scored 0.76 while the observation checklist scored 0.84 showing sufficient reliability to yield consistent data for this study.

3.8 Data Collection Procedure

Data collection involved the administration of questionnaires to teachers and students. These respondents responded to the questions in the questionnaires and returned them to the researcher based on the arrangements made. School heads took part in responding to interview questions in a 15 minutes session where they were required to give their views, opinions and ideas about the topic of study. The interview was meant for shedding more light on issues not captured by questionnaires, but are considered important in enriching the discussion in the subsequent chapters. The researcher then used observation checklist to identify some of the ICT resources and related materials, check the quantity, state and availability and record the same on the checklist. Two research assistants were helping the researcher in the research process; they were trained on the purpose of the study and expectations of the study. They helped in administering questionnaires and confirming that respondents have answered all the questions before they took them.

3.9Data Analysis Techniques

Data analysis is the process of bringing order, structure and meaning to the mass of information collected. The method of analysis chosen in this study depended on the research questions tested. Based on the data collection instruments, data was analyzed both quantitatively and qualitatively. Quantitative data was analyzed using SPSS software version 22 where descriptive and inferential statistics. The description of the characteristics of variables (sampling units) was done using frequencies and percentages Inferential statistics involved the establishment of coefficient correlation to establish the influence of independent variables on the dependent variables.

3.10 Ethical Considerations

The researcher sought approval of the proposal from the Department of Educational Administration and Planning, and the Faculty of Education. She then sought an approval letter from the School of Graduate Studies of the University of Nairobi. The letter was then used by the researcher to acquire a research permit from the National Commission for Science, Technology, and Innovation (NACOSTI). The research permit was used to inform the Trans Nzoia County Director of Education on the intended study. The permit was also used to seek permission from the respondents of the study. The nature and purpose of the research were explained to the respondents by the researcher. The following four areas were addressed throughout the study as ethical concerns: avoiding harm to participants, informed consent, privacy, and confidentiality and avoiding deception.

CHAPTER FOUR

DATA ANALYSIS, PRESENTATION AND INTERPRETATION

4.1 Introduction

This chapter deals with data analysis, presentation and interpretation of the research findings. The study investigated the influence of school-based factors on integration of ICT in teaching and learning in public secondary schools in Kwanza sub-county. The objectives were to establish the influence of school type, schools' support, teachers' skills and students' attitude on integration of ICT in Teaching and learning in public secondary schools. The findings of this study are based on the responses of the principals, teachers and students. Collected data was analyzed using descriptive and inferential statistics and presented in frequency distribution tables.

4.2 Questionnaire Return Rate

Three sets of questionnaires were used to collect data for this study, that is, questionnaires for principals, teachers and students. The sample size comprised of 13 principals, 15 Teachers and 162 students, where 13 principals were interviewed and 177 questionnaires were issued to the respondents, thus 189 research tools were administered. Table 4.1 presents the instrument response rate.

Table 4.1: Questionnaire Return Rate

Category	Number of questionnaires administered	Number of questionnaires filled out and returned	Percent
Principals	13	12	92.3
Teachers	15	15	100.0
Students	162	158	97.5
Total	**189**	**185**	**95.4**

Table 4.1 indicates that the total response rate was 95.4 percent. The findings indicated that the response rates were representative and conformed to the statement from Mugenda and Mugenda (2003) that stipulates that instrument response rates above 70 percent are excellent and adequate foe analysis in social science research.

4.3 Demographic Information on the Respondents

This section was to establish the demographic attributes of respondents to understand the background of the respondents in the study. The researcher required them to indicate their gender, age, academic qualifications and teaching experience, among other variables. The information was important to establish the nature of the participants of the study. Descriptive statistics from the data collected from the respondents were presented in subsequent sections.

4.3.1 Distribution of Respondents by Gender

The demographic characteristics of the sample are divided into two basic categories where there is a category for teachers and another for students. The results are presented in Table 4.2.

Table 4.2: Respondents Gender

Gender	Principals		Teachers		Students	
	Frequency	Percent	Frequency	Percent	Frequency	Percent
Male	9	75.0	4	26.7	77	48.7
Female	3	25.0	11	73.3	81	51.3
Total	**12**	**100.0**	**15**	**100.0**	**158**	**100.0**

Table 4.2 shows that a majority (75%) of the principals were male while, 73.3 percent of the teacher respondents were female. These findings agree with Cubillo and Brown (2003) who note that the teaching profession is dominated by women. Females are more represented in the teaching career due to the limited strain associated with the profession unlike other strenuous profession like building and construction, joinery among others.

Students' representation by gender showed that female students (51.3%) were slightly higher than male students (48.7%). These findings were an implication that due to the higher numbers of girls population than boys in the study area, the population of female students was slightly higher than that of their male counterparts. Therefore, the study sample was gender representatives since both genders were represented in all categories of respondents.

4.3.2 Age Distribution of Teachers

The study sought to find out the age of the teachers. This information helped to know the ages of the teachers in public secondary schools in Kwanza sub-County. The results are presented in Table 4.3.

Table 4.3: Principals and Teachers' Distribution by Age

Age in years	Principals		Teachers	
	Frequency	Percent	Frequency	Percent
Below 30 years	0	0.0	4	26.7
31 – 40 years	2	16.7	8	53.3
41 – 50 years	3	25.0	2	3.3
Over 50 years	7	58.3	1	6.7
Total	**12**	**100.0**	**15**	**100.0**

Table 4.3 indicates that majority of the teachers were of the age ranging between 26 and 35 years accounting for 70 percent. This shows that majority of the teachers are in their mid-twenties and thirties. Students were requested to indicate their class to show their representation in the study. Table 4.4 presents the study findings.

Table 4.4: Students Distribution by Class

Class	Students	
	Frequency	**Percent**
Form 3	61	38.6
Form 4	97	61.4
Total	**158**	**100.0**

Results presented in Table 4.4 shows that a majority (61.4%) of the student respondents were drawn from form four classes. This showed that data was gotten from students who had been in the schools for the longest period, thus giving reliable information on integration of ICT in their schools over the years.

4.3.3 Level of Education of the Teachers

The level of educational qualification for teachers was considered a very integral variable based on the assumption that there is a high correlation between level of education and teachers understanding of the factors influencing integration of ICT in the teaching of . The results are as presented in Table 4.5.

Table 4.5: Principals and Teachers Highest Academic Qualification

Level of education	Principals		Teachers	
	Frequency	Percent	Frequency	Percent
Diploma	5	41.7	6	40.0
BED	6	50.0	7	46.7
Masters	1	8.3	2	13.3
Total	**12**	**100.0**	**15**	**100.0**

The data in Table 4.5 indicates that most of the teacher respondents representing 46.7% had bachelor degree. The results therefore indicated that a high percentage of the teachers attained a bachelor's degree. The findings also showed that teachers in secondary schools in Kwanza Sub-County had attained relevant skills to carry out their pedagogical duties in integration of Teaching and learning. The result agrees with Ware and WarsChauer (2008) that teacher professional training equips them with skills to facilitate instructional process in teaching and learning.

4.3.4 Teachers' Work Experience

The teachers were requested to indicate their teaching experience in years to establish whether it had an impact on the teachers' use of ICT in teaching and learning. The findings are as shown in Table 4.6.

Table 4.6: Teachers' Teaching Experience

No. of years	Teachers	
	Frequency	**Percent**
Below 10 years	3	20.0
11 – 20 years	10	66.7
Over 21 years	2	13.3
Total	**15**	**100.0**

The results on Table 4.6 showed that a majority of the teachers had a level of experience of between 11 and 20 years which was 66.7%. This clearly indicated that majority of the teachers in the sub-county had been teaching for a reasonable period of time and were better placed in understanding the school-based factors influencing integration of ICT in teaching of in secondary schools in Kwanza sub county.

