PREPAREDNESS OF PUBLIC SECONDARY SCHOOLS ON THE
USE OF INFORMATION COMMUNICATION TECHNOLOGY IN
TEACHING AND LEARNING IN MUKURWEINI, NYERI COUNTY-
KENYA

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DECLARATION

This is my original work and has not been presented for a degree in any other university

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To my beloved wife Lucy Nyawira and daughter Margaret Wambui for their understanding, cooperation and support that they have given me throughout the time I have been studying at Kenyatta University
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My ultimate gratitude goes to dear supervisors Dr. Mary Chui and Dr. N. Ogeta for the invaluable guidance and academic nurturing. This work would not have been complete without their indispensable input. God bless them.
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# ABBREVIATIONS AND ACRONYMS

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<thead>
<tr>
<th>Abbreviation</th>
<th>Description</th>
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<tbody>
<tr>
<td>ICT</td>
<td>Information Communication Technology</td>
</tr>
<tr>
<td>KICD</td>
<td>Kenya Institute of Curriculum Development</td>
</tr>
<tr>
<td>MoE</td>
<td>Ministry of Education</td>
</tr>
<tr>
<td>MoEST</td>
<td>Ministry of education, Science and Technology</td>
</tr>
<tr>
<td>NACOSTI</td>
<td>National Commission for Science Technology and Innovation</td>
</tr>
<tr>
<td>NEPAD</td>
<td>New Partnership for Africa Development</td>
</tr>
<tr>
<td>SSA</td>
<td>Sub-Saharan Africa</td>
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ABSTRACT

Globally the important role played by the use of Information and Communication Technology (ICT) in educational institutions has grown with states putting heavy investments in the purchase of ICT equipment and providing internet access for students and teachers. The Kenya government has been encouraging the adoption of ICT in schools. However, it is not clear to what extent this has been implemented. In Mukurwe-ini Sub County the implementation of ICT has not been effective as evidenced by Table 1.1. This study sought to assess the preparedness of public secondary schools on the Information Communication Technology (ICT) in Mukurwe-ini Sub County, Nyeri County. The study will assess the extent of use of ICT in secondary schools as well as investigate the school related and the teacher related preparedness to the use of ICT in their duties. The information obtained is helpful in assessing the implementation of government policy on ICT in schools. The study adopted descriptive survey design. The target population consisted; 31 public secondary school principals and 374 teachers in Mukurwe-ini Sub County. The researcher employed purposively, stratified random sampling techniques to select a sample of 15 schools, 15 principals and 120 teachers for the study. Data was collected using self-administered questionnaires. The questionnaires were assessed by experts in the field of educational technology to ensure validity while the reliability was tested using Cronbach’s alpha co-efficient calculated from the results of a pilot study and found to have a Cronbach’s Alpha Coefficient of 0.85. The study obtained both quantitative and qualitative data. Qualitative data were analysed thematically as per research objectives. Quantitative data were analysed by use of descriptive statistics in which measures of central tendencies such as mean, mode, and percentages were used for determination of extent of ICT, the level of school related and teacher related preparedness while inferential statistics specifically the independent sample t-test was used to test the relationship between variables using Statistical Package for Social Sciences (SPSS). It was found that teachers rarely used computers in teaching and learning. The school preparedness was poor with school environment and support being low while teachers had positive attitudes towards integration of ICT in teaching. However, teachers were found not to be well adequately trained and experienced in the use of ICT thus very low self confidence in use of ICT in teaching and learning. Conducive school environment that was supportive was found to have positive impact of integration of ICT, inadequate training and low self confidence hindered the adoption of ICT. The study recommended that the inclusion of ICT in curriculum in teacher training institutions, increased funding, provision up to date training of teachers and employment of technical support staff to improve ICT adoption in teaching and learning.
CHAPTER ONE
INTRODUCTION

1.0 Introduction

This chapter presents the background of the study and highlights the statement of the problem. It also presents, the purpose of the study, objectives, research questions, justification, and significance of the study, scope, limitations, delimitations, assumptions, theoretical and conceptual framework and operational definitions of terms.

1.1 Background of the Study

Information Communication Technology (ICT) refers to technological tools and resources used for communicate, creation, dissemination, storage, and management of information (Blurton, 2002). These ICTs are not only computers and their accessories but also multimedia devices such radio and television and mobile phones among others. Researchers have shown great interest in how computers can best be used to improve the efficiency and effectiveness of education at all levels. However, as noted by Cairncross and Pöysti (2004), the use of computers and the internet in education in developing countries is still in infancy stages and in some it is not used at all, due to limited infrastructure and the perceived high cost of access (Cairncross & Pöysti, 2004).

The use of ICT in education fields can be applied in a number of fields within the school setting. For instance, ICTs can be useful in performing management duties and also in classroom in the content delivery process. Cairncross and Pöysti (2004)
noted that schools use ICTs in two different ways: in the administrative processes and carrying out core duties of classroom management as well as delivering the content in classroom. Computers in classroom may be used for teaching ICT skills or as a teaching aid when teaching other subjects.

Computers in educational institutions are used frequently in performing administrative duties. For example, teachers may not use hand written student reports and deliver the same as large bundles of papers rather they could prepare computer reports and send them safely to parents and other stakeholders online (Rowand, 2000). Computer can also be used in school setting for time tabling, preparation and management of students’ data, and management of staff data, keeping school books of account, library resources management, stores management, secretarial services, preparation and management of examination results.

The use ICT in curriculum implementation in the classroom should be guided by the ways in which it is being used. The effectiveness of any technological device varies according to application in the context. According to Haddad and Draxler (2002) there are five levels of use of technology in education: presentation, demonstration, drill and practice, interaction, and collaboration. Presentation and demonstration is the most basic level of application all ICT appliances: print media, audio and video, broadcasts media, computers or the internet—may be used for it. However, for interactive teaching and learning computers and the Internet are the ICTs that are best suited. Despite this, enormous potential of these technological tools in
education has remained unexploited since they are have only been used in making presentations and demonstrations.

The important role of (ICT) in improving education has been identified by researchers in different parts of the world. These include: Kozma and Anderson (2002) who noted that educational institutions must embrace the integration of ICT in teaching as a teaching aid. Pelgrum (2001) had the notion that the efficiency of educational institution can greatly be improved by adoption of ICT; Hennessy, Ruthven and Brindley (2005) underscored the marked improvement in management of school resources at reduced costs due to use of tailor made computer application. Owing to this, governments and proprietors in education have invested heavily in installation of computers in learning institutions and provision of computer networks in schools (Pelgrum, 2001). Moreover, researchers in educational technology predict exponential growth in the integration of ICT in classroom (Pelgrum, 2001). In contrast, Cooper (1998) predicted that adoption of technology in the implementation of curriculum seem complex and seems to be challenging and complex in its setting. Confirming this, Kozma and Anderson (2002) noted that adoption of technology in classroom teaching had not been fully achieved in formal and informal institutions of education in whether in developed or developing nations.

The Kenya National ICT policy paper was formally issued to schools in the year two thousand and six. The policy was aimed at improving the livelihoods of citizens by making affordable ICT services available and easily accessible (MoEST, 2005). In regard to educational institutions adoption of ICT the mandate was to improve the quality of curriculum instruction. In the quest for integrating ICT in education

Due to this fragmentation the Ministry of Education saw that need to bring all these policy documents together. The overall objective of the consolidation was to bring together ICT policies in education so as to have common scope, adoption, administration and similar ways of addressing innovations and safeguarding Intellectual Property Rights (IPR). The consolidated policy was aimed at providing a framework for the review of the ICT policy integration in educational institutions (MOE, 2006).

In order to achieve the stated strategic objective, MOE came up with the MOE ICT4E Model. The MOE ICT4E document stipulates that, the mission of the ICT project in schools be to provide of Quality Education for Development. The document underscores the fact that the successful integration of ICT will depend on the support of educational managers. According to the Republic of Kenya (2012) the policy aimed at improving ICT adoption in schools through professional development, provision of ICT materials and infrastructure through partnerships and collaborations with stakeholders.

According to Republic of Kenya (2012), since the inception of policy on ICT in education in 2006, several efforts have been put across but with little success. For instance, the New Partnership for Africa Development (NEPAD) e-Schools Programme had an objective of integrating ICT in the teaching and learning process
at secondary and primary school levels. It was envisaged that this would improve equitable access to quality education to all. The implementation plan was to ensure that in a period of 5 years all secondary schools are ICT compliant while in primary schools compliance was expected to be achieved in 10 years (MOE, 2006). By the year 2006 it was observed that this had made little or no impact mainly due lack of infrastructure and ICT equipment in schools (MOE, 2006).

Owing to the above noted barrier, the government under the Economic Stimulus Package (ESP) computer supply project, 1470 schools were equipped with ICT infrastructure, supplied with Form 1 and 2 digital content and their principals were to be trained on basic ICT skills and their applications in day to day running of school management affairs in the period 2009 to 2012 (Republic of Kenya, 2012). The package included the provision of Computers and their necessary accessories such as printers and Projectors. Schools were also to have installed Local Area Network (LAN) paid Internet services for a period of one year; training for teachers on integration of ICT in their school routine duties and digitization of the curriculum content. Among the selected schools that benefited in the year 2010 were schools from Mukurwe-ini Sub County, Nyeri County.

A report by the Sub County Quality Assurance Officer on ICT implementation in the year 2012 showed that the national policy was yet to be adopted by many schools in Mukurwe-ini Sub County. See Table 1.1
Table 1.1: ICT Policy Implementation status in Mukurweini Sub County

<table>
<thead>
<tr>
<th>ICT Implementation</th>
<th>Number</th>
<th>Percentage</th>
<th>Status of Implementation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Schools offering computer studies as a subject</td>
<td>4</td>
<td>12.1</td>
<td>poor</td>
</tr>
<tr>
<td>Schools with computer laboratories used by learners</td>
<td>3</td>
<td>9.1</td>
<td>poor</td>
</tr>
<tr>
<td>Schools with accessible internet to all learners and teachers</td>
<td>2</td>
<td>6.1</td>
<td>poor</td>
</tr>
<tr>
<td>School using computers for instruction in all subjects</td>
<td>1</td>
<td>3.0</td>
<td>poor</td>
</tr>
<tr>
<td>Schools with all teachers trained on ICT integration in teaching</td>
<td>0</td>
<td>0</td>
<td>Not implemented at all</td>
</tr>
</tbody>
</table>

The above statistics shows that schools in Mukurwe-ini have not implemented the ICT policy as per requirements with only four schools out of 33 offering computer studies, with a computer laboratory and internet and none having all teachers trained on ICT integration. Although the government recommended the ICT integration in classroom instruction by setting policies to guide the implementation, little has been done in Mukurwe-ini towards the implementation of the policy. The above report however did not address the use of ICT in teaching and learning. This study therefore sought to assess the use of ICT in teaching and learning and the preparedness hindering its use in public secondary schools in Mukurwe-ini Sub County, Nyeri-County.
1.2 Statement of the Problem

The benefits of ICT adoption and use in improving efficiency of educational institutions and the education sector as a whole has led to heavy investments in the purchase of computers and other forms of ICTs and ICT infrastructure that would necessitate the use of ICTs in schools. However, the effective use of ICT in curriculum implementation has been a difficult process hindering the achievement of full potential of ICT in teaching and learning almost impossible in most countries. In Kenya, the policy for adoption of use of ICT in schools was formulated in 2006. Since then, studies have reported no meaningful progress in ICT integration in schools. Among the key preparedness noted was lack of equipments and infrastructure. Owing to the above noted barrier, the government under the Economic Stimulus Package (ESP) computer supply project, 1470 schools were equipped with ICT infrastructure, supplied with Form 1 and 2 digital content and their principals were to be trained on use of ICTs for education Management over the period 2009-2012. Among the pilot Sub Counties that benefited was Mukuru-eni Sub County. However, a report by the Sub County Quality Assurance Office indicated that little has improved. This implies that there are other preparedness other than lack of equipment and infrastructure. Despite this no study has been done to establish the preparedness to use of ICTs in secondary schools in Mukurwe-ini thus the need for the current study.

1.3 Purpose of the Study

The main aim of this study was to assess the preparedness of secondary schools on the use of ICT in Mukurwe-ini Sub County, Nyeri County.
1.4 **Objectives of the Study**

The study was guided by the following objectives:

i. To assess the extent of use of ICT by teachers in teaching and learning in public secondary schools in Mukurwe-ini Sub County, Nyeri County.

ii. To establish the school related preparedness to the use of ICT by teachers in secondary schools in Mukurwe-ini Sub County, Nyeri County.

iii. To determine the teacher related preparedness to the use of ICT in public secondary schools in Mukurwe-ini Sub County, Nyeri County.