The teachers were required to indicate whether they had acquired any other professional training. Thus, they were to identify the kind of additional training that teachers received and presented the findings as shown in Table 4.7.

Table 4.7: Additional Professional Training Acquired by Teachers

Training	Teachers	
	Frequency	Percent
Computer application skills	13	86.7
Software and hardware training	2	13.3
ICT integration	11	73.3
ICT Education pedagogy	14	93.3

n = 15

Data presented in Table 4.7 shows that about 86.7 percent of teachers in secondary schools integrating ICT in Kwanza sub-county had attained basic computer skills and ICT integration skills though, only 2 teachers (13.3%) had software and hardware knowhow. This implies that majority of the teachers were conversant with basic computer literacy thus, they were competent in integration of ICT during lessons.

4.4 School Type and Integration ICT in Teaching and Learning

The first objective of the study sought to establish the influence of school type on integration of ICT in teaching and learning in public secondary schools in Kwanza Sub-County. The study sought to establish whether students' resources ratio influenced integration of ICT in integration of teaching and learning. Table 4.8 presents students enrolment as indicated by teachers.

Table 4.8: Students Enrolment as Perceived by Teachers

No. of students	Teachers	
	Frequency	**Percent**
Below 30 students	1	6.7
31 – 40 students	4	26.7
41 – 50 students	2	13.3
Above 50 students	8	53.3
Total	**15**	**100.0**

Table 4.8 shows that a majority of the secondary schools (53.3%) had over 50 students per class. This is an indication that many secondary schools in the sub-county were overpopulated. Data collected during the interview with the principals, eight of the principals indicated that their schools were overenrolled with classroom capacity of over 40 students especially in day schools which offered Free Day secondary education through the government's subsidy. Thus, the level of students' enrolment in different categories of school types influences effective integration of ICT in Teaching and learning.

From the observations made by the researcher during data collection, classroom enrollment in day schools was higher than that of boarding schools. This implied that resources in day schools were overstretched hindering effective integration of ICT in teaching and learning. The findings agree with Wangili (2015) that many public day schools were overpopulated due to the implementation of Free Day secondary education hindering effective adoption

of ICT in secondary schools in Tranzoia. There is significant difference in ICT adoption and school type which are either day or boarding schools. Wangili (2017) established that there is a difference in ICT adoption and use among day and boarding secondary schools in Trans-Nzoia County. Thus, boarding schools have better facilities with modern ICT as compared to day schools. This is mainly because most of the boarding schools are well established with good infrastructural facilities and have been in existence for a longer period as compared to day schools.

The findings concur with Mutisya (2017) that boarding schools have better facilities with modern ICT as compared to day schools. The study sought to establish the ratio of ICT infrastructure in different school types to show whether adequacy influenced integration in teaching and learning. Table 4.9 presents the study findings on the ratio of ICT facilities to students in different school types.

Table 4.9: Student-Computer Ratio in Different School Types

School types	Responses	Principals		Teachers		Students	
		Frequency	Percent	Frequency	Percent	Frequency	Percent
Day	1:2	0	0.0	0	0.0	0	0.0
schools	1:5	11	91.7	13	86.7	103	65.2
	1:10	0	0.0	0	0.0	41	25.9
Boarding	1:2	1	8.3	2	13.3	14	8.9
schools	1:5	0	0.0	0	0.0	0	0.0
	1:10	0	0.0	0	0.0	0	0.0
	Total	**12**	**100.0**	**15**	**100.0**	**158**	**100.0**

Data presented in Table 4.9 shows that all categories of respondents; 91.7 percent of principals, 86.7 percent of Teachers and 65.2 percent of students, stated that the students-ICT facilities ratio was one computer shared among five students. The findings implied that computers in secondary schools in Kwanza Sub-County were inadequate because students were forced to share the resources in a group. Further information from interviews with principals stated that secondary schools especially day schools did not have enough computers and other ICT infrastructure for individual students forcing them to share during teaching and learning process.

The researcher's observation revealed that across all school types ICT infrastructure were not adequate forcing students to share the limited available infrastructure. This shows that ICT facilities across different school types were not adequate to facilitate extensive integration of ICT in teaching and learning.

Therefore, lack of enough ICT infrastructure in various school type was likely to hinder successful integration of ICT in lessons in public secondary schools. The findings agree with Clark (2000) on the argument that efficient and effective use of technology depends on the availability of hardware and software and the equity of access to resources by teachers, students, and administrative staff.

The respondents were requested to indicate whether school type influence integration of ICT teaching and learning. Table 4.10 presents the study results.

Table 4.10: School Type Influence Integration of Teaching and Learning

Response	Principals		Teachers		Students	
	Frequency	Percent	Frequency	Percent	Frequency	Percent
Influence	12	100.0	13	86.7	109	69.0
Do not influence	0	0.0	2	13.3	49	31.0
Total	**12**	**100.0**	**15**	**100.0**	**158**	**100.0**

Data from all (100%) principals, 86.7 percent of teachers, and 69 percent students showed that provision of adequate teaching and learning resources on school type influenced integration of teaching and learning. These findings showed that school type played a crucial role in effective integration of Teaching and learning in secondary school education. The information agrees with Farrant (2004) who notes that for any meaningful change and improvement in education, there must be adequate ICT facilities. The findings

also agree with Wangili (2017) established that there is a difference in ICT adoption and use among day and boarding secondary schools in Trans-Nzoia County. Results from Wangili's study show that boarding schools adopted and used ICT for a longer period of time than day schools. The study further sought to establish the ways in which ICT resources are used to influence integration of teaching and learning. Table 4.11 presents the study findings.

Table 4.11 Ways ICT Resources Influence Integration of ICT in Teaching and Learning

Response	**Principals n= 12**		**Teachers n=15**		**Students n=158**	
	(f)	**(%)**	**(f)**	**(%)**	**(f)**	**(%)**
Watching educative videos/ set books	11	91.7	13	86.7	141	89.2
Internet searching	2	16.7	4	26.7	22	13.9
Sending assignments through emails	1	8.3	3	20.0	8	5.1
Downloading teaching materials	7	58.3	4	26.7	0	0.0
Using talking dictionary during pronunciation class	8	66.7	9	60.0	17	10.8

Data presented in Table 4.11 shows that majority (91.7% principals, 86.7% teachers and 89.2% students) of the respondents indicated that ICT resources are expansively used in their schools to watch educative videos or set books. Eight principals (66.7%) and 60 percent teachers indicated that during lessons

ICT resources are used during pronunciation lessons. This shows that ICT resources were used on certain lessons as opposed to using them in all lessons.

The respondents were requested to rate the extent to which school type influence integration of teaching and learning. Table 4.12 presents the study results.

Table 4.12: Respondents' Perception on the Rate School Type Influence Integration of Teaching and Learning

Response	Principals		Teachers		Students	
	(f)	(%)	(f)	(%)	(f)	(%)
To a large extent	9	75.0	9	60.0	87	55.1
To a moderate extent	2	16.7	4	26.7	39	24.7
To a little extent	1	8.3	2	13.3	23	14.6
Not at all	0	0.0	0	0.0	9	5.7
Total	**12**	**100.0**	**15**	**100.0**	**158**	**100.0**

Table 4.12 shows that majority of the principals (75%), teachers (60%) and 55.1 percent of students indicated that school type influence integration of teaching and learning to a large extent. These findings imply that school type is crucial component to enhance effective integration of teaching and learning in secondary schools education. The findings are in consistence with arguments from Samuel and Bakar (2006) that lack of ICT infrastructure and infrastructure facilities in schools were cited as the most common reason that impedes the integration of ICT tools in the integration of teaching and

learning, causing a long waiting list of learners who want to use ICT resources in the computer room.

4.5 Schools' Support and Integration ICT in Teaching and Learning

School leadership provides the direction and support in terms of school policy that outlines goals and the necessary resources for the teachers. The second research objective sought to determine the influence of school schools' support on integration of ICT in teaching and learning in public secondary schools in Kwanza Sub-County. The principals were requested to indicate whether they support in-service training for teachers on the integration of ICT in integration of teaching and learning. Table 4.13 presents the study findings.

Table 4.13: Principals' Response on Support In-Service of Teachers on ICT Use on Integration of Teaching and Learning

Response	**Principals**	
	Frequency	**Percent**
Yes	8	66.7
No	4	33.3
Total	**12**	**100.0**

Table 4.13 shows that 66.7 percent of the principals indicate they support refresher/in-service training for Teachers on integration of ICT on the integration of teaching and learning. This implies majority of school head in public secondary schools in Kwanza Sub-County were committed to ensuring successful integration of ICT in Teaching and learning.

The principals were asked to indicate the frequency which they support refresher/in-service training for teachers on integration of ICT in teaching and learning. Table 4.14 presents the study results.

Table 4.14: Frequency of In-Service for Teachers on Integration of ICT in Teaching and Learning

Response	Principals		Teachers	
	Frequency	Percent	Frequency	Percent
Monthly	1	8.3	0	0.0
Termly	2	16.7	1	6.7
Yearly	5	41.7	2	13.3
Never	4	33.3	12	80.0
Total	**12**	**100.0**	**15**	**100.0**

According to most of the principals, 41.7 percent, support their Teachers to attend refresher or in-service training on integration of ICT yearly. These results were disputed by 80 percent of the teachers who sated that refresher/in-service training never happen in their schools. The contrast on opinion showed that, principals' schools' support for teachers on in-service and refresher courses on integration of ICT in integration of Teaching and learning was not effectively carried out. The findings disagree with Clarke (2006) that school leadership should provide teachers with necessary resources and professional learning opportunities, connect teachers to each other, and to experts and resources beyond the school, engage teachers in curriculum teaching and learning, assessment, and reporting and decision-making, leverage students'

expertise and willingness to embrace ICT. The study further sought to establish the reasons behind principals not supporting refresher/in-service for Teachers on integration of ICT in Teaching and learning. The study findings are as presented in Table 4.15.

Table 4.15: Principals' Reasons for not Supporting Teachers' Refresher/In-Service Training

Response	Principals	
	(f)	(%)
Lack of adequate funds for in-service	12	100.0
Administration do not see the point of refresher/in-service	2	16.7
Teachers' negative attitude	8	66.7
Lack of time for refresher courses	10	83.3

n=12

Table 4.15 shows that all principals, 100 percent, who participated in the study, lack of funds for in-service training for teachers was among the majors reason why they did not support in-service training of teacher on integration of ICT in Teaching and learning. Other reasons included limited time to conduct refresher courses that was cited by 83.3 percent of principals and 66.7 percent stated teachers negative attitude towards support given. These results imply that other administrative duties and limited resources hindered principals from supporting refresher/in-service training for teachers on integration of teaching and learning using ICT facilities. The results are in line with Noor ul Amin, (2013) on the argument that successful ICT integration is related to actions taken at the school level, such as the development of an ICT plan, ICT support, and ICT training

The school heads who indicated that they supported teachers to use ICT resources during lessons were requested to indicate the type of support they offered. Table 4.16 presents the study findings.

Table 4.16: Type of Support to Enable Teachers use ICT During Lessons

Response	**Principals**	
	(f)	**(%)**
Providing ICT resources for in-class use	3	25.0
Supervision of teaching and learning process and giving feedback	4	33.3
Employment of technicians	1	8.3
Emphasize classroom application of technology during staff meeting.	11	91.7

n =12

Information presented in Table 4.16 shows that a majority of the principals, they emphasize to teachers to embrace application of technology in classrooms during staff meeting, only 8.3 percent of the principals indicated that they employ technicians to support teachers on the use of ICT during lessons. This information shows that much needs to be done by the secondary schools' administration in support of their teachers to ensure effective integration of ICT in teaching and learning integration. The findings agree with Ali, Haolader, and Muhammad, (2017) that the role of school leaders in building the capacity of teachers to support and facilitate ICT integration in teaching and learning is therefore very important. The school leader's major

responsibility lies in initiating and implementing school change also in taking the right decisions to support the ICT integration into pedagogical practices.

The study sought to establish whether public secondary schools integrating ICT in their learning process had on-site classroom based technical support from qualified ICT personnel to enhance effective integration of ICT in Teaching and learning. Table 4.17 presents the study findings.

Table 4.17: Presence of On-site Classroom Based Technical Support from Qualified ICT Personnel

Response	Principals		Teachers		Students	
	Frequency	**Percent**	**Frequency**	**Percent**	**Frequency**	**Percent**
Influence	2	16.7	3	20.0	35	22.2
Do not influence	10	83.3	12	80.0	123	77.8
Total	**12**	**100.0**	**15**	**100.0**	**158**	**100.0**

Data presented in Table 4.17, a majority of the schools lacked on-site classroom based technical support from qualified ICT personnel. This shows that many secondary schools did not engage qualified technical support despite the school type. These findings differed with arguments from Mutisya (2017), there is significant difference in ICT adoption and school type which are either day or boarding schools. Most of the day schools used both traditional and modern ICT related aspects in teaching and learning process thus integration of ICT is reported to be slower. But, a slight difference is

observed where more boarding schools seem to adopt and use modern ICT as compared to day secondary schools in Kitui County.

The study further sought to establish the types of programs provided by principals in secondary schools to enhance integration of ICT in teaching and learning integration. Table 4.18 presents the principals' responses.

Table 4.18: Software Provided to Integrate ICT in Teaching and Learning

Response	**Principals**	
	(f)	**(%)**
SMART Board	5	41.7
VR-Headsets	12	100.0
Students' portal	0	0.0
Britannica dictionary	11	91.7
Auto tutor	1	8.3
Accelerated reader	7	58.3
Compu read	4	33.3
Distar	1	8.3
Application packages	12	100.0

n = 12

Data presented in Table 4.18 shows that principals offered different types of software to ensure effective integration of ICT in Teaching and learning integration. The most commonly provided software were VR-Headsets, Britannica dictionary and application packages. This shows that principals provided the basic programs that would facilitate integration of ICT in

teaching and learning integration. This is in line with Chen (2008) who found out that lack of access to computers and software was a major impediment to computer integration.

The principals were asked to indicate the ICT resource providers in their schools and the results presented in Table 4.19.

Table 4.19: ICT Resources Provider

Response	**Principals**	
	Frequency	**Percent**
Individual sponsors/ Donor	7	58.3
School administration	5	41.7
Total	**12**	**100.0**

Table 4.19 shows that 58.3 percent of principals indicated that their schools had received ICT facilities from individual sponsors or donors. This information shows that majority of the schools' administration were yet to fully support integration of ICT in teaching and learning and depended on well-wishers.

The principals were asked to state other support other than refresher courses given by school administration to integrate ICT in teaching and learning. Table 4.20 presents the study findings

Table 4.20: Other Forms of Support Given by School Administration to Integrate ICT in Teaching and Learning

Response	Principals	
	Frequency	Percent
Ensure connectivity	3	25.0
Regular maintenance of hardware	9	75.0
Total	**12**	**100.0**

Data presented in Table 4.20 shows that majority of the principals indicated that they regularly maintain ICT resources and infrastructure to ensure integration of ICT in teaching and learning. The findings concur with recommendations from MCEETYA (2006) that school leadership should ensure that teachers develop the knowledge, competence, skills and confidence to exercise professional judgments in utilizing ICT in implementing curriculum.

The principals and teachers were asked to indicate whether administrators monitor progress of integration of ICT in lessons in their schools. Teachers, students and principals' responses are as shown in Table 4.21.