1.5 **Research Questions**

In order to achieve the objectives, the following research questions were formulated:

i. To what extent are ICTs used by teachers in teaching and learning in public secondary schools in Mukurwe-ini Sub County, Nyeri County?

ii. What are the school related preparedness that hinder the use of ICTs by teachers in public secondary schools in Mukurwe-ini Sub County, Nyeri County?

iii. What are the teacher related preparedness that hinder the use of ICTs in public secondary schools in Mukurwe-ini Sub County, Nyeri County?

1.6 **Justification of the Study**

The study seeks to establish how much ICT is applied by teachers in teaching and learning and performing other non-teaching duties such as keeping school records, time tabling, keeping students’ records etc. This information would provide useful data for assessment of the implementation of the school policy on ICT which is vital
to the stakeholders in the Ministry of Education for use in the efforts to achieve the intended objectives.

1.7   Significance of the Study

The findings of the study would also enlighten school administrators and teachers in different areas where ICT can be applied and the inadequacies within the school that need to be addressed in order to make the use of ICT in the schools more effective. The researcher made recommendations that assisted the Kenya Institute of Curriculum Development (KICD) in ensuring better implementation intervention measures. The study results also contributed to knowledge by providing more literature on ICT use in education.

1.8   Scope of the Study

The study was carried out in Mukurwe-ini Sub County, Nyeri County. The Study was done in public secondary schools in Mukurwe-ini Sub County only. Mukurwe-ini Sub County is located in Nyeri County Central Kenya. It borders Mathira East, Tetu, Nyeri South Sub Counties, and Murang’a and Kirinyaga Counties. The Sub County has an area of 179.5 square kilometers and has four (4) administrative divisions namely Mukurwe-ini Central, Mukurwe-ini North, Mukurwe-ini East and Mukurwe-ini West.
1.9 Study Limitations

i. The accuracy of data collected largely depended on the objectivity of the responses given by the respondents. However, the researcher assured the respondents that the information would be treated confidentially and for the sole purpose of the study.

ii. Since the participation was voluntary, misrepresentation is possible due to non-response from selected participants. The researcher minimized this problem by using sample sizes that are greater than the minimum recommended.

1.10 Delimitations of the Study

i. The research was carried out in Mukurwe-ini Sub County only. However, the results were generalized to other parts of the country where the research was not carried out.

ii. Mukurwe-ini Sub County is a rural region which lies in a semi-arid area, factors such as geographical location and infrastructure may affect access and use of certain resources such as computers and internet thus the situation may not be a replica of an urban setting.

1.11 Assumptions of the Study

The study was based on the assumption that all public secondary school teachers are aware of ICT policy in schools and its objectives.
1.12 Theoretical Framework

This study was guided by the theory of ICT in schools developed by Ten Brummelhuis (1995). According to Brummelhuis (1995) the factors affecting use of ICT in school can broadly be categorized into two: school factors and teacher factors. School factors refer to factors that can be controlled at school level such as: school environment, availability of facilities, school administrative support and ICT infrastructure in the school. Teacher related factors are related to the teacher characteristics that affect teacher attitude towards ICT and willingness and ability to adopt it as a tool for use at work as well as teacher knowledge on ICT. In this study, the researcher wished to establish the teacher characteristics that hinder the teacher from using ICT in his/her own school duties as well as the characteristics of the school that hinder the teachers from using ICT.

1.13 Conceptual Framework

In this framework, a distinction is made between school related factors and the teacher related factors. The Teacher related factors affect the willingness and the ability of the teacher to apply computers in teaching and performing other duties in the school while the school related factors directly affect the use of computers by teachers both in teaching and non-teaching duties. The teacher factors and the school factors are also perceived to be interrelated. See Figure 1.1
Independent Variable

Teacher related Preparedness
- ICT knowledge
- Training in application of ICT in teaching
- Use computer software for personal purposes
- Teachers experience
- Age
- Computer ownership
- Gender
- Computer attitude
- Perceived self confidence in computer use

School Related Preparedness
- Encouragement from colleagues
- School administration support
- Availability of Technical support
- Departmental support
- Availability of relevant software

Dependent Variable

Use of ICT in teaching and learning
- Curriculum content
- Policy requirements
- Work load

Intervening Variable

Figure 1.1: Conceptual Framework
1.14 Operational Definitions of Key Terms

**Classroom Instruction:** Refers normal Teaching in class

**Information Communication Technology (ICT):** Diverse set of technological tools and resources used to communicate, to create, disseminate, store, and manage information such as computers, and the Internet.

**School related factors:** Refers to school attributes such as physical conditions and administrative structures

**School management:** Refers to all activities that are related to the administrative duties in a school

**Teacher related factors:** Refers to personal attributes of the teacher such as age and education level
CHAPTER TWO
LITERATURE REVIEW

2.0 Introduction

This chapter consists of a review of previous literature on use of ICT in schools and the factors that influence teacher and administrator motivation to use ICT in school management or classroom instruction. The literature is organized into use of ICT in schools, school related obstacles and teacher related obstacles.

2.1 Use of ICT in Schools

ICTs have been proposed as a tool for improving school management just like other institutions with the belief that digitizing operations improves the efficiency of the processes making it easier for the system to achieve its objectives. For example, in Malaysia the ICT Master Plan and Vision 2020, has its long term objective being the transformation of the economy through improved education. The document stipulates that the education system shall be improved through ICT integration in order to achieve the countries goal in economic empowerment. Further the Malaysian Ministry of Education in collaboration with non-governmental organisations has put their focus on development of new technologies for use in education in order to empower students in the use of ICT. This has led to the integration of ICT in education system even at basic levels for efficient management of the schools, necessitating access to information as well as ease of communication (MoE, Malaysia, 2009).
The Malaysian Government has put emphasis on the use of ICT in; enhancing equity in access to ICT among students in schools, the use of ICT as a medium of instruction and to improve efficiency and effectiveness in school management processes. To achieve uniformity in the student’s ability to use ICT in school the policy recommended the teaching of ICT as a subject in schools to all students (Hassan, 2006).

According to Look (2005), the consistent use of ICT education improves performance. This was shown in a number of studies that suggested that schools that have rich ICT environments had enhanced performance in all subjects. In addition Becta (2003) reported that the effective use of ICT in teaching and learning allows students to get instant feedback from teachers, helps ease computation thus creating more time for extra study work. The also revealed that interactive study using multimedia motivated students to spare more time for academic work as opposed to other activities in school. In another study, Barak (2004) investigated the influence of use of ICT on stimulus variation in teaching. The study pointed out that ICT as a teaching tool promoted deep learning and helped teachers in catering for individual needs of the students thus improving performance for all the students. However, Barak (2004) on the contrary noted that teachers were more comfortable in using ICT for their own duties but not keen on integration of ICT in classroom teaching.

A review of 219 studies on the use of technology in education consistently found that students in technology rich environments experienced positive effects on performance in all subject areas (Look, 2005). In particular, Becta (2003) pointed out that ICT provide fast and accurate feedback to students, and speed up
computations and graphing, thus freeing students to focus on strategies and interpretation. Further, use of interactive multimedia software, for example, motivates students and leads to improved performance. In fact, studies showed that more students finished high school and many more consider attending college where they routinely learned and studied with technology (Becta, 2003). Barak (2004) pointed further revealed that the use of ICTs in education would promote deep learning, and allows schools to respond better to the varying needs of the students. Despite the apparent benefits of the use of ICT for educational purpose, studies showed that in many cases, the learning potential of ICT is deprived as many teachers are still not fully ICT literate and do not use it in their teaching.

Studies on teachers’ readiness for ICT generally, showed that teachers were not prepared for the full exploitation of the ICT potential in teaching and learning (So & Paula, 2006).

Among the goals of integration ICTs in education is enhancing teaching and learning so as to improve the quality of instruction and consequently the education standards (Higgins, 2003). However, in most developing countries this dream is yet to be realized. For instance in South Africa, the potential use ICTs in content delivery has not been fully exploited. According to Koo (2008) a lot of attention has been given to poor ICT infrastructure and ineffective policy formulation and implementation process with the thought that they affect the use of ICT in classroom instruction (Koo, 2008). A few researchers have attempted to assess the integration of ICT in pedagogical approaches in areas where infrastructure is well established. On this matter, Pelgrum (2001) showed that even in cases where the infrastructure is
available good, a small fraction of teachers are effectively integrated ICTs in the teaching and learning process effectively. Becta (2003) on the same note reported that there are other non-technical factors that hinder the effective adoption of ICTs in classroom instruction. Such factors therefore need be unearthed so as to realize the full potential of the adoption of ICT in pedagogy.

According Bingimlas (2009), ICT integration in curriculum delivery is a intricate process with many of preparedness to be overcome. A barrier could be seen as any condition that impairs the progress of achieving the ICT integration policy objectives. The preparedness deprive teachers of the opportunities to exploit their full potential in teaching.

Chigona and Chigona (2010) in their study on ICT integration reported that, the level of adoption of ICTs in the classroom instruction was wanting. The study also identified other factors that hindered the adoption of ICT in the curriculum delivery in secondary schools in Kenya. These preparedness to the ICT adoption in teaching and learning were broadly grouped into personal, social and environmental preparedness.

Thailand has also embraced the integration of ICT in schools with a number of projects: the SchoolNet, EdNet, ICT Master Plan (2002-2006) and Thai Learning Technologies 2010. Similar role is also being played by various government organizations in the Island Schools kick starting project (Tongkaw, Wood-Harper, Wood & Tongkaw, 2011).
While ICT is commonly adopted in performing school administrative roles, its application in curriculum implementation in class setting varies significantly (Schiller, 2003). However, there is adequate literature to show that the use of computers for instruction has significant benefits. Wellburn (1996) reviewed existing literature on influence of ICT in education. The study lead to a conclusion that the current literature is indicates that use of ICT facilitates the attainment of the set goals in educational institutions. In Dutch teacher education institutes, it was reported that tutors rarely used ICT for teaching (Brummelhuis, 2001). A national survey carried out to evaluate the perceptions of tutors on the role played by ICT integration in curriculum delivery. It was found that two-third of the teachers had positive perceptions on the value of ICT in classroom instruction (Brummelhuis, 2001). Despite this, further analysis showed that only half of tutors applied ICT regularly in teaching their courses but only in preparation of lessons and to conduct administrational duties rather than teaching.

The study also revealed the student teachers used only word processing and applications for searching information. This was attributed to the fact that the tutors never introduced the student teachers to ICT facilities available in the college including educational software that they were expected to use in teaching at primary and secondary levels. On the other hand students showed lack of knowledge about how ICT could be as a teaching aid. The researcher concluded that application of ICT as medium or even as an aspect in teaching and learning were still in its infancy in teacher training colleges.
In Uganda, Farrell, (2007) noted that a few schools had computers and internet connectivity while others lacked internet as well as electricity. The computers in schools were found in computer laboratories with capacities of 10-20 computers connected to a television receiver and a VCR. Farrel noted that there was frequent use the computers by students scheduled two or three times per week per class. However, adequacy of the computers was a problem with congestion due to large population of learners against a few computers in their computer laboratories (Farrell, 2007).

Secondary schools in Kenya have few computers that are mainly found in the offices implying that they are mainly used for performing administrative duties. Others have computers for use in teaching computer but not adequate or suited for use as tools for instruction in other subjects. According to Farrel (2007) these schools with computers, had very high student-computer ratio thus guaranteeing little interaction of the students with the computers (Farrell, 2007).

2.2 Preparedness to the Use of ICT in Teaching and Learning

Literature on the implementation of ICT use in schools shows that it is influenced by a spectrum of factors (Mumtaz, 2000). These factors are broadly distinguished into; non-manipulative and manipulative school and teacher factors. Non-manipulative factors refer to the factors that do not have direct link to the school, such as age of the teacher, t experience in teaching, experience of the teacher in use of computers, governmental policy on compute use in schools as well as availability of external support for schools (Brummelhuis, 1995). Manipulative factors are those that can be influenced by the individual or institutional characteristics such as: teacher attitude
towards integration of ICT in teaching, ICT knowledge and skills of the teachers, willingness of school to support the implementation process and availability of ICT support personnel (Brummelhuis, 1995). All these factors once not taken into consideration in the implementation process become preparedness to the school ICT policy implementation process thus rendering the effect of provision of computers and infrastructure to schools a waste.