Table 4.21: Administrators Monitor Progress of Integration of ICT in Lessons

Response	Principals		Teachers		Students	
	Frequency	Percent	Frequency	Percent	Frequency	Percent
Yes	7	58.3	2	13.3	30	19.0
No	5	41.7	13	86.7	128	81.0
Total	**12**	**100.0**	**15**	**100.0**	**158**	**100.0**

Table 4.21 shows that a majority of principals (58.3%), they monitored progress of integration of ICT in lessons. This notion was refuted by 86.7 percent of teachers and 81 percent of students. This disagreement in opinion showed that the administrators were not keen in supervising integration of ICT in teaching and learning.

4.6 Teachers' Skills and Integration ICT in Teaching and Learning

Teachers need to have formal substantive communication with other teachers either at international, national, regional, local or at the school level. These professional interactions with teachers at other schools and the involvement in specific peer leadership activities, mentoring, workshops conferences and presentations help teachers to networks with their colleagues in other schools (Becker, 1994). The third objective of the study sought to establish how teachers' skills influence integration of ICT in teaching and learning in public secondary schools in Kwanza Sub-County. The students were issued with a likert scale to show the teaching method used by their teachers the scale was;

A = Always, S = Some times and N = Never. Table 4.22 presents the study results.

Table 4.22: Frequency of Using Teaching Methods by Teachers

Teaching method	A		S		N	
	Frequency	Percent	Frequency	Percent	Frequency	Percent
Demonstration	53	33.5	71	44.9	35	22.2
Role play	15	9.5	33	20.9	110	69.6
Lecture	147	93.0	11	7.0	0	0.0
Practical using computer	39	24.7	61	38.6	58	36.7

Data presented in Table 4.22 shows that majority of the students stated that their teachers used lecture method in teaching lessons. This information shows that many schools in Kwanza Sub-County did not integrate ICT in teaching lessons.

The respondents were requested to indicate whether principals encourage Teachers' skills on integration of ICT in teaching and learning. Principals and teachers responses are as shown in Table 4.23.

Table 4.23: Principals Encourage Teachers' Skills on Integration of ICT in Teaching and Learning

Response	Principals		Teachers	
	Frequency	Percent	Frequency	Percent
Yes	11	91.7	10	66.7
No	1	8.3	5	33.3
Total	**12**	**100.0**	**15**	**100.0**

Data contained in Table 4.23 shows that a majority of the principals and teachers (91.7% and 66.7% respectively), principals in their school encourage teachers to collaborate with their peers on integration of ICT in teaching and learning. These shows that majority of the secondary schools believed in teamwork to ensure effective integration of ICT in teaching and learning. This also shows that teachers are fortified to consult from each other on ICT integration.

The teachers and principals were requested to indicate whether teachers' skills at school level influence integration of ICT in Teaching and learning and their responses presented as shown in Table 4.24.

Table 4.24: Teachers' Skills Influence Integration of ICT in Teaching and Learning

Response	Principals		Teachers	
	Frequency	**Percent**	**Frequency**	**Percent**
Yes	12	100.0	9	60.0
No	0	0.0	6	40.0
Total	**12**	**100.0**	**15**	**100.0**

Table 4.24 shows that all principals (100%) and 60 percent teachers indicated that teachers' skills at school level influence integration of ICT in Teaching and learning. This shows that teachers' skills were significant in integration of ICT in teaching in secondary schools. The results concur with Cox and Sood (1999) that ICT teachers being a member of an association makes teachers gain confidence in ICT use in their classrooms.

The teachers were asked to indicate the frequency of engaging their peers on integration of ICT in teaching and learning. Table 4.25 presents the study findings.

Table 4.25: Frequency of Teachers Engaging Peers on Integration of ICT in Teaching and Learning

Response	Principals		Teachers	
	Frequency	**Percent**	**Frequency**	**Percent**
Always	6	50.0	9	60.0
Rarely	5	41.7	3	20.0
Never	1	8.3	3	20.0
Total	**12**	**100.0**	**15**	**100.0**

Table 4.25 shows that a half of the principals and majority teachers (60%) Teachers always engage their peers on integration of ICT in teaching and learning. This shows that teachers were actively involved with their peers to ensure effective integration of ICT in secondary schools in the study area.

The study then sought to specific benefits that were realized from teachers' skills on integration of ICT in teaching and learning. Table 4.26 presents the principals and teachers responses.

Table 4.26: Benefits of Teachers' Skills on Integration of ICT in Teaching and Learning

Benefits	Principals		Teachers	
	(f)	(%)	(f)	(%)
Receiving regular information on classroom technology	6	50.0	8	53.3
Networking with colleagues	7	58.3	9	60.0
Diversification of technological knowhow	11	91.7	10	66.7
Development of technological desire and enthusiasm	8	66.7	12	80.0
Improvisation of teaching aids	3	25.0	2	13.3

Table 4.26 shows that there were various benefits cited by principals and teachers emanating from teachers' skills on integration of ICT in teaching and learning. For instance, 6(50%) principals and 8(53.3%) teachers stated that teachers' skills helps teachers in receiving regular information on classroom technology. Seven (58.3%) principals and 9(60%) teachers indicated that skills enhanced networking among colleagues, while 11(91.7%) principals and to (66.7%) teachers indicated that skills benefit teachers on diversification of technological knowhow. Eight(66.7%) principals and 12(80%) teachers stated that teachers' skills helped to develop technological desire and enthusiasm.

Further, these finding shows that teachers' skills was cited to have a positive influence of integration of ICT in Teaching and learning. This shows that

consultation from peers helped widen their technological knowhow and easier problem solving strategies. The findings imply that teachers' skills influence integration of ICT in Teaching and learning positively.

4.7 Students' Attitude and Integration of ICT in Teaching and Learning

Objective four of the study sought to establish whether students' attitude influence integration of ICT in Teaching and learning. To measure this objective, the researcher first requested the students to indicate the frequency of using computers in class. Table 4.27 presents the study findings.

Table 4.27: Frequency of Students' Using Computers

Response	Students	
	Frequency	Percent
Daily	22	13.9
Weekly	79	50.0
Termly	46	29.1
Never	11	7.0
Total	**158**	**100.0**

Table 4.27 shows that a half of the students indicated that they use computers in their schools on weekly basis. These findings imply that students only use computer in designated computer lessons, hence they are not allowed enough time to use the facilities in their schools.

The researcher also sought to establish whether teachers' workload hindered effective integration of ICT in Teaching and learning. Table 4.28 presents the responses from teachers.

Table 4.28: Number of Lessons Per Week

Response	**Teachers**	
	Frequency	**Percent**
Below 15	2	13.3
16 – 30	3	20.0
Over 31	10	66.7
Total	**15**	**100.0**

Table 4.28 shows that a majority of teachers (66.7%) indicated that they taught over ten lessons per week. This shows that teachers had heavy workload that would hinder effective integration of ICT in teaching and learning. The study results also indicate that since majority of the students in Table 4.27 stated that they rarely use computers in class teachers do not integrate ICT when teaching lessons.

The principals and teachers were requested to indicate whether teachers have other responsibilities other than teaching. Their responses were presented as shown in Table 4.29.

Table 4.29: Teachers have Other Responsibilities besides Teaching

Response	Principals		Teachers	
	Frequency	Percent	Frequency	Percent
Yes	11	91.7	14	93.3
No	1	8.3	1	6.7
Total	**12**	**100.0**	**15**	**100.0**

Table 4.29 shows, 11 (91.7%) principals and 14(93.3%) teachers indicated that teachers had other responsibilities other than teaching. This implies that teachers had other responsibilities hindering their effective integration of ICT in teaching and learning due to the time required to attend to other duties.

The researcher requested the respondents to indicate whether the time allocated for integration of ICT in teaching and learning was enough. The results from the study are as shown in Table 4.30.

Table 4.30: Enough Time is Allocated for Integration of ICT in Teaching and Learning

Response	Principals		Teachers	
	Frequency	Percent	Frequency	Percent
Yes	2	16.7	1	6.7
No	10	83.3	14	93.3
Total	**12**	**100.0**	**15**	**100.0**

Data contained in Table 4.30 shows that 93.3 percent of principals and 83.3 percent of teachers time allocated for integration of ICT in Teaching and learning was not enough. This shows that limited time is allotted to ICT aided teaching and learning processes. The findings are an implication that little time is given to ICT integration in instructional process due to the vastness of the syllabus to be covered and limitation of the available learning time.

The study further sought to establish whether students in public secondary schools in Kwanza Sub-County use ICT resources to do their homework. Table 4.31 presents the study findings.

Table 4.31: Students Use of ICT Resources to Do Homework

Response	**Principals**		**Teachers**		**Students**	
	Frequency	**Percent**	**Frequency**	**Percent**	**Frequency**	**Percent**
Always	0	0.0	2	13.3	19	12.0
Rarely	3	25.0	3	20.0	41	25.9
Never	9	75.0	10	66.7	98	62.1
Total	**12**	**100.0**	**15**	**100.0**	**158**	**100.0**

Data contained in Table 4.31 shows that majority of the respondents (75% principals, 66.7% teachers and 62.1% students) indicated that students in their schools never used ICT resources to do their homework. This shows that majority of the secondary schools did not offer students ICT facilities to use during their free time.

The study also sought to establish barriers encountered during integration of ICT in teaching and learning. Table 4.32 presents the study results.

Table 4.32: Barriers Encountered During Integration of ICT in Teaching and Learning

Response	Principals	
	Frequency	Percent
Limited access to computers	8	66.7
Poor internet reception	11	91.7
Poor maintenance of hardware	11	91.7
Unsuitable education software	5	41.7
ICT tools' failure during presentation	4	33.3
Expansive child-friendly programs for teaching	7	58.3

Information contained in Table 4.32 shows that other than the study variable other barriers hinder effective integration of ICT in teaching and learning. They include limited access to computers, poor internet reception, and poor maintenance of ICT hardware, ICT tools' failure and expensive child-friendly programs. This shows that integration of ICT in teaching and learning was faced by numerous challenges thus, much needs to be done to mitigate the effectiveness in integration of ICT in Teaching and learning.

The study sought to establish the level of integration of ICT resources in public secondary schools in Kwanza Sub-County. Table 4.33 shows the availability, adequacy and functionality of ICT resources and infrastructure in public secondary schools.

Table 4.33: Availability, Adequacy and Functionality of ICT Tools in Public Secondary Schools

ICT tools	Available		Not available		Adequate		Not adequate		Functional	
	(f)	(%)	(f)	(%)	(f)	(%)	(f)	(%)	(f)	%
Computers for learning	12	100.0	0	0.0	0	0.0	12	100.0	7	53.3
Electricity infrastructure	12	100.0	0	0.0	-	-	-	-	9	75.0
Internet facility	3	25.0	9	75.0	-	-	-	-	1	8.3
Printer	2	16.7	10	83.3	0	0.0	12	100.0	6	50.0
Scanner	0	0.0	12	100.0	0	0.0	12	100.0	2	16.7
Copier	1	8.3	11	91.7	0	0.0	12	100.0	8	66.7
Projector	12	100.0	0	0.0	0	0.0	12	100.0	4	33.3

Data contained in Table 4.33 shows that ICT tools that were observed from the study area revealed that majority of the schools had most of the essential resources though either inadequate or not functional. For instance, all schools had electricity infrastructure though, in three schools it was disconnected. This

means that in schools that electricity was disconnected the facilities were not used. Consequently, internet connectivity was quoted to be very poor thus not reliable for implementing teaching and learning. Only seven schools were reported to have functional computers. This shows that integration of ICT was not fully effected in the study area.

4.8 Inferential Statistics

The researcher further, sought to establish the relationship between the independent variables (school type, teachers' skills, schools' support as well as students' attitude) and the dependent variable (integration of ICT in teaching and learning) by correlating the study findings. Table 4.34 shows the correlation matrix of the study.

Table 4.34: Correlation Matrix

			School type	Teachers' skills	Students' attitude	Schools' support
	Integration of ICT in teaching and learning	Pearson Correlations				
		Sig. (2-tailed)	1			
	School type	Pearson Correlations	0.638	1		
		Sig. (2-tailed)	0.29			
	Teachers' skills	Pearson Correlations	0.764	0.523	1	
		Sig. (2-tailed)	0.017	0.016		
Students' attitude		Pearson Correlations	0.622	0.743	0.597	1
		Sig. (2-tailed)	0.017	0.012	0.028	
	Schools' support	Pearson Correlations	0.529	0.533	0.72	0.531
		Sig. (2-tailed)	0.047	0.009	0.002	0.014

***** Correlation is significant at the $P \leq 0.05$ level (2-tailed)

The data presented in Table 4.34 shows that teachers' school type, teachers' skills, students' attitude and schools' support were computed into single variables per factor by obtaining the averages of each factor. Pearson's correlations analysis was then conducted at 95% confidence interval and 5% confidence level 2-tailed. Table 4.34 indicates that the correlation matrix between the factors school type, teachers' skills, students' attitude and schools' support) and integration of ICT in teaching and learning. According to the correlation matrix, there is a positive and significant relationship

between Integration of ICT in teaching and learning and school type of magnitude 0.638 and a P-value of 0.029 at 5% level of significance and 95% level of confidence. The positive relationship indicates that there is a correlation between school type and the integration of ICT in teaching and learning.

The findings also show that there is a positive and significant relationship between integration of ICT and teachers' skills of magnitude 0.764 and a P-value of 0.017 at 5% level of significance and 95% level of confidence. The positive relationship indicates that there is a correlation between teachers' skills and integration of ICT in teaching and learning. According to the correlation matrix, there is a positive and significant relationship between integration of ICT in teaching and learning and students' attitude of magnitude 0.622 and a P-value of 0.021 at 5% level of significance and 95% level of confidence. The positive relationship indicates that there is a correlation between students' attitude and integration of ICT in teaching and learning appraisals.

According to the correlation matrix, there is a positive and significant relationship between integration of ICT in teaching and learning and schools' support of magnitude 0.529 and a P-value of 0.047 at 5% level of significance and 95% level of confidence. The positive relationship indicates that there is a correlation between schools' support and the integration of ICT in teaching and learning. The correlation findings infer that school based factors have integration of ICT in teaching and learning. This notwithstanding, all the factors were significant (p-value <0.05) at 95% confidence level.

CHAPTER FIVE

SUMMARY, CONCLUSIONS AND RECOMMENDATIONS

5.1 Introduction

The chapter provides a brief summary of the study, conclusions and recommendations and suggestions for further studies.

5.2 Summary of the Study

The purpose of this study was to investigate the school-based factors that influence integration of ICT in teaching and learning in public secondary schools in Kwanza sub-county. The study was guided by the following objectives: to examine the influence of school type, teachers' skills, schools' support, and students' attitude on integration of ICT in teaching and learning in public secondary schools in Kwanza Sub-county. The study was guided by the model of ICT integration process. The study employed descriptive survey research design.

The study targeted 43 principals, 826 teachers and 2458 students. Purposive sampling technique was used to select public secondary schools, principals and teachers that integrate ICT in teaching and learning. The students were sampled by use of stratified random sampling as per gender. Thirteen principals, 18 teachers and 162 students were sampled for the study. The research instruments were interview schedule guides, questionnaires and observation checklist. Collected data was analyzed both qualitatively and quantitatively.