2.2.1 School Related Preparedness

Demetriadis et al. (2003) noted that for schools to adopt student-centered use of ICT must be well established links with the community at large. This will necessitate the development of a more elaborate plan for use of ICT as teaching and learning tools. This implies that there should be rearrangement of responsibilities, roles and priorities of different stakeholders so as to allow willing members of the community to play their roles in the school ICT initiative.

In this respect, Granger and Morbey (2002) identified factors contributing to the successful integration of ICT in classroom instruction. They reported that successful implementation of school ICT policy required not only computers but commitment of the school members and community.

Kington, Harris and Leask (2002) carried out a survey ICT innovative application in schools. The survey revealed that some schools introduced laptops in their teaching and learning by building up a 'connected learning community' in an area which lacked necessary social and economic set up. To this end they concluded that
schools need to appreciate the role that could be played by students’ homes on the success ICT policy as they design policies for ICT integration.

When parents are allowed to participate actively in the school ICT implementation plans of, the implementation is more effective and efficient (Bangkok, 2004). According to Bangkok (2004) when this is done, there is increased motivation and excitement on the side of teachers, students and parents which makes them share their experiences leading to improved participation. These sentiments imply that parental involvement and supportive community indulgence positively influence the implementation of ICT integration plan in education.

The school vision is a key pillar in giving direction for action which leads to attainment of goals in the school. In this respect, school’s ICT vision articulates the short and long term goals and expected outputs of the ICT integration in both administration and classroom teaching (Anderson & Dexter, 2000). Supporting this Bennett (1996) stressed that the school ICT mission clearly explains the role of ICT in improving educational systems and therefore it must be coined carefully and with involvement of all stakeholders. According to Ertmer (1999), a vision gives us the starting place, the goal we need to attain, as well as guiding principles towards achieving this goal. This calls of well defined ICT mission and a vision in the school that will guide the implementers and facilitators towards their desired end product.

Means and Olson (1997) noted that for effective ICT implantation plan, governments, schools, teachers and community in general need to develop an ICT vision before they invest in computer hardware, software and human resource
development. This is to say that school wishing to adopt technology must believe in the value of its adoption otherwise they may not achieve the objectives. In cognizance of the collaborative efforts required in integration of ICT in teaching and learning, there is no unique way of doing things rather, different people may come up with different opinions that are useful in the end. Teachers must therefore be adequate time and resources to learn, experience, share their views on the practices they come across, pertaining ICT use in classroom. This will ensure gain confidence in the development and implementation of sound pedagogical approaches that incorporates ICT as a tool for improvement (Kearsley & Lynch, 1992).

Strudler and Wetzel (1999) pointed out that once after and adopted by all, the n vision formulation, a plan for integrating the ICT that clearly explains how teachers will use ICT in their day to day instructional process is drawn (Bangkok, 2004). Analysis of the study by Gulbahar (2005) on technology integration planning process that was done in K-12 school in Turkey showed that a master plan for implementation was key to the success of the process. Educational institutions must therefore develop an implementation plan for implementation order to use ICT effectively and efficiently in teaching, learning as well as in school management practices.

Due to the fast evolution of ICT, schools must endeavour to acquire up to date ICT accessories and software if technology application in classroom will be a success (Gulbahar, 2005). Gulbahar, (2005) Further, reported an example of innovative integration of computers in school system in Australian. The school had provided personal notebook computers and allocated web spaces, email access and workspace
for all teaching and non-teaching staff, and students from year 5 and above. In order to allow teaching and learning while the learners are at different places video conferencing is was made available and supported by the school intranet which placed all the school resources on-line. The students could then access the school resources and televised lessons via radio connections from school and home. This innovation marked a complete change in pedagogy used in the college while improving effectiveness in content delivery (Richardson, 2000). However, for it work the community and all the school members were involved at all stages.

The school management is also an essential facet in determining how effectively ICT adoption plan will be implemented with ease. Other significant factors are the teachers, non-teaching, curriculum planners, availability of skilled support staff, students’ knowledge and attitude on ICT use, level of training and personal development, as well as resources allocated for implementation plan (Manson, 2000). Supporting these sentiments, Slaouti and Barton (2007) highlighted lack ICT equipment, inadequacy of time, lack of mentors on ICT use and opportunities for apprenticeship have a negative influence on a teacher’s ability to integrate ICT into his/her lessons.

The application of ICT in institutions is dependent on several social and technical dependencies. To describe the interdependencies between technology and people, concept of socio-technical systems is used to explain the culture of the institution, attitudes, feelings and beliefs. It has an important role to play shaping the mood of the institution hence influencing the efficiency and effectiveness of the ICT plan implementation process (Kling & Lamb, 2000). Hoy and Miskel (2001) pointed out,
that the way the organization leadership supports the ICT implementation plan determines to a great extent the success of the implementation process.

In case of a school setting, the principal’s encouragement to the use of ICT in teaching and will to allow collaborations between teachers within the school and also with other teachers in other schools plays a key role in bringing positive changes towards adoption of ICT in the instruction process.

According to Fullan (1991) the easiest means of putting forward the adoption of ICT platform in the school is democratization of the change process that involves and encourages the contribution of all the school members and stakeholders. This implies that all the school members participate in the change process at planning level, own the change, perceive the project as theirs and therefore support any teacher who wishes to adopt ICT in gaining further knowledge and skills. Poor or failure of the school principal to support the ICT adoption process serves as serious drawback to the successful ICT implementation process.

In Kenya, a study on factors influencing ICT integration in teaching in Bungoma Sub County noted that: teachers had low levels of knowledge and skills in ICT a factor that reduced the teachers’ morale. Secondly, there were no incentives and rewards that seemed to give motivation to the teachers. Thirdly, lack of important resources coupled with unavailability of hardware and software together with negative administrator’s attitude were the key factors that influence the teacher use of ICT in classroom teaching (Wanjala, Khaemba & Mukwa, 2011).
2.2.2 Teacher Related Preparedness

Schools have heavily invested in the purchase of new technological devises in recent years with the feelings that teachers will make use of these technologies in classroom instruction. This implies that how smooth adoption process will be is not only determined by infrastructure and ICT facilities and equipment but also the willingness and readiness of the teacher to use ICT (Jones, 2001). The attitudes of teachers towards adoption of ICT in the classroom significantly affect their in the teaching and learning process. If teachers lack of confidence and skill, they develop fear implying that ICT is taken as a second option as teachers prefer traditional pedagogies (Harris, 1999).

According to Vannatta and Fordham (2004) the amount of time a teacher is willing to commit to teaching and preparing for class lessons, the teachers will to adopt change combined the amount of support by the school in terms of training predicts the extent of ICT adoption by teachers in classroom instruction. The authors further noted that administrators in both teacher training colleges and schools should offer the necessary training on ICT, and allow teachers to contribute to the desired changes in pedagogy.

Sherman (1998) identified time allocated for training as a hindrance to ICT adoption in curriculum implementation. He noted that there was lack of time and opportunities for teachers to practice the use of new technologies, as well as sharing opportunities for application of ICT with other teachers (Sherman, 1998). Adequate time must therefore be allocated for teachers individual skills development, through practice so as to gain confidence (McKenzie, 1999).
Teachers’ characteristics such as educational level, teaching experience, experience in the use of ICT in curriculum delivery, as well as demographic characteristics of teachers like age and gender may influence adoption technology in teaching (Schiller, 2003). In contrast, Albirini (2006) reported that teachers’ age did not significant correlation with factor teachers’ attitudes towards ICT.

Bauer and Kenton (2005) did a qualitative study to assess the classroom practices of teachers in the use ICT for instruction. They pointed out that highly skilled and experienced teachers in the use of ICT frequently used ICT for classroom instruction. Despite these good technological traits there was no consistent integration of ICT by teachers due to time constraints. Students had little time for interacting with computers while teachers required more time for lesson planning involving technology as tool of instruction. Other problems were related to lack of up to date software and hardware and low skills levels of learners.

Teacher personal characteristics have also been found to influence how teachers use computer technology in their classrooms. Bielaczyc and Collins (1999) suggested that the learning style of the teacher affects his/her ability to integrate ICT in classroom teaching. For instance, creative teachers who are knowledge constructing and habitual learners a with the qualities of decision makers and a decision makers, are more likely to use computers in more integrative ways that promote and support pedagogy (Bielaczyc & Collins, 1999). The above sentiments implies that current teachers need to be a breast with the current trends of knowledge acquisition be part of the change in technology and innovative enough in order to cope with ICT integration challenges.
Albirini (2006) noted that functionality attributes of the ICT equipment significantly influenced the teachers’ attitudes towards computer use. Thus, when teachers feel that ICT is beneficial, they see it as compatible with their work related activities; they are likely to demonstrate positive attitudes towards ICT.

According to Afshari et al. (2009) professional development of teachers requires integration of technology into their educational program. Similarly, Baylor and Ritchie (2002) found that embracing ICT in classroom enhanced professional development of the teacher.

Another study in Bungoma Sub County Kenya showed that Pedagogical Factors, Teacher Attitudes: Personal Familiarity with ICTs: Teacher Training: Attitudes to change: Professional development: Pedagogical approaches: Teacher abilities in technical applications and ICT knowledge: frequency of ICT use by teacher: Teacher confidence and motivation: and Subject knowledge as key teacher factors that influence the extent of teacher usage of ICT in teaching and other class related activities.

2.3 Critical Review of Literature

The use of ICT in schools has been cited by many researchers as a key initiative that can improve teacher performance in class instruction by encouraging pupil interaction and learner centered approaches in teaching. The (ICT) as a tool for instruction provides an enabling teaching and learning environment and makes learning student centered thus making it active, self directed and constructive. ICT should not just be seen as a tool to add to teaching or replace existing
methodologies. It should rather be seen as an important instrument that supports and improves new methods of teaching and learning. (MoE, Malaysia, 2009; Becta, 2003; Look, 2005; Hassan, 2006; So & Paula, 2006; Higgins, 2003; Koo, 2008).

However, the use of ICT in school both in teaching and learning has been found to be adopted by few teachers and school administrators in both developed and developing countries (Brummelhuis, 1995; Farrell, 2007; Tongkaw, Wood-Harper, Wood & Tongkaw, 201; Becta, 2003; Look, 2005; Hassan, 2006; Mumtaz, 2000; Granger and Morbey, 2002).

Researchers tend to agree that the factors that affect the use of ICT in school can broadly be classified into school related and teacher related. The school related factors are school size, culture, availability of facilities, and availability of the computers in the school, attitude of the school administrators towards computers, school policy on use computers among others. Similarly, the use of ICT in school management has been seen to be affected by school factors such as those related to the personnel involved in school management (Demetriadis et al., 2003; Granger and Morbey, 2002; Kington, Harris and Leask, 2002; Bangkok, 2004; Anderson & Dexter, 2000; Bennett, 1996; Ertmer, 1999; Kearsley & Lynch, 1992; Strudler and Wetzel, 1999).

Teacher related factors that influence use of ICT and innovation include; Teachers’ characteristics e.g. individual’s educational level, age, gender, educational experience, experience with the computer for educational purposes and financial position. Teacher attitude towards use of ICT, time allocation and work load,
competency in use of ICT, usage of ICT for personal issues, teacher ability to adapt to changes among others (Wanjala, Khaemba & Mukwa, 2011; Vannatta and Fordham, 2004; Harris 1999; Sherman, 1998; Durrell, 1990; McKenzie, 1999; Schiller, 2003; Venkatesh and Morris, 2000; Albirini, 2006; Roberts, Hutchinson and Little, 2003; Bauer and Kenton, 2005; Bielaczyc & Collins, 1999)

The reviewed literature has shown that implementation of ICT in schools has been faced with various problems. The implementation of the ICT policy in public secondary schools has also been shown not have been fully effected in many schools. A key thing in the policy is the use of ICT in teaching and learning by teachers. Research shows that use of ICT in teaching and learning is not common in secondary schools in Kenya. A survey of computer facilities in Mukuru-eni Sub County further implies that secondary schools in Mukuru-eni have not fully implemented the school ICT policy. Furthermore, the presence of ICT facilities in schools does not guarantee the effective use of ICT by teachers in teaching and other non-teaching duties in schools. However, no study has been done to establish the level of use of ICT by teachers thus the need for this study.
CHAPTER THREE
RESEARCH METHODOLOGY

3.1 Introduction

This chapter presents the methods to be used for data collections and analysis of results. The chapter consists of: research methods, design, target population, sampling procedures and techniques, sample size, research instruments, piloting, testing reliability and validity of research instruments, data collection procedures, data analysis techniques and ethical considerations.