On establishing the influence of school type on integration of ICT in teaching and learning in public secondary schools in Kwanza Sub-County. The study findings revealed that a majority of the secondary schools had over 50 students per class. This is an indication that many secondary schools in the sub-county were overpopulated, thus there is a likelihood that the level of students enrolment in different categories of school types influence effective integration of ICT in Teaching and learning in public secondary schools in Kwanza Sub County. This shows that lack of enough infrastructure in different school type influence extensive integration of ICT in teaching and learning. Therefore, lack of enough facilities in various school type was likely to hinder successful integration of ICT in lessons in public secondary schools.

Data from all (100%) principals, 86.7 percent of teachers, and 69 percent students showed that provision of adequate infrastructure influenced integration of teaching and learning. These findings showed that school type played a crucial role in effective integration of teaching and learning in secondary school education. School type dictate the level of ICT integration due to the infrastructure that are expansively used in their schools to watch educative videos or set books.

The study findings shows that majority of the principals (75%), Teachers (60%) and 55.1 percent of students indicated that school type influence integration of teaching and learning to a large extent. These findings imply that school type are a crucial component to enhance effective integration of teaching and learning in secondary schools education. This shows that school

type were used on certain lessons as opposed to using them throughout in lessons.

On the influences of teachers' skills integration of ICT in teaching and learning in public secondary schools in Kwanza Sub-County. Majority of the principals and teachers (91.7% and 66.7% respectively), principals in their school encourage teachers to collaborate with their peers on integration of ICT in teaching and learning. These shows that majority of the secondary schools believed in teamwork to ensure effective integration of ICT in teaching and learning. This also shows that teachers are fortified to consult from each other on ICT integration.

All principals (100%) and 60 percent teachers indicated that teachers' skills at local of school level influence integration of ICT in Teaching and learning. This shows that teachers' skills were significant in integration of ICT in teaching in secondary schools. Half of the principals and majority teachers (60%) Teachers always engage their peers on integration of ICT in Teaching and learning. This shows that teachers were actively involved with their peers to ensure effective integration of ICT in secondary schools in the study area.

According to 58.3 percent of the principals and 66.7 percent of Teachers there were no ICT teachers collaborative support groups. This shows that though, teachers were reported to engage with their peers on ICT integration there were no formally organized groups to enhance skills of ICT teachers in Kwanza Sub-County.

A majority of the principals (75%) and most teachers (46.7%) teachers' skills is very beneficial for integration of ICT in teaching and learning. This implies that teachers' consultation and engagement of each other benefited their ability to integrate of ICT in Teaching and learning. These finding shows that, teachers' skills was cited to have a positive influence of integration of ICT in teaching and learning. This shows that consultation from peers helped widen their technological knowhow and easier problem solving strategies. The findings imply that teachers' skills influence integration of ICT in Teaching and learning positively.

On determining the influence of school schools' support on integration of ICT in teaching and learning in public secondary schools in Kwanza Sub-County. The information from the study findings showed that 66.7 percent of the principals indicate they support refresher/in-service training for teachers on integration of ICT on the integration of teaching and learning. This implies majority of school head in public secondary schools in Kwanza Sub-County were committed to ensuring successful integration of ICT in teaching and learning.

Most of the principals, 41.7 percent, support their teachers to attend refresher or in-service training on integration of ICT yearly. These results were disputed by 80 percent of the teachers who sated that refresher/in-service training never happen in their schools. The contrast on opinion showed that principals' schools' support for teachers on in-service and refresher courses on integration of ICT in integration of teaching and learning was not effectively carried out.

All principals, 100 percent, who participated in the study, lack of enough funds for in-service training for teachers was among the majors reason why they did not support in-service training of teacher on integration of ICT in Teaching and learning. Other reasons included limited time to conduct refresher courses that was cited by 83.3 percent of principals and 66.7 percent stated teachers negative attitude towards support given. These results imply that other administrative duties and limited resources hindered principals from supporting refresher/in-service training for teachers on integration of teaching and learning. A majority of the principals, they emphasize to teachers to embrace application of technology in classrooms during staff meeting, only 8.3 percent of the principals indicated that they employ technicians to support teachers on the use of ICT during lessons. This information shows that much needs to be done by the secondary schools' administration in support of their teachers to ensure effective integration of ICT in teaching and learning integration.

Results from the study shows that majority of the principals (83.3%) indicated that they always provide ICT resources to implement teaching and learning, while 60 percent of teaches and 40.5 percent of students disputed the response. This shows that teachers and students were not fully satisfied with the levels of principals' support on ICT integration in teaching and learning integration. Further the study revealed that 58.3 percent of principals their schools had received ICT resources from individual sponsors or donors. This information

shows that majority of the schools' administration were yet to fully support integration of ICT in teaching and learning and depended on well-wishers.

Objective four of the study sought to establish whether students' attitude influence integration of ICT in teaching and learning. According to half of the student they use computers in school on weekly basis. These findings imply that students only use computer in designated computer lessons, hence they are not allowed enough time to use the ICT facilities in their schools. A majority of teachers (66.7%) indicated that they taught over ten lessons per week. This shows that teachers had heavy workload that would hinder effective integration of ICT in teaching and learning. The study results also indicate that since majority of the students in Table 4.34 stated that they rarely use computers in class Teachers do not integrate ICT when teaching lessons. Information from 11 (91.7%) principals and 14(93.3%) teachers indicated that teachers had other responsibilities other than teaching. This implies that teachers had other responsibilities hindering their effective integration of ICT in teaching and learning due to the time required to attend to other duties and use ICT resources when teaching .

According to 93.3 percent of principals and 83.3 percent of teachers time allocated for integration of ICT in Teaching and learning is not enough. This shows that limited time is allotted to ICT aided teaching and learning processes. The findings are an implication that little time is given to ICT integration in instructional process due to the vastness of the syllabus to be

covered and limitation of the available learning time. Data from the study shows that majority of the respondents (75% principals, 66.7% teachers and 62.1% students) indicated that students in their schools never used ICT resources to do their homework. This shows that majority of the secondary schools did not offer students with facilities to use during their free time.

5.3 Conclusions

From the findings of the study, several conclusions were arrived at: Integration of ICT in teaching in secondary schools would provide the teachers with opportunities to improve professionally through in service courses of ICT, given the right conditions. This will give the teachers an opportunity to transform education and as a result help students acquire confidence and pleasure in new technologies by being familiar with ICT applications.

The ICT leadership of head teachers had an influence on the prioritization of ICT in the mission and vision of schools, as well as ICT funding; hence the determination of ICT adoption in secondary school teachers. The attitude of head teachers was generally positive. They saw technology as an upgrade to classrooms which will propel the interest of learners to acquire knowledge. Despite this, their budgets were a limiting factor. If a school's head teacher networked with NGOs as well as other stakeholders, then that school was s step ahead when it comes to ICT equipment's acquisition. In order to champion for the integration of ICT in their schools, head teachers need to have strategies and skills when it comes to mobilizing resources.

5.4 Recommendations

From the study, the following recommendations may help in addressing respective groups to whom may find them relevant:

i. The MOE should allocate more finances for computers acquisition in public secondary schools, then ICT needs to become examinable. The access to computers is a prelude for ICTs successful adoption for learning and teaching. All secondary schools should be provided with ICT infrastructure of high quality so that the digital divide can be bridged between those who have and those who don't have the ICT facilities.

ii. The study recommends that Teacher Training Colleges (TTCs) and the Curriculum Support Officers (CSOs) should provide pre-service and in-service training for teachers to improve their knowledge and skills on ICT integration as be a continuous process. Also the study recommends that the MOE and school administrations should provide ICT skilled field officers to be on standby to assist teachers on integration challenges. Through these measures teachers will benefit to relay knowledge to students because Information communication technology has become a commonplace entity in all aspects of life. The use of ICT has fundamentally changed the practices and procedures of all forms of activities within business and governance institutions. Therefore ICT application in secondary school education cannot be overemphasized. Suggestion of one field officer for every five schools.

iii. The school principals and BOM should supply of in-service skills in ICT when it comes to areas like networking, pedagogy, technical matters and social issues is essential for the competence of ICT. This will lead to computers being used effectively. Older and senior teachers need to be trained. MOE needs to ensure there is adequate training of teachers concerning ICT in order to ensure the upholding of equity when it comes to the provision of ICT services in secondary schools. This will help since most of teachers are still uneasy and anxious when it comes to using computers in classrooms caused by them being incompetent in ICT, they therefore, need to be given the basic ICT training. In order to adopt a workable remedy, there is need for an assessment study which will address the inadequacies in ICT among teachers.

iv. The Ministry of Education and other policy makers like KICD need to consider putting ICT as a core subject in the curriculum of secondary schools because it is an important factor in vision 2030. Making ICT as a core will help improve students' attitude towards ICT because it will be as essential to them as any other subject they learn in school. Thus, the eagerness of students to learn ICT concepts will help realize effective integration in teaching and learning

5.5 Suggestions for Further Studies

Based on the present study, the researcher has made the following suggestions for consideration of further studies.

i. It is recommended that this study need further development in order to have the breadth of the field of study. Studies with the same topics still need development because it has received little attention. More school-based parameters can be looked into.

ii. Further studies on barriers teachers are facing using ICT in the classroom. Comparison between public and private schools on ICT integration is recommended. This is because most private schools permit students to bring gadgets to school and teaching and learning takes place within the use of ICT.

iii. Future studies should be done about the adoption of ICT between the principals and extend to other education levels like pre-school, primary schools, training colleges for teachers, together with other high learning institutions.

iv. Further studies can as well be carried to determine if the characteristics of teachers like age, gender, academic qualifications and the period they have been teaching are best attitude predictors when it comes to ICT in schools in Kenya.

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APPENDICES

Appendix 1: Letter Introduction

Caroline Odhiambo

P.O. Box

Kitale

Dear Respondent,

RE: CONSENT TO TAKE PART IN DATA COLLECTION

My name is Caroline Odhiambo, I am a student at University of Nairobi undertaking a degree in Master of Education department of curriculum and instruction. I am undertaking a thesis research entitled "influence of school-based factors on integration of information and communication technologies in teaching and learning in public secondary schools in Kwanza Sub-County, Kenya." You have been selected to participate in this study and I would like to request you to give your honest response towards the questions asked in this study regarding the topic. The responses given will be handled with utmost confidentiality and will be used strictly for academic purposes. Thanks in advance.

Yours faithfully,

Caroline Odhiambo

MED Student - University of Nairobi.

Appendix 2: Questionnaire for Teachers

Instructions: *You are kindly requested to respond to the items in the questionnaire as honestly as possible. Please do not write your name anywhere on this questionnaire. Respond by ticking (√) where appropriate or fill in the required information in the spaces provided.*

Section A: Demographic information

1.Indicate your gender Male ( ) Female ( )

2.Indicate your age bracket Below 25 years [ ]25-35 years [ ]36-45 years [ ]

Above 45 years [ ]

3.What is your professional qualification level?

Diploma [ ]Bachelor degree [ ]Master degree [ ]Doctorate degree [ ]

4.For how long have you been teaching?

Less than 3 years [ ]3-6yrs [ ]7-10 yrs. [ ]over 11 yrs. [ ]

Section B: School type and integration of ICT

5.What is the nature/type of school you teach?

Mixed day secondary school[ ]

Boys' boarding school [ ]

Girls' boarding school[ ] other,

specify……

6.In your own opinion, to which extent to you agree or disagree with the following statements as they apply to school type and integration of ICT using the following scale SA = Strongly Agree, A = Agree, U = Undecided, SD = Strongly Disagree, D = Disagree

Statement	SA	A	U	SD	D
The school type/nature of the school influences integration of ICT in instructional practice					
Instructional practice using ICT is easily done in boarding schools compared to day school					
Period of school establishment determine the level of ICT investment and hence integration in teaching/learning					

Teacher ICT skill development

7.How do you rate your computer knowledge and skills on the usability of Computers? Very good [ ]Good[ ]Fair [ ] Poor [ ]Very School [ ]

8.Has the school been connected to the Internet accessible to teachers for educational research? Yes [ ]No[ ]

9.Do you use academic software/programs to enhance teaching/learning in your learning institution? Yes [ ]No[ ]

10.How often do you integrate ICT in instructional practice? Frequently [ ] Sometimes [ ] Rarely[ ]Never [ ]

11.The extent to which a teacher lesson plan, experiment, and evaluate learners using ICT enhance professional development. Strongly agree [ ] Agree [ ]Undecided [ ] Disagree [ ] strongly disagree [ ]

Section D: School ICT support and integration of ICT

12.Has your school ever hosted or organized ICT workshop aimed at enhancing the integration of ICT in teaching and learning? Yes [ ] No [ ]

13.Which support does the school offer regarding ICT integration in teaching

and learning?

Seeking for ICT external consultation[ ]

Repairing and maintaining ICT devices[ ]

Rewarding and motivating good performance in ICT[ ]

Allowing teachers' unlimited access and usability of ICT devices [ ]

Other, state……

14. Select the extent to which you agree or disagree with the following statement, "Availability of ICT devices, and resources encourage teacher's integration in instructional practice." Strongly agree [ ] Agree [ ] Undecided [ ] Disagree [ ] strongly disagree [ ]

Section E: Students' attitude and integration of ICT

15. To what extent do you think the integration of ICT in teaching and learning have impacted student's achievement in academics Very Great Extent [ ] Great Extent [ ]Moderate extent [ ] Low extent [ ] not extent at all [ ]

16. On a scale of 1-5, 1 being the lowest and 5 being the highest, how would you gauge the level of students' participation and attention in class whenever teaching and learning is integrated with ICT? 1 [ ]2[ ]3[ ]4[ ] 5[ ]

17. What are students beliefs, perceptions and practices associated with ICT integration in teaching and learning, briefly explain……

18. The use of ICT increases students' confidence to participate actively in the class. Strongly agree [ ] Agree [ ] Undecided [ ] Disagree [ ] Strongly disagree [ ]

Thank you for participating in the survey.

Appendix 3: Questionnaire for Students

SECTION A: Personal Information

1.Indicate your gender

Male ( ) Female ( )

2.Indicate your age bracket

Below 15 years [ ]15-18 years [ ]19-21 years [ ]above 22 years [ ]

3.Indicate your class

Form 1[ ]Form 2 [ ]Form 3[ ]Form 4[ ]

SECTION B: Students' attitude on the integration of ICT in learning

4.Attitudes result from our learning experiences within our environments. Indicate the extent to which you agree or disagree with the following statements as they relate to student's attitude and integration of ICT in teaching and learning. ICT using the following scale SA = Strongly Agree, A = Agree, U = Undecided, SD = Strongly Disagree, D = Disagree

Statements	SAs	A	U	D	SD
I like working with computers					
My teacher is the one who can help me use ICT					
I have improved my performance since the integration of ICT in learning					

I feel confident using internet on my assignments					
My friends use ICT in their assignments					
Subjects that the teacher has integrated ICT in teaching and learning are more interesting					
It is difficult to use ICT in learning					
Integration of ICT in learning will help me pass my final exam					

Thank you for participating in the survey.

Appendix 4: Interview Schedule for Head Teachers

1. How long have you been in the teaching profession and what achievements have you made regarding the integration of ICT in teaching and learning?

2.How have you, in your capacity supported teacher professional development in ICT?

3.What has the school management done to support the integration of ICT in teaching and learning?