3.2 Research Design

According to Fouche and De Vos (1998), a research design is a detailed plan of how a research project will be undertaken. It provides the basis from which the data are collected to investigate the research questions. Schurink (1998) opines that the researcher should select the research approach after considering the aim, the nature of the research questions, and the resources (informative subjects) available for the study. In this study the researcher used quantitative research design employing descriptive approaches because he wanted to evaluate the extent of use of ICT by teachers in teaching and learning in secondary schools and rate the factors that affect the use of ICT in schools. The participants (teachers) are directly involved in the use of ICT in teaching and other school activities thus they know the challenges they face and the magnitude of their influence thus they are able to give the relevant information accurately.
Descriptive research approach deals with questions based on the current state of affairs (Orodho, 2005). According to Allison, Owel, Rothwell, O’Sullivan, Saunders and Rice (1996), a descriptive approach sets out to seek precise and adequate descriptions of the activities, objects, processes and persons involved in a study. In this study, a descriptive method was used to provide accurate description of how teachers use ICT in teaching and management in schools, their computer use knowledge and attitudes as well as the frequency of use of different computer software for personal purposes.

3.3 Target Population

According to Mugenda and Mugenda (1999), a target population is the total set from which the individuals or units of the study are chosen. It is the totality of the persons, events or organizations units with which the real research problem is concerned. On the other hand, the portion of the target population that the researcher has reasonable access to is called accessible population (Simelane, 1998). The accessible population should therefore have the relevant information that is required to answer the research questions adequately while the target population should have all the characteristics of the subjects to be studied. The target population for this study was the 31 public secondary schools in Mukurwe-ini while the Principals and teachers who are directly involved in school management and classroom instruction in such schools were the accessible population.

3.4 Sampling Procedures and Techniques

According to Orodho (2005), sampling is the scheme of action or procedure that clarifies how the subjects are to be selected for the research. Simelane (1998) posits
that it involves the selection of a group of participants with which the researcher is
to conduct the study. It is done in order to give the researcher a more manageable
group for the purpose of the study. The researcher used three sampling techniques
namely; purposive sampling, stratified sampling and simple random sampling. The
sampling techniques were applied at different levels as indicated in Table 3.1

<table>
<thead>
<tr>
<th>Sample</th>
<th>Sampling technique</th>
<th>Reasons for sampling procedure</th>
</tr>
</thead>
<tbody>
<tr>
<td>Schools</td>
<td>Purposeful and stratified</td>
<td>Purposeful sampling ensured that the selected schools are only those that were existing before the introduction of ICT policy in 2006.</td>
</tr>
<tr>
<td>Teachers</td>
<td>Stratified</td>
<td>Stratified sampling ensured all school</td>
</tr>
<tr>
<td>Principal</td>
<td>Purposive</td>
<td>All head teachers of the selected schools shall be involved.</td>
</tr>
</tbody>
</table>

3.5 Sample Size

The table developed by Kathuri and Pals (1993) was used to determine the appropriate sample size at 95% confidence interval. The proposed sample sizes are shown in Table 3.2
Table 3.2: Population and Sample Sizes

<table>
<thead>
<tr>
<th>Group</th>
<th>Population size</th>
<th>Sample size</th>
<th>Sample Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Schools</td>
<td>25</td>
<td>23</td>
<td>92.0%</td>
</tr>
<tr>
<td>Principals</td>
<td>25</td>
<td>23</td>
<td>92.0%</td>
</tr>
<tr>
<td>Teachers</td>
<td>374</td>
<td>271</td>
<td>72.5%</td>
</tr>
</tbody>
</table>

3.6 Research Instruments

The study adopted the questionnaire “Factors Affecting Teachers Teaching with Technology (SFA-T3) developed by Charoula Angeli which was modified to suit the current study and the teacher population in this study. Interview schedules were used to collect data from the principals while observation guides were used to provide information on the different ways in which ICTs are used by teachers in secondary schools.

3.7 Piloting of Research Instruments

The researcher conducted a pilot study prior to the main research. This involved two schools and 10 teachers from Mukurwe-ini Sub County which were included in the final study. The schools were selected on basis that they existed before the introduction of the secondary school policy on ICT in schools in 2006.

3.8 Testing of Validity and Reliability

The results of the pilot study were used to test the validity and reliability of the questionnaires for use with target population before use in the main study.
3.8.1 Validity of Research Instruments

The study adopted content validity which was used to show whether the test items represent the content that they are designed to measure (Mugenda & Mugenda, 1999). In order to ensure that all the items used in the questionnaires are consistent and valid the instruments were subjected to scrutiny and review by experts in the school education of Kenyatta University.

3.8.2 Reliability of Research Instruments

The researcher used the internal consistency of items to check the reliability of the research instruments. This was done by calculating the Cronbach’s alpha coefficient for all the sections of the questionnaire from the results of the pilot study. A value of 0.7 or below of the Cronbach’s alpha coefficient show low internal consistency (Cronbach and Azuma 1962). The Cronbach’s alpha coefficient was calculated from the results of the pilot study with the help of Statistical Package for Social Sciences (SPSS) Version 20. The questionnaire had a Cronbach’s Alpha Coefficient of 0.85 thus it was deemed to have adequate reliability for use with the sample.

3.9 Data Collection Procedures

Data collection started by first visiting the selected schools and introducing oneself by the researcher to the principal. During this time, the researcher arranged for visits to the school for data collection. During the visits, the researcher then presented the self administered questionnaires to the respondents and collected them after a week.
3.10 Ethical Considerations

The researcher obtained information that could be confidential; about teachers and school records and processes. Some information was personal, thus many may not have been free to reveal it. To avert this, the researcher used self administered questionnaires in which the respondents were not required to give information that could reveal their identity. Similarly, the researcher obtained a research permit from the National Commission for Science Technology and Innovation (NACOSTI) and the Sub County Education Officer Mukurwe-ini to conduct research before requesting for official visits from school Principals. The information that was obtained was purely used for the sake of the research.

3.11 Data Analysis Techniques and Procedures

Data analysis process start by sorting out the questionnaires and classifying so as to gather information per school since the school was used as the unit of analysis. Both descriptive and inferential statistics were used to analyze data obtained from the study. Descriptive statistics such as frequencies, averages, and percentages were used to analyse data on use of ICT in schools and qualitative data on school and teacher preparedness to use of ICT by teachers in teaching and learning. Inferential statistics specifically the independent sample t-test was used to test the effect of the teacher and school factors on use of ICT in schools.
CHAPTER FOUR

RESULTS ANALYSIS, PRESENTATION AND DISCUSSION

4.1 Introduction

This chapter presents the findings of the study. The chapter is organized into introduction, questionnaire return rate, demographic information, extent of use of ICT in schools, the school related factors affecting the use of ICT in public secondary schools and teacher related factors affecting the use of ICT in teaching and learning in public secondary schools.

4.2 Questionnaire Return Rate

This refers to the percentage of the questionnaire that was dully filled and returned to the researcher. The total number of questionnaires that were completely filled and returned was 116. This constituted a return rate of 96.7% of the sample which was above the 85% recommended for an acceptable level of errors due to non – response (Simelane (1998)).

4.3 Demographic Information

The bio data that the researcher sought to find included: gender, age, teaching experience, and duration of stay in the current school, period of implementation of ICT in the school, teaching subjects, computer ownership and training on computer integration in teaching.
4.3.1 Gender, Age, Teaching Experience and Duration of Stay in Current School

The sample consisted of 41 (35.3) females and 75 (64.7%) male teachers. This could be attributed to the fact male teachers were more than female teachers in the district. The teachers’ age was found to range from 19 to 58 years with an average of 33.5 years showing that the sample was well distributed among all the age groups. The teaching experience referred to the number of years that the teacher had stayed in the teaching profession. The teaching experience was found to range from less than year to 35 years with an average of 12.5 years while the duration of stay of the teachers in their stations at the time of the study had a range of 1 to 9 years with a mean of 4.28 years.

4.3.2 Teaching Subjects

These referred to the subjects that teacher taught in the current school. The teaching subjects were grouped into various categories. The results are presented in Table 4.1

<table>
<thead>
<tr>
<th>Subject Area</th>
<th>Frequency</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Science and Mathematics</td>
<td>25</td>
<td>21.55%</td>
</tr>
<tr>
<td>Arts</td>
<td>14</td>
<td>12.07%</td>
</tr>
<tr>
<td>Sciences</td>
<td>21</td>
<td>18.10%</td>
</tr>
<tr>
<td>Arts and Languages</td>
<td>17</td>
<td>14.66%</td>
</tr>
<tr>
<td>Technical and sciences</td>
<td>10</td>
<td>8.62%</td>
</tr>
<tr>
<td>Technical and mathematics</td>
<td>5</td>
<td>4.31%</td>
</tr>
<tr>
<td>Technical and Arts</td>
<td>6</td>
<td>5.17%</td>
</tr>
<tr>
<td>Languages</td>
<td>18</td>
<td>15.52%</td>
</tr>
<tr>
<td>Total</td>
<td>116</td>
<td>100.00%</td>
</tr>
</tbody>
</table>
The sample consisted of all the eight possible subject combinations in secondary schools with the least common being technical and mathematics (4.31%) while the most common science and mathematics (21.55%).

4.3.3 Duration of Introduction of Computer Use in Schools
This refers to the period of time that has elapsed since the introduction of computers in a given school. The duration was found to vary from less than 1 year to 10 years with an average of 3.5 years. This shows that while some schools started using computers even before the introduction ICT policy in schools in the year 2006 while others are yet to introduce the use of computers in their schools. This shows poor implementation since all the school that participated in the study existed before the school ICT policy introduction in the year 2006. Similarly, all the schools had benefited from the Economic Stimulus Package (ESP) computer supply project and had been equipped with ICT infrastructure, supplied with Form 1 and 2 digital content of the year 2009 thus most schools started integrating computers and other ICTs in teaching and learning after the year 2009.

4.3.4 Computer Ownership and Training
Computer ownership referred to the possession of a personal computer while training refers to attendance of any course on integration of computer in teaching and learning. The teachers were required to indicate whether they owned computers and whether they had attended any computer training course on integration of computer in teaching and learning. About a third of the respondents 42 (36.2%) owned computers for their own personal use while a majority 74 (63.8%) did not have personal computers. However, majority of the teachers had attended a training
course on integration of ICT in teaching and learning 72 (62.1%) while 44 (37.9%) had not attended such training.

4.4 The Extent of use of ICT in Public Secondary Schools

This was measured by the frequency of use of different software for carrying out certain duties in the school that are related to teaching. The teachers were requested to indicate the frequency based on a five point Likert scale with the choices: Never (0), Rarely (1), Sometimes (2), Frequently (3) and Always (4). The Likert scores are summarised in Table 4.2

<table>
<thead>
<tr>
<th>Computer Use</th>
<th>Never</th>
<th>Rarely</th>
<th>Sometimes</th>
<th>Frequently</th>
<th>Always</th>
</tr>
</thead>
<tbody>
<tr>
<td>Teachers do use internet for downloading teaching materials</td>
<td>34</td>
<td>29.3</td>
<td>27</td>
<td>23.3</td>
<td>16</td>
</tr>
<tr>
<td>Teachers use word processing for making notes for students</td>
<td>39</td>
<td>33.6</td>
<td>24</td>
<td>20.7</td>
<td>12</td>
</tr>
<tr>
<td>Teachers use word processing for making schemes of work and lesson plans</td>
<td>44</td>
<td>37.9</td>
<td>23</td>
<td>19.8</td>
<td>5</td>
</tr>
<tr>
<td>Teachers use word processing for exams preparation</td>
<td>31</td>
<td>26.7</td>
<td>12</td>
<td>10.3</td>
<td>25</td>
</tr>
<tr>
<td>Teachers use computer</td>
<td>33</td>
<td>28.4</td>
<td>17</td>
<td>14.7</td>
<td>25</td>
</tr>
</tbody>
</table>
storage devices for
keeping softcopies
Teachers use videos 44 37.7 37 31.6 21 17.7 5 4.1 10 8.9
for demonstrations
Teachers use power
point for presentations
  e.g. models, plays
Teachers  use  41  35.3  26  22.4  27  23.3  11  9.5  12  10.3
educational CDs such
  as books
Teachers  use  48  41.4  17  14.7  21  18.1  12  10.3  18  15.5
computers for keeping
  records of work
Teachers  use  42  36.2  24  20.7  13  11.2  11  9.5  26  22.4
computers for
  preparing and keeping
  students progress
  records
Teachers  use  28  24.1  15  12.9  13  11.2  16  13.8  44  37.9
computers for
  preparation of merit
  lists
Teachers  use  30  25.9  13  11.2  19  16.4  16  13.8  38  32.8
computers for
  examination
  preparation and
  storage
Teachers  use  48  41.4  18  15.5  10  8.6  12  10.3  27  23.3
computers for
  preparation of students
  report cards/forms
The results show that each perceived application of ICT by teachers in instructional processes as well as other duties that are performed by teachers in the school was applied though at different levels with some being rarely used while others were very common. In order to compare the rating of these applications the total score per item was computed as the sum of the scores awarded by all the teachers. The total score was then converted into percentage by dividing by the total possible score per item which was given by: number of respondents × maximum score (4). The ways in which teachers used ICT in schools were divided into two main categories: Use of ICT in teaching and learning process and the use of ICT in performing other office duties assigned to teachers.

4.4.1 Use of ICT in Teaching

Four ways were identified in which teachers applied ICT in teaching and learning process. These were: use of Educational CDs such as set books; use of videos for demonstrations; use of power point for presentation such as models and plays; and word processing (e.g., Word) for making notes for learners. The results are displayed in Figure 4.1.
Teachers also rated the use computer for making notes slightly high (35.8%) as compared to some other aspects in which teachers would apply computers in teaching. This low percentage could be attributed to the desired time that is required for majority of teachers to type notes due to low typing speed among others. It goes without saying that for a beginner which most teachers in the use computers, it is easier to create notes that are hand written than making them in soft copies. Likewise, since most secondary school books are in hard copies it requires a teacher to key in the notes an exercise that is tedious and time consuming for the already overloaded teachers. This explains why despite the fact that every teacher in a school must make notes only a 35.8.0% used computers in preparation of teaching notes. These results were confirmed by the document analysis which indicated that less than 36% of the teachers had computer typed notes and those who had just a
few not all his or her teaching notes were in soft copies or were typed. This shows that teachers mainly attempted to type their notes but were either unable or not taking it very keenly.

On this matter the school principals showed that although they encouraged teachers to use ICTs in preparation of notes and other duties only a few were keen on doing it may be due to lack of expertise as well as workload that could not allow them to do so. Secondly, the teachers view that typing notes was tedious and time consuming is another reason for this especially for those who were able to type effectively. This could further be attributed to negative attitude to use computers in teaching as the principals indicated that teachers felt that some computer applications such as typing notes, power point presentation among others were time consuming and did not add much value to the content delivery or instructional process. Similar findings were reported by Granger and Morbey (2002) who noted that effective implementation of computer projects in schools need not only facilities and infrastructure but commitment by teachers and other stakeholders. On a similar note, Means and Olson (1997) recommend that teachers and schools must develop a vision before they make substantial investments in hardware and software. In other words, users of technology must have a fundamental belief in the value of innovation or the innovation is doomed to failure.

Use of educational CDs in content delivery was limited to a score of 34.7%. This could be attributed to the fact video teleconferencing was not used in Kenyan schools and that the curriculum developers such as KIE only produced CDs for set books which are used in teaching and learning of English literature and *Kiswahili*
They therefore found very little applications in the other subjects. This meant that for teachers to use these they were supposed to make their own which they may view as a waste of time transferring content from a book to a CD. Document analysis confirmed this when it was found that only educational CDs for set books used in teaching literature in English and “Kiswahili fasihi” were available in schools. The principals also reported that teachers never placed orders or requested for any other educational CDs on other subjects may be due to lack of information. These findings confirm the findings of Slaouti and Barton (2007) who reported hurdles such as access to equipment, software as well as digitization of content greatly hinders teachers’ efforts in the use ICTs in classroom teaching.

The least frequently used computer applications were: use of videos for class demonstrations at 28.7% while use of PowerPoint presentations in class rated at 20.3%. Videos and power point presentations require not only computers fitted in classrooms but also other expensive special equipments such as projectors to work. Though the schools were supplied with at least one projector per school, this was quite inadequate as some schools had as many as three streams. Secondly, the fear of use of computer aided devices by the teachers, lack of expertise in use of projectors and power point as well as editing of important internet materials was difficult and time consuming were other challenges. These findings concur with the sentiments of Vannatta and Fordham (2004) found that the teacher attributes of time committed to teaching and openness to change combined with the school/school system attribute of the amount of technology training to be a reliable predictor of classroom technology use.
Most schools may not have these equipments making it difficult for willing teachers to use. This could be responsible for the low rate of their use although they are important tools in teaching and learning. Durrell (1990) reported similar results in his study when he noted that teachers often feel constrained by the lack of time to discuss and develop their skills.

4.4.2 Use of ICT in Performing Other Teacher Duties

The referred to the use computers in carrying out school duties that were assigned to teachers apart from classroom instruction: these included; preparation of examinations, schemes of work, lesson plans, records of work among others. The Likert scores were converted to percentages as explained in section 4.4.1 and the results presented in Figure 4.2.
The most commonly used application was found to word processing for the preparation of examinations (57.5%). This could be attributed to the fact that examination preparation is duty of every teacher in a school. All teachers are therefore required to set examinations which must be printed. For this to be done the examinations must be in soft copy a situation that forces the teachers to use computer in the examination preparation. In some schools therefore typing of examinations is a policy thus forcing teachers to use computers during setting of exams.
Second frequent use of computer for storage of information for future reference either reference materials for students or important records for the teacher (54.7%). The school may not have enough computers for access to all the pupils thus the teachers in most cases stored crucial information. Flash disks and CDs were common devices that could be obtained easily since they are cheap and portable. Teachers would thus prefer to use softcopies stored in the flask disks, CDs and any other storage devices for use by students at their own free time as well as reference for teachers at a later date. Information obtained from the internet was best stored in the computers since it in soft copy. The use of internet to download academic materials thus leads to increased use of computer storage devices.

The use of computers in school for storage of examination materials was also quite common among teachers (54.1%). Teachers used past examination materials for revision in the subsequent years as well as guides for setting examinations and giving examples. It is thus easier to retrieve the materials from a computer than keeping bulk papers in shelves. Secondly, materials stored in soft copy forms are safer and easily accessible than files which may not last long and may not provide durability of the same materials.

Preparation of merit lists was rated at fourth though it wasn’t very common (43.3%). The ability of computers to carry out certain mathematical functions in a simpler manner and rank cases enables it to be a useful tool in the preparation of merit lists. Due to this teachers preferred using computers rather than manual working in order to save time. However, preparation of merit lists in schools in a business of class teachers only a factor could have greatly contributed to the low rating of the use.
The use computers by teachers for the preparation and keeping of students’ progress records were rated at 40.3%. Although not very commonly practiced by many teachers it was the duty and requirement for all teachers to prepare pupils progress records thus slightly higher frequencies that other teacher routine practices such as schemes of work and lesson plans. Progress records are frequently updated documents that are easily managed using a computer more than free hand thus teachers preference of the computer use. It should also be noted that the teachers must have access to enough computers and able to use the computer effectively in performing such duties for them to able to use them since the duties are purely given to subject teachers.

Others that were lowly scored were use of internet for downloading teaching materials (39.2%), preparation of students report cards with a score of 39.2%, the use computers for making schemes of work and lesson plan (36.6%) and the use of computers for keeping records of work (36.0%), Teachers showed that they use computers rarely for these duties presumably due to lack of knowledge in carrying out the duties on a computer or because the schools may require hard copies for signing. These results indicate that use of computers for doing other non teaching duties was more common than the use of computers and other ICTs in classroom teaching. This could be attributed to a number of reasons. Firstly, in some schools a number of non-teaching duties were required by policy to be either computer typed or the materials printed such as examinations, merit lists, progress reports among others. These forced teachers to do non teaching duties with the use of ICTs as a policy by the school management thus certain duties were purely done by use of computers by all teachers. Supporting this argument was the sentiments made by the
school principals during interviews who noted preparation of merit lists, examinations and progress records must be done by use of computers and stored in soft copies by school policy. These results are supported by the findings of Wanjala et al. (2011) who noted that school management duties are have been computerized in many schools.

4.5 School related Preparedness on the use of ICT in Public Secondary Schools

This referred to the school climate and support it offered to teachers in integrating ICT in teaching and learning as well as carrying out other teacher duties within the school. The teachers rated the conduciveness of the school ICT support and climate on a five point Likert scale in which higher scores indicated a more supportive environment for use of ICT by teachers. The choices given were: Completely disagree (0), Disagree (1) Neutral (2), Agree (3) and completely agree (4). The results obtained from the Likert scores are summarised in Table 4.3
<table>
<thead>
<tr>
<th></th>
<th>Never</th>
<th></th>
<th>Rarely</th>
<th></th>
<th>Sometimes</th>
<th></th>
<th>Frequently</th>
<th></th>
<th>Always</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Teachers encourage other teachers to use ICT in teaching and learning</td>
<td>34</td>
<td>29.3</td>
<td>13</td>
<td>11.2</td>
<td>30</td>
<td>25.9</td>
<td>28</td>
<td>24.1</td>
<td>11</td>
<td>9.5</td>
</tr>
<tr>
<td>ICT coordinator encourages teachers to integrate computers in teaching and learning</td>
<td>31</td>
<td>26.7</td>
<td>15</td>
<td>12.9</td>
<td>22</td>
<td>19.0</td>
<td>34</td>
<td>29.3</td>
<td>14</td>
<td>12.1</td>
</tr>
<tr>
<td>Principal encourages teachers to integrate computers in teaching and learning</td>
<td>14</td>
<td>12.1</td>
<td>18</td>
<td>15.5</td>
<td>35</td>
<td>30.2</td>
<td>31</td>
<td>26.7</td>
<td>18</td>
<td>15.5</td>
</tr>
<tr>
<td>The inspector encourages teachers to integrate computers in teaching and learning</td>
<td>35</td>
<td>30.2</td>
<td>15</td>
<td>12.9</td>
<td>31</td>
<td>26.7</td>
<td>20</td>
<td>17.2</td>
<td>15</td>
<td>12.9</td>
</tr>
<tr>
<td>Teachers exchange ideas about technology integration with other teachers</td>
<td>15</td>
<td>12.9</td>
<td>10</td>
<td>8.6</td>
<td>28</td>
<td>24.1</td>
<td>39</td>
<td>33.6</td>
<td>24</td>
<td>20.7</td>
</tr>
<tr>
<td>There are other teachers who use computers in teaching and learning</td>
<td>17</td>
<td>14.7</td>
<td>17</td>
<td>14.7</td>
<td>16</td>
<td>13.8</td>
<td>39</td>
<td>33.6</td>
<td>27</td>
<td>23.3</td>
</tr>
<tr>
<td>In departmental meetings teachers frequently discuss the subject of integrating computer in school curriculum</td>
<td>17</td>
<td>14.7</td>
<td>15</td>
<td>12.9</td>
<td>36</td>
<td>31.0</td>
<td>23</td>
<td>19.8</td>
<td>25</td>
<td>21.6</td>
</tr>
<tr>
<td>Teachers are well informed about the value of computers in teaching and learning</td>
<td>23</td>
<td>19.8</td>
<td>12</td>
<td>10.3</td>
<td>25</td>
<td>21.6</td>
<td>35</td>
<td>30.2</td>
<td>21</td>
<td>18.1</td>
</tr>
<tr>
<td>A variety of computer software is available for use in schools</td>
<td>31</td>
<td>26.7</td>
<td>10</td>
<td>8.6</td>
<td>16</td>
<td>13.8</td>
<td>33</td>
<td>28.4</td>
<td>26</td>
<td>22.4</td>
</tr>
<tr>
<td>The technical support is adequate in schools</td>
<td>38</td>
<td>32.8</td>
<td>24</td>
<td>20.7</td>
<td>28</td>
<td>24.1</td>
<td>14</td>
<td>12.1</td>
<td>12</td>
<td>10.3</td>
</tr>
<tr>
<td>The instructional support is adequate in schools</td>
<td>28</td>
<td>24.1</td>
<td>32</td>
<td>27.6</td>
<td>25</td>
<td>21.6</td>
<td>19</td>
<td>16.4</td>
<td>12</td>
<td>10.3</td>
</tr>
<tr>
<td>The technical infrastructure in schools is adequate</td>
<td>30</td>
<td>25.9</td>
<td>32</td>
<td>27.6</td>
<td>25</td>
<td>21.6</td>
<td>14</td>
<td>12.1</td>
<td>15</td>
<td>12.9</td>
</tr>
</tbody>
</table>
The results show variations in the school climate and support for the utilization of ICT in teaching and learning by teachers. The percentage score for each of the items was calculated as the sum of the scores awarded by all the respondents divided by maximum score per item: given by number of respondents (116) multiplied by maximum score (4) and then converted into percentage. The results for the percentage scores are presented in Figure 4.2.