4.What are some of the challenges experienced by the school regarding the integration of ICT in teaching and learning?

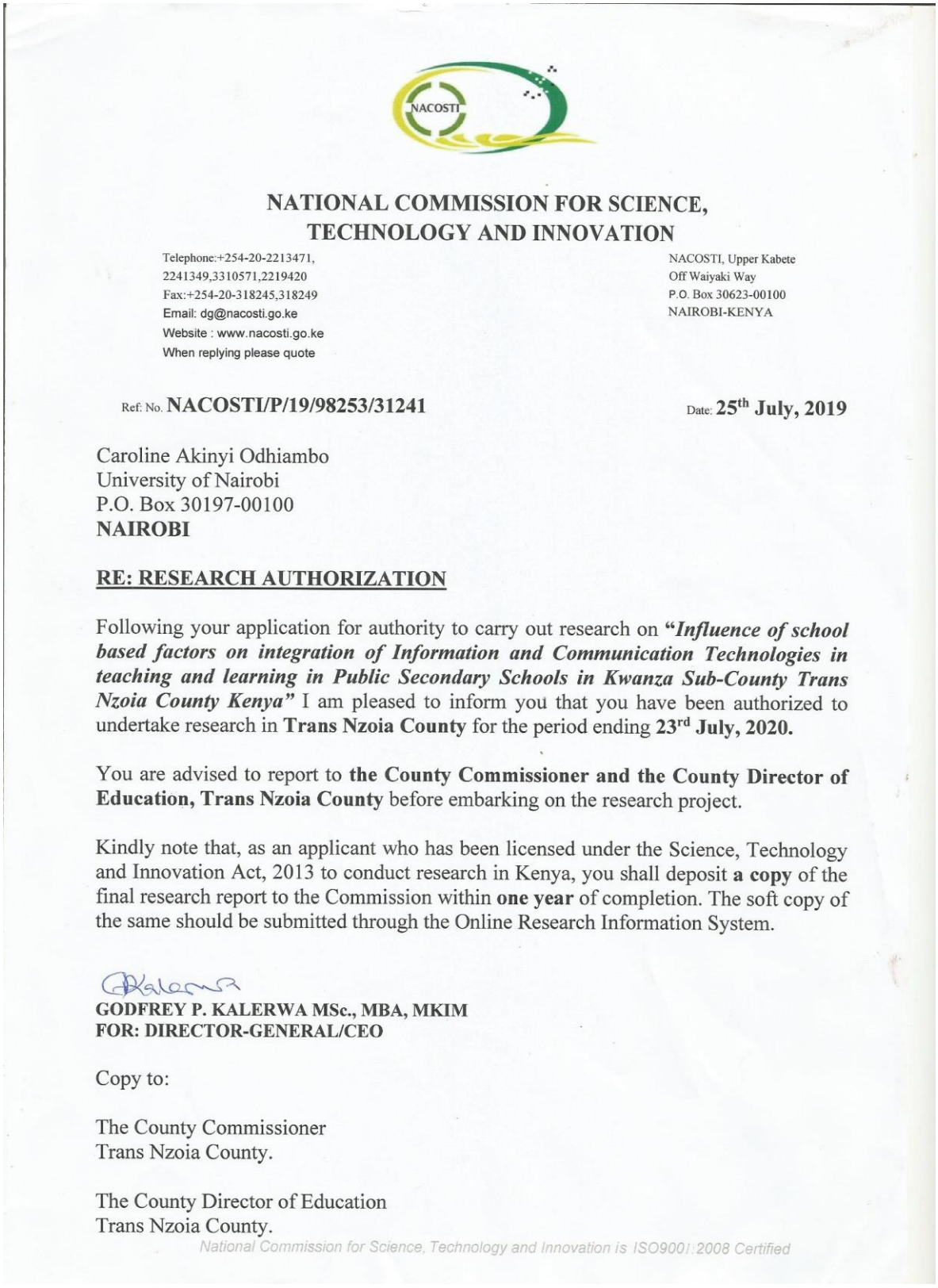
5.How did you manage to mitigate some of the challenges?

6.What are your recommendations about the integration of ICT in teaching and learning in your school?

Appendix 5: Observation Checklist

IT facilities and devices infrastructure	**Available**	**Not Available**	**Adequacy**	**Functionality**
Computer for learning				
LCD and overhead projector				
White boards				
TV Sets				
Digital Cameras/ Video,				
Scanners				
Radios				
Printers				
Internet facilities				
Photocopiers				
Infrastructure				
Appropriate computer rooms/labs				
Availability of electricity				
Qualified and competent ICT teacher				

Appendix 6: Authorization Letter



NACOSTI

NATIONAL COMMISSION FOR SCIENCE, TECHNOLOGY AND INNOVATION

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When replying please quote

NACOSTI, Upper Kabete
Off Waiyaki Way
P.O. Box 30623-00100
NAIROBI-KENYA

Ref: No. **NACOSTI/P/19/98253/31241**

Date: **25th July, 2019**

Caroline Akinyi Odhiambo
University of Nairobi
P.O. Box 30197-00100
NAIROBI

RE: RESEARCH AUTHORIZATION

Following your application for authority to carry out research on ***"Influence of school based factors on integration of Information and Communication Technologies in teaching and learning in Public Secondary Schools in Kwanza Sub-County Trans Nzoia County Kenya"*** I am pleased to inform you that you have been authorized to undertake research in **Trans Nzoia County** for the period ending **23rd July, 2020.**

You are advised to report to **the County Commissioner and the County Director of Education, Trans Nzoia County** before embarking on the research project.

Kindly note that, as an applicant who has been licensed under the Science, Technology and Innovation Act, 2013 to conduct research in Kenya, you shall deposit **a copy** of the final research report to the Commission within **one year** of completion. The soft copy of the same should be submitted through the Online Research Information System.

GODFREY P. KALERWA MSc., MBA, MKIM
FOR: DIRECTOR-GENERAL/CEO

Copy to:

The County Commissioner
Trans Nzoia County.

The County Director of Education
Trans Nzoia County.

National Commission for Science, Technology and Innovation is ISO9001:2008 Certified

Appendix 7: Research Permit

THIS IS TO CERTIFY THAT:
MS. CAROLINE AKINYI ODHIAMBO
of UNIVERSITY OF NAIROBI, 92-902
KIKUYU,has been permitted to conduct
research in *Transnzoia County*
on the topic: *INFLUENCE OF SCHOOL BASED FACTORS ON INTEGRATION OF INFORMATION AND COMMUNICATION TECHNOLOGIES IN TEACHING AND LEARNING IN PUBLIC SECONDARY SCHOOLS IN KWANZA SUB-COUNTY TRANS NZOIA COUNTY KENYA*
for the period ending:
23rd July,2020

.....
Applicant's Signature

Permit No : NACOSTI/P/19/98253/31241
Date Of Issue : 25th July,2019
Fee Recieved :Ksh 1000

.....
Director General
National Commission for Science, Technology & Innovation

THE SCIENCE, TECHNOLOGY AND INNOVATION ACT, 2013

The Grant of Research Licenses is guided by the Science, Technology and Innovation (Research Licensing) Regulations, 2014.

CONDITIONS

1. **The License is valid for the proposed research, location and specified period.**
2. **The License and any rights thereunder are non-transferable.**
3. **The Licensee shall inform the County Governor before commencement of the research.**
4. **Excavation, filming and collection of specimens are subject to further necessary clearance from relevant Government Agencies.**
5. **The License does not give authority to transfer research materials.**
6. **NACOSTI may monitor and evaluate the licensed research project.**
7. **The Licensee shall submit one hard copy and upload a soft copy of their final report within one year of completion of the research.**
8. **NACOSTI reserves the right to modify the conditions of the License including cancellation without prior notice.**

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