**Figure 4.3: Percentage Scores for School Climate and Support**

Exchange of ideas with other teachers about computer use in teaching and learning or other jobs related to teaching had the highest score of 60.1%. This implies that teachers were willing to get informed about the use of ICT in teaching and learning.
though they faced other challenges. Computer integration by other teachers was the second rated with 59.1% showing that a number of teachers in the school used computers in carrying out their duties including teaching. The discussion on integration in teaching and learning in departmental meetings was also found to score high (55.2%) implying that heads of departments and their teachers had the feeling that integration of computers could ease their work and improve their performance and that they were willing to do it if provided with necessary support. The support and encouragement by principals to use computers in teaching was also highly rated among the factors (54.5%). This is a clear indication that a good number of school principals were willing to implement the ICT policy in schools thus creating a conducive atmosphere for integration. This was also supported by the fact that teachers were well informed of the importance of ICT integration in teaching and learning (54.1%). It could be due to this that teachers felt that integration of computers was necessary and discussed it in departmental meanings in order to come up with recommendations that could help support and enhance computer use in school activities specifically teaching and learning. These findings concur with findings of Bennett (1996) who stressed the importance of a well-defined mission that describes technology’s place in education and puts down policy framework for the ICT integration by all. Similar findings were also reported by Kearsley and Lynch (1992) asserted that Teachers must have opportunities to study, observe, reflect, and discuss their practice, including their use of ICT, in order to develop a sound pedagogy that incorporates technology.

Other important factors that were fairly supportive included: the availability of a variety of software for use in computer integration in teaching (52.8%),
encouragement by the school inspectors/quality assurance officers (42.5%) and availability of adequate instructional support (40.3%). It should be noted that although the Economic Stimulus Package equipped schools with computers and other accessories such as printers and projectors the school administration have the role of providing funds for concurrent expenditure such as software and technical staff. The push by quality assurance officers led to the starting of ICT departments in all schools as per policy in which the school principals would then try to equip with necessary software and hard ware thus giving teachers appreciable instructional support.

The availability of adequate technical support in the schools on the use of computers was also rated fairly (36.6%). Encouragement by the school ICT coordinator to use computers in teaching and learning (46.8%) was viewed as important, as well as the encouragement by other teachers (43.3%) while adequacy of technical infrastructure was the least rated in terms of conduciveness of the environment (38.5%). The school principals reported that schools had challenges in –providing adequate technical personnel due to high costs involved. This implies that schools lacked up to date software and support staff who could guide and help teachers in integration of ICT into their teaching process. These findings confirm the findings of Gulbahar (2005) who noted that using up-to-date hardware and software resources is a key feature to diffusion of technology use in teaching and learning process.

The effect of school related factors on the integration of ICT by teachers in teaching and learning was investigated by determining the relation between school climate and support in schools and the frequency of use of computers in schools. The total
scores for use of computers were computed as sum of the scores awarded by all the respondents on a five point Likert scale. The total scores for the school climate and support were calculated in a similar manner. The effect was then tested using the independent sample t-test with the school climate and support as independent or the categorical variable. This was grouped into two categories (Unsupportive and supportive school climate). In order to categorize the school climate the average percentage score for school climate was computed by summing up the average scores for all the items of the scale and dividing by the number of items. This gave an average score of 48.7%. All the teachers who scored less than this average were categorized as being in unsupportive school climate while teachers with scores higher than 48.7% on school climate were categorized as being in school with supportive school climate. The results are summarized in Table 4.4

<table>
<thead>
<tr>
<th>school support</th>
<th>Equal variances</th>
<th>Sig.</th>
<th>Levene's Test for Equality of Means</th>
<th>F</th>
<th>Sig.</th>
<th>t</th>
<th>df</th>
<th>df (2-tailed)</th>
<th>Mean Difference</th>
<th>Std. Error Difference</th>
<th>95% Confidence Interval of the Difference</th>
<th>Lower</th>
<th>Upper</th>
</tr>
</thead>
<tbody>
<tr>
<td>Equal assumed</td>
<td>.077 .783</td>
<td>-10.133</td>
<td>.000</td>
<td>-18.808</td>
<td>2.637</td>
<td>-24.262</td>
<td>-13.353</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
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</tr>
</tbody>
</table>
The results show there was a significant difference between the mean scores on use of ICT by in school where the school climate was supportive (M = 56.50, SD = 4.613) and schools in which the school climate was deemed unsupportive (M = 37.69, SD = 3.562), t(116) = -10.13, P < 0.0005 at a significance level of P < 0.05. The percentage effect was determined by calculating eta squared from these results using equation 1.

\[
\text{Eta squared} = \frac{r^2}{t^2 + (N_1 + N_2 - 2)}
\]

Where \(N_1\) and \(N_2\) refer to the number of teachers in unsupportive school climate and those in supportive school climates respectively. The Eta squared was found to be 0.385 which converts to a percentage of 38.5%. This implies that school climate and support could predict 38.5% of the frequency of integration of ICT in teaching and learning and other related duties in secondary schools. In other words an increase in the supportiveness of the school climate by a unit would increase the computer integration by 38.5%. This shows that there is a strong positive contribution of integration of ICT by the conduciveness of the school climate.

Adequacy of technical infrastructure in the school is a key element that would determine whether teachers can be able to integrate ICT in their teaching or not. A score of 38.5% indicated that in many school these were not adequate. This may mean that teachers had tom plan to alternate in the use of some of these important facilities greatly reducing the integration of ICT as learning of given topics in the school must follow the school time table which may not be flexible enough to accommodate ICT lessons. Some facilities like computer laboratories may be as few as 1 computer per school making it highly competitive thus most teachers are denied
the chance for its use or reserved for students taking ICT as a subject. Similar sediments were made by Higgins (2003) and Koo (2008). These researchers reported that the lack of infrastructure and access to technology affect the use of ICT in pedagogy.

Technical and instructional support for the integration of ICT is a major component of ICT policy implementation in schools. Schools should therefore employ technical staff that would assist teachers in the use of different packages in teaching as well as different facilities such as projectors, educational CDs among others. Inadequacy of these technical staff means inadequacy of technical assistance for ICT use instruction thus poor or low levels of computer integration in teaching and learning. This is similar to what was noted in Higgins (2003) who noted that even in schools with adequate ICT equipments and infrastructure lack of technical ICT staff hinders implementation of ICT policy.

Computer integration requires the use of specialized programmes that could help achieve the targets. Availability of a variety of software for use by teachers such as PowerPoint among others determines the kind of integration that can be done by the teachers. Failure to have adequate and suitable varieties of software for the performance of certain functions related to teaching will therefore hinder the implementation of ICT integration in schools. Similarly, informing or training teachers on ICT integration demystifies the myth of ICT which is thought by many unachievable within the Kenyan setting. When teachers are trained on use of computer to carry out certain duties it appears as a discovery them arouses their curiosity to practice thus improving their ICT use in teaching and learning. These
findings concur with other findings (Schiller, 2003; Wellburn, 1996; and Tongkaw, et al., 2011).

The frequent discussion on integration of ICT in teaching at departmental level shows the emphasis that is put at departmental level for use ICT in teaching and learning. It also implies that teachers are kept informed by others on new ways new software among other advancements in computer applications, an idea that encourages all the teachers in a given department to adopt ICT in teaching. This coupled with the exchange of ideas on ICT use among teachers enlightens teachers on the ICT applications, gives encouragement and changes the attitudes of teachers towards the use of ICT. In this way, teachers who do not use ICT in teaching and other duties may start using and those who use get better new ways of doing it. The findings agree with findings of other researchers in other parts of the world (Fullan (2001); Farrell (2007), Mumtaz, 2000).

Computer integration by other teaching in teaching is also a positive motivator into use of ICT in teaching. When colleagues use ICT techniques teachers are encouraged to adopt the same since they have people to consult and those that share common ideas discuss them in a manner to improve their teaching. This improves the ICT implementation discussions at departmental levels improving the use of IC in the school. Teachers by so doing educate one another on how to use ICT.

Another important factor was the encouragement by the school inspectors (quality assurance officers). These officers are charged of duty of ensuring that quality education is given to all learners. Due to this, they supervise the implementation of
government policies by the school principals, ICT involved. They thus act as supervisors of the ICT projects pushing principals to provide the necessary support. The principals influence the supportiveness of the school climate for ICT integration owing to the fact that they budget for it, provide infrastructure at times, important facilities such as printers, computers, modems, projectors among others. Principals thus facilitate the integration through purchase of resources and encouraging teachers to integrate ICT or either by funding teachers to attending seminars or by giving general directions. Similar results have been reported by: (Kington, Harris and Leask, 2002; Bangkok, 2004; Gulbahar, 2005).

4.6 Teacher Related Preparedness on Use of ICT in Teaching and Learning
These were grouped into five: demographic characteristics of teachers; knowledge of computer application software use; frequency of computer software for personal use; computer use attitudes; and perceived self confidence in computer use.

4.6.1 Demographic Characteristics and Frequency of Computer Use
The study investigated the effect of the following demographic characteristics of teachers on their frequency of integration of ICT in teaching and learning as well as other related duties in school: age, years of experience, length of duration since introduction of computers in the school, teaching subjects, gender and participation in ICT integration courses. The effect of these variables on the integration of ICT in teaching and learning was investigated using the independent sample t-test with demographic characteristics being the categorical variables and extent of use of ICT in teaching and learning being the dependent variable.
Teaching experience was grouped into long serving teachers (more than 12 years experience) and short serving teachers (less than 12 years experience in teaching). There was no significant difference between the mean scores for the application of integration of ICT by long serving teacher had short serving teachers (P = 0.069) showing that teaching experience had no significant effect on the use ICT in teaching in secondary schools.

The length of duration of introduction of computers in the school was found to have no significant effect on the integration of computers in teaching and learning at P < 0.05 significance level (P = 0.124). This could be due to the fact that many schools may have introduced computers in their schools mainly for in their offices for clerical duties with little access to teachers and most of them being serious inadequate for use by the large number of teachers thus most teachers fail to integrate ICT in teaching.

Another factor that had no effect on ICT integration in teaching was the subjects taught by the teachers (P = 0.451). The use of ICT in teaching demands proper planning which may not be based on the content that is to be taught. In other words, in every subject, ICT is applicable in different ways making it possible for all teachers to integrate ICT in their teaching and other duties almost equally. Unexpectedly, attendance of ICT integration courses of the teachers was also found to have no statistically significant effect on ICT integration in schools. This could be attributed to the fact that a large number of the teachers had attended at least a seminar on ICT integration and all of them attended the same course thus there was no mach difference between the courses attended.
Similarly, the depth of the content coverage may not have substantial to give teachers adequate knowledge for computer integration thus creating little difference between those who had attended and those who never attended in terms of computer knowledge and skills. These findings differ with the findings of Chigona & Chigona (2010); and Tongkaw, Wood-Harper, Wood & Tongkaw (2011) who reported that ICT training courses were positively related with integration of ICT by teachers in their daily school activities as well as teaching a fact that could attributed to differences in the content coverage and availability of ICT infrastructure in our schools.

The age of the teachers was grouped into two categories: old teachers (above 40 years of age) and young teachers (40 years and below). The results of the t-tests showed that there was a significant difference scores for ICT integration for old teachers (M = 14.20, SD = 6.191) and mean scores for young teachers (M = 27.50, SD = 9.152), \( t(116) = 6.442, P = 0.002 \) at \( P<0.05 \) significance level. The results show that young teachers integrated computers in their teaching and school activities more frequently than old teachers. The level of significance was tested by calculating Eta squared which was found to be 0.136. Converted to percentage this gives 13.6% implying that 13.6% of the integration of ICT in teaching and learning in secondary schools could explained by teachers’ age. Having young teachers therefore increased the rate of use of ICT in the schools other factors held constant.

This can be explained by exposure of the teachers to ICT during their college life. Young teachers were in colleges and universities when ICT was already introduced in the universities and colleges. Majority have therefore learned ICT in their colleges
as part of their training unlike the old teachers who were in universities and colleges when computer use was not established. Similarly, today’s’ learning at university is ICT based with students expected to use ICT in preparing assignments, obtaining learning materials from the internet, coupled with automation of most of the university services. This forces students to learn and acquaint themselves with computer use thus increasing their confidence and creating positive attitudes towards use of computers in their day to day lives. These findings concur with the findings of other researchers (Brummelhuis, 2001; Fullan, 2001; Mumtaz, 2000).

4.6.2 Knowledge of Computer Application Software Use

The teachers rated themselves on their knowledge of common application software use on a five point scale with choices: I cannot use it (0), I can use it to a small extent (1), I can use it satisfactorily (2), I can use it well (3) and I can use it very well (4) in which higher scores indicated higher proficiency in their use. The average scores for the teachers proficiency in the use of the application software was obtained by summing up the scores obtained by all teachers for given software and dividing by the total number of teachers then converting to percentage. The results are presented in Figure 4.3
Figure 4.4: Percentage of Proficiency in Use of Basic Software (Researcher 2014)

The results show that the teachers’ proficiency in the use of basic application software that are commonly used in integration of ICT in teaching was too low with a range of 24.2% to 43.2% and an average of 32.9%.

The most common application software in terms of proficiency of use was found to be internet (43.2%). This could be attributed to the fact that internet access was not limited to the use of computers only and that many people use cell phones which are able to serve the internet. Secondly, internet finds many uses in day to day life of people with most common ones being ease of communication through email which has improved among people with the introduction of social websites such as face book and twitter. This explains why teachers were found to use internet in searching for teaching materials more frequently that other ICT integration methods.
Word processing software was second with percentage proficiency of 37.9%. Such a low proficiency shows the inability of teachers to use computers to make notes as this would be too tedious to them and time consuming owing to the fact that they cannot type quickly and it was expensive for them to pay for typing services a situation that calls for the use of hand written materials. Power point though so useful in class presentations was not common to many teachers with a score of 27.3%. This could be due to a number of factors one being that it dies not find many applications in the day to lives of the teachers thus they were not practicing it frequently. This greatly leads to reduced use of computers in classroom teaching.

Spreadsheets (word excel) had a proficiency of 31.8% despite its usefulness in calculations and data analysis which could provide a simpler way of teaching mathematics, graphs among other topics while data base scored the lowest (24.2%) although these are powerful tools for keeping information such as students progress records and records of work.

The effect of computer knowledge on computer integration was tested using the independent sample t-test with computer software knowledge as the categorical variable and computer integration as the continuous variable. The total scores per respondent were calculated as the sum of the scores for knowledge in the different application software. The computer knowledge was collapsed into two categories: beginners and expert. This was done by first calculating the average score for computer knowledge which was found to be 32.9%. Beginners were all the teachers who scored less than the average marks (32.9%) while those teachers who scored above this mark were grouped as experts. The results are displayed in Table 4.5
<table>
<thead>
<tr>
<th>Total Knowledge of computer software</th>
<th>Equal variances assumed</th>
<th>F</th>
<th>Sig.</th>
<th>t</th>
<th>df</th>
<th>Mean Difference</th>
<th>Std. Error Difference</th>
<th>95% Confidence Interval of the Difference</th>
<th>Lower</th>
<th>Upper</th>
</tr>
</thead>
<tbody>
<tr>
<td>Equal variances assumed</td>
<td></td>
<td>.166</td>
<td>.688</td>
<td>-7.988</td>
<td>22</td>
<td>.000</td>
<td>-9.701</td>
<td>1.388</td>
<td>-12.573</td>
<td>-6.830</td>
</tr>
</tbody>
</table>

There was a significant difference between the mean scores beginners in computer integration (M = 25.19, SD = 3.391) and experts (M = 57.89, SD = 3.219), t(116) = -7.988, P<0.0005. This is clear indication that there was a statistically significant effect of computer software knowledge on by teachers on their integration of computers in teaching and learning and other related duties in the school. To determine the effective size of the strength of this relationship the Eta squared was calculated (0.280). This means that that 28.0% of the computer integration could be predicted by computer application software knowledge of the teachers.
It should be noted that computer application in teaching and learning requires adequate knowledge of the programmes that can be used to perform given tasks effectively. Lack of this knowledge leads to negative attitude as well as lack of self confidence in handling computers a situation that makes teachers avoid the use of computers in teaching and learning in fear of embarrassment before students. Secondly, inadequate expertise in the use of certain computer application software leads to lack of awareness of the software ability to perform given tasks thus even those who can use certain software but are not very good in them may not even know what the software can be used to do. A notable situation is that most scored averagely on computer knowledge indicating that they could use the different software but not to perform all purposes that the software could be applied in thus teachers avoid their use in class. These findings concur with the findings (Ya’acob et. al., 2005; So & Paula, 2006; Barak, 2006).

4.6.3 Frequency of Software Use for Personal Purposes

This referred to the use of computer by teachers in performing tasks that were not related to the school work either at home or in school such entertainment, own learning among others. The teachers were requested to rate their frequency of use of certain software on a five point Likert scale with choices: Never (0), Once or twice a term (1), Once or twice a month (2), Once or twice a week (3) and Almost every day (4). The percentage frequency of use of each software was obtained as a sum of scores awarded to each software by all the respondents. This was converted to percentage of the total possible score (Maximum score × number of respondents). The results are presented in Figure 4.4
Figure 4.5: Percentage Use of Different Software for Personal Use

The results showed that teachers rarely used computer software for their personal use with the highest ranked being accessing internet rated at 57.1% and the lowest being making presentations rated at 22.3% and an average use 38.2%. This shows very low use of computer which could be attributed to poor computer infrastructure within their localities as most schools are in rural areas where electricity and internet may not be readily available. Lack of knowledge and low interest in the use of computer may also be a cause for this.

The frequency use of computer software for personal use per teacher was determined by summing the individual scores for the use of each software and converted to percentage by dividing by total maximum score from the scale. The effect of use of computer for personal issues on computer integration in teaching and
learning was studied using the independent sample t-test with use of computer for personal issues being the independent variable and computer integration being the dependent variable. The frequency if use of computer for personal work was categorised into rare and frequent users by placing those who scored below the overall mean as rare users and those who scored above the mean as frequent users. The findings are summarised in Table 4.6

**Table 4.6: T-test for Frequency of Software Use and Integration of ICT in Teaching and Learning**

<table>
<thead>
<tr>
<th>Levene's Test for Equality of Variances</th>
<th>t-test for Equality of Means</th>
<th>95% Confidence Interval of the Difference</th>
</tr>
</thead>
<tbody>
<tr>
<td>F</td>
<td>Sig.</td>
<td>t</td>
</tr>
<tr>
<td>---</td>
<td>------</td>
<td>---</td>
</tr>
<tr>
<td>Knowledge variances of computer software</td>
<td>assumed</td>
<td>-6.599</td>
</tr>
</tbody>
</table>
The results show that there was a significant difference in the integration of ICT in teaching and learning for teachers who rarely used application software for personal purposes ($M = 34.08$, $SD = 2.691$) and those who used the application software frequently for their personal purposes ($M = 58.67$, $SD = 3.525$), $t(116) = -6.947$, $P < 0.005$ at $P < 0.05$ significance level. The calculated Eta squared was found to be 0.227 or 22.7%. This indicates that 22.7% of the integration of computers in teaching and learning by teachers could be explained by use of software for personal purposes.

Computer knowledge though must be studied is much of a skill. Practicing therefore improves proficiency in the use by enhancing speed in certain uses such as typing, manipulation of data using word excel and data base among others. The use of these common application software by teachers for personal purposes therefore makes them more effective in their use thus the ability to use them easily in for teaching.

Teaching requires expertise and mastery of content as well as the methods to be applied in the teaching. The same way for use of computer in teaching teachers must be conversant with its use to avoid failures during the lesson. Such expertise gives courage in the use of computers by instilling confidence to the teachers thus improving the frequency of its application in school working. It also improves the knowledge of what the computers can do better and easily as compared to manual works leading to a change attitude in the integration of computers by teachers in teaching and other school related duties. These findings are similar to the findings of other researchers (Schiller, 2003; Brummelhuis, 2001; Jones, 2001; Russell & Bradley 1997; Harris 1999; Vannatta & Fordham, 2004; Sherman, 1998).
4.6.4 Teacher Attitude towards Integration of ICT in Teaching and Learning

This referred to the personal feelings about the usefulness, the effectives and ability of teachers to use computers in teaching and learning and other duties in the school. The computer attitude for the teachers was measured by rating certain perceived attitudes on a five point Likert scale in such a way that higher scores indicated a more positive attitude towards computer use. The sum of the scores for the individual attitude gave the total score per teacher. This was converted to percentage by dividing by the maximum scores in the scale.

The findings showed that most teachers had negative attitudes towards ICT integration with the percentage scores ranging from 18.8% to 38.4% with an average score of 30.9%. This could be attributed to lack of computer knowledge by the teachers, poor or no support for integration from the school administration coupled with lack of confidence in the use computers. The results concur with what was reported by (Rogers, 1995; Schiller, 2003 and Moreover, Venkatesh & Morris, 2000).

In order to determine the effect of the computer attitudes on ICT integration by teachers the computer attitude scores were banded into 2 categories: those with positive attitudes and those with negative attitudes and the effect tested using the independent sample t-tests with computer attitude as the independent variable and integration of ICT being the dependent variable. The results are presented in Table 4.7.
Table 4.7: T-Tests for Computer Attitudes and ICT Integration in Teaching and Learning

<table>
<thead>
<tr>
<th>Levene's Test for Equality of Variances</th>
<th>t-test for Equality of Means</th>
<th>95% Confidence Interval of the Difference</th>
<th>Lower</th>
<th>Upper</th>
</tr>
</thead>
<tbody>
<tr>
<td>F</td>
<td>Sig.</td>
<td>t</td>
<td>df</td>
<td>tailed)</td>
</tr>
<tr>
<td>---</td>
<td>-----</td>
<td>---</td>
<td>----</td>
<td>---------</td>
</tr>
</tbody>
</table>

The results show that there was a significant difference between the mean scores for computer integration by the teachers who had negative attitude towards computers (M = 38.92, SD = 10.259) and the mean scores for computer integration by teachers with positive attitudes to computer use (M = 59.17, SD = 8.032), t(116) = -8.013, P = 0.02 at 95% confidence interval. The Eta squared value was calculated to determine the percentage effect of computer attitudes on integration of ICT in teaching and learning by teachers. This was found to be 0.281 implying that 28.1% of the integration of computers could be predicted by teachers’ attitudes towards use of computers. In other words, a positive change of attitude of the teachers towards computer use by 100% would increase the integration of ICT by teachers in teaching and learning by 28.1%.
Negative attitudes towards the use of computers by teachers are attributable to their low knowledge in computer applications coupled with knowledge on the integration into teaching. In efficiency in the use of the computers makes people too slow in working with computers thus seeing the use of a computer to perform certain tasks as tedious and time wasting, this eventually creates feelings that computers are not effective thus negative attitude towards their use. These findings concur with the findings of Albirini (2006); Dillon and Morris (1996) and Afshari et al. (2009).

4.6.5 Perceived Self Confidence in Integrating ICT in Teaching and Learning

This refers to the feelings of the ability to integrate ICT in ones teaching programmes without difficulties. It was measured on a five point Likert scale on as rated by teachers with higher scores showing higher self confidence levels. The scores were summed up to obtain the total score by individual teachers which were then converted into percentage of the maximum score per respondent in the scale. The findings showed that teachers had extremely low self confidence levels in the integration of ICT in teaching and learning with the lowest scoring 4.8% and the highest scoring 26.0% with an average of 15.0%.

Such low levels of self confidence are either due to lack of knowledge in computer applications as shown that most teachers were not conversant with use of common application software that could be used for ICT integration in teaching such as Power Point, excel among others. Many teachers were also found not to possess computers at home. This limits their ability to practice the use of computers as well as the use of computers for their own use consequently limiting acquisition of self confidence in computer use for teaching and learning and performing other office related duties.
The effect of self confidence in the use of computers on integration of computers in teaching and learning was investigated using the independent sample t-tests with self confidence being the independent (categorical variable) and the computer integration being the dependent (continuous variable). The percentage scores for self confidence were used to group the teachers into two groups: those who had self confidence and those had no self confidence in computer integration. The results of the t-tests are shown in Table 4.8.

Table 4.8 T-Test for Perceived self Confidence and ICT Integration

<table>
<thead>
<tr>
<th>Total extent of ICT integration</th>
<th>Levene's Test for Equality of Variances</th>
<th>t-test for Equality of Means</th>
<th>95% Confidence Interval of the Difference</th>
</tr>
</thead>
</table>

The results show that there was a significant difference in the mean scores for ICT integration for teachers with higher levels of perceived self confidence in computer integration (M = 29.67, SD = 6.906), and those who had no self confidence in
computer integration (M = 17.54, SD = 9.413), t(264) = -12.428, P = 0.001 at 95% confidence interval. The percentage effect was found to big (Eta squared = 0.317) showing that 31.7% of ICT integration in teaching and learning could explained by perceived self confidence. The increase in perceived self confidence in ICT integration by a unit could therefore lead to an increase of levels or frequencies of ICT integration of ICT in teaching and learning of 31.7%.

It can be noted that when teachers have self confidence in integration of ICT they will try to use computers in their teaching and other related duties irrespective of the preparedness that exist. Such teachers are motivated to look solutions to problems facing the ICT integration as they deem it an important tool for teaching and learning with a number of advantages and that it makes their work easier hence increased ICT integration in schools. Similar findings were obtained by Afshari et al. (2009) and Baylor and Ritchie (2002).
CHAPTER FIVE

SUMMARY OF FINDINGS CONCLUSIONS AND RECOMMENDATIONS

5.1 Introduction

This chapter presents a summary of the research results, conclusions made from the findings of the study as well as recommendations made from the conclusions of the study. It also consists of suggestions for further studies.

5.2 Summary of Findings

The researcher determined the extent of integration of ICT in teaching and learning in secondary schools, and other teacher related duties by teachers in secondary schools, the school and the teacher preparedness to the ICT integration. The study further determined the effect of different teacher and school related factors on the extent of integration of ICT in teaching and learning as well as performing other duties by teachers. The school related preparedness investigated was the perceived supportiveness of the school climate to use of ICT. The teacher related preparedness investigated were: teacher demographic characteristics such as: knowledge of computer application software use; frequency of computer software for personal use; computer use attitudes; and perceived self confidence in computer use.

5.2.1 Extent of use of ICT in Teaching and Learning

Integration of ICT in teaching and learning had four applications. The most common application was use computer for making notes rated 35.8% while the second highly rated was Use of educational CDs in content delivery which was limited to a score of 34.7%. The least frequently used computer applications were: use of videos for
class demonstrations at 28.7% while use of PowerPoint presentations in class rated at 20.3%.

The integration of computers by teachers in other duties that are related to teaching was also evaluated. The most commonly used application was found to word processing for the preparation of examinations (57.5%). This was followed by use of computer for storage of information for future reference either reference materials for students or important records for the teacher which was rated at 54.7%. The use of computers in school for storage of examination materials was also quite common among teachers with a percentage score of 54.1%. Preparation of merit lists was rated at fourth though it wasn’t very common at 43.3%, while the use computers by teachers for the preparation and keeping of students’ progress records were rated at 40.3%. Others were use of internet for downloading teaching materials (39.2%), preparation of students’ report cards with a score of 39.2%, the use computers for making schemes of work and lesson plan (36.6%) and the use of computers for keeping records of work (36.0%).

5.2.2 School Related Preparedness

The school related factors were rated as follows: exchange of ideas with other teachers about computer use in teaching and learning or other jobs related to teaching had the highest score of 60.1%. The second highly rated was Computer integration by other teachers with 59.1%. The discussion on integration in teaching and learning in departmental meetings was also found to score high (55.2%) The support and encouragement by principals to use computers in teaching was also highly rated among the factors (54.5%) followed by teachers being well informed of
the importance of ICT integration in teaching and learning rated at 54.1%. Others were the availability of a variety of software for use in computer integration in teaching (52.8%), encouragement by the school inspectors/quality assurance officers (42.5%) and availability of adequate instructional support (40.3%). The availability of adequate technical support in the schools on the use of computers was also rated fairly (36.6%). Encouragement by the school ICT coordinator to use computers in teaching and learning (46.8%) was viewed as important, as well as the encouragement by other teachers (43.3%) while adequacy of technical infrastructure was the least rated in terms of conduciveness of the environment (38.5%). The results further showed that school climate has a significant positive influence on the extent of adoption of ICT in teaching and performing other duties in secondary schools ($P < 0.0005$). School climate was found to predict 38.5% of the integration of ICT by teachers in performing both their teaching and non-teaching duties.

### 5.2.3 Teacher Related Preparedness

Teacher related factors that were investigated were: length of introduction of computers in the school had no significant effect on extent of integration of ICT by teachers in teaching and learning and performing other duties ($P=0.124$). Another factor that had no effect on ICT integration in teaching was the subjects taught by the teachers ($P = 0.451$). Teachers age was found to have a statistically significant effect on ICT integration ($P = 0.002$) with young teachers embracing integration of ICT more than old teachers. Teacher age was found to predict 13.6% of the extent of ICT integration.
On knowledge of basic computer application software, teachers were found to have low proficiency in working with computers with a range of 24.2% to 43.2% and an average of 32.9%. The most common application software in terms of proficiency of use was found to be internet (43.2%) followed by word processing software with percentage proficiency of 37.9%. Spreadsheets (word excel) had a proficiency of 31.8%, Power point though so useful in class presentations had a proficiency of 27.3% while the least proficient was data base scored the lowest (24.2%). There was a significant difference between the mean scores beginners in computer integration (M = 25.19, SD = 3.391) and experts (M = 57.89, SD = 3.219), t(116) = -7.988, P<0.0005. The Eta squared value was found to be 0.280 or 28.0%.

Teachers rarely used computer software for their personal use with the highest ranked being accessing internet rated at 57.1% and the lowest being making presentations rated at 22.3% and an average use 38.2%. There was a significant difference in the integration of ICT in teaching and learning for teachers who rarely used application software for personal purposes (M = 34.08, SD = 2.691) and those who used the application software frequently for their personal purposes (M = 58.67, SD = 3.525), t(116) = -6.947, P<0.005 at P<0.05 significance level. The calculated Eta squared was found to be 0.227 or 22.7%.

Most teachers had negative attitudes towards ICT integration with the percentage scores ranging from 18.8% to 38.4% with a mean score of 30.9%. There was a significant difference between the mean scores for computer integration by the teachers who had negative attitude towards computers (M = 38.92, SD = 10.259) and the mean scores for computer integration by teachers with positive attitudes to
computer use (M = 59.17, SD = 8.032), t(116) = -8.013, P = 0.02 at 95% confidence interval with eta squared value of 28.1%.

Teachers had extremely low self confidence levels in the integration of ICT in teaching and learning with the lowest scoring 4.8% and the highest scoring 26.0% with an average of 15.0%. There was a significant difference in the mean scores for ICT integration for teachers with higher levels of perceived self confidence in computer integration (M = 29.67, SD = 6.906), and those who had no self confidence in computer integration (M = 17.54, SD = 9.413), t(264) = -12.428, P = 0.001 at 95% confidence interval. The percentage effect was found to big (Eta squared = 0.317).

### 5.3 Conclusions

Teachers were found to integrate ICT in teaching and learning and other related duties but to a small extent that varied from one teacher to the other with some teachers not using ICT for in teaching and learning at all.

Conducive school climate that was supportive was found to increase the integration of ICT in teaching and learning. The teacher’s age affected integration negatively with younger teachers integrating ICT more often that old teachers. The teachers’ knowledge of computer software was also found to increase the use of computers for teaching and learning in school. The use of computer software for personal purposes had a strong positive relationship with ICT integration in teaching and learning.
Teachers use of software for personal purposes was found to have a positive influence on integration of ICT. Perceived self confidence in the use of computers was also found to have a strong positive influence on ICT integration while computer use attitudes by the teachers had negative influence of ICT integration in secondary schools.

5.4 **Recommendations**

Based on the research findings the researcher made the following recommendations:

i. The government through the ministry of education should ensure that ICT integration projects are adequately funded so as to allow school acquire not only the necessary equipment and infrastructure but also cater for concurrent expenditure such as the purchase of software and employment of technical staff.

ii. Government employ ICT specialists in schools to give technical support and coach teachers on computer integration in teaching and learning

iii. Government should initiate rigorous in service computer training for all teachers in order to equip all teachers with adequate computer knowledge for ICT integration in teaching and learning

iv. To avert future problems teacher training curriculum should be ICT based so as to produce ICT integration trained teachers

5.5 **Suggestions for Further Studies**

i. The study did not address the adoption of ICT in school management thus the need for such a study

ii. There is need for a study that would determine the ICT training needs for the teachers.

iii. There is need for a study to establish the adequacy of ICT facilities in schools.
REFERENCES


Shahan, K. E. (1976). *The administrator’s role in developing innovations.* Unpublished Manuscript, Boston, MA:


Appendix I: Questionnaire for Teachers

PART ONE: DEMOGRAPHIC INFORMATION

Please circle or write your answer in the space provided.

1. Age: .................................................................

2. Gender
   Male [ ]
   Female [ ]

3. Years of teaching experience: ..............................................................

4. Years of teaching experience in your current school: ...........................................

5. How many years ago were computers introduced for the first time in your school?
   ..............................................................................................

6. Subjects you teach ............................................................. & ..............................................................

7. Have you ever participated in professional development course(s) related to the integration of computers in teaching and learning?
   Yes [ ]
   No [ ]

PART TWO: KNOWLEDGE OF COMPUTER SOFTWARE

Please tick your answer: the choices are: I cannot use it (0), I can use it to a small extent (1), I can use it satisfactorily (2), I can use it well (3) and I can use it very well (4)

<table>
<thead>
<tr>
<th>Computer software</th>
<th>0</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 Word processing (e.g., Word)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2 Databases (e.g., Access)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3 Spreadsheets (e.g., Excel)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4 Presentation software (e.g., PowerPoint)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5 Internet</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
PART THREE: FREQUENCY OF SOFTWARE USE FOR PERSONAL PURPOSES

Please tick your answer: the choices are: Never (0), Once or twice a term (1), Once or twice a month (2), Once or twice a week (3) and Almost every day (4)

<table>
<thead>
<tr>
<th>I use the computer to</th>
<th>0</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 Make presentations (e.g., PowerPoint)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2 Process text (e.g., Word)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3 Publish materials (e.g., Publisher)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4 Prepare spreadsheets (e.g., Excel)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5 Create graphics (e.g., Paint)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>6 Communicate (e.g., email)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>7 Access the Internet</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>8 Use Educational CD</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
PART FOUR: COMPUTER ATTITUDES

Please tick your answer: the choices are: Completely disagree (0), Disagree (1), Neutral (2), Agree (3) and Completely agree (4)

<table>
<thead>
<tr>
<th>I use the computer to</th>
<th>0</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 I feel comfortable with the idea of the computer as a tool in teaching and learning</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2 The use of computers in teaching and learning stresses me out</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3 If something goes wrong I will not know how to fix it</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4 The idea of using a computer in teaching and learning makes me skeptical</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5 The use of the computer as a learning tool excites me</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>6 The use of computers in teaching and learning scares me</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>7 The computer is a valuable tool for teachers</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>8 The computer will change the way I teach</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>9 The computer will change the way students learn in my classes</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>10 I can do what the computer can do equally as well</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>11 The computer is not conducive to student learning because it is not easy to use</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>12 The computer helps students understand concepts in more effective ways</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>13 The computer helps students learn because it allows them to express their thinking in better and different ways</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>14 The computer helps teachers to teach in more effective ways</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>15 The computer is not conducive to good teaching because it creates technical problems</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
PART FIVE: PERCEIVED SELF-CONFIDENCE IN INTEGRATING ICT

In some of the following sentences the term “integration” is used. This term is used to indicate that learners use Computers as learning tools in classrooms activities. Please tick your answer: the choices are: Completely disagree (0), Disagree (1), Neutral (2), Agree (3) and completely agree (4)

<table>
<thead>
<tr>
<th>I feel confident that</th>
<th>0</th>
<th>1</th>
<th>2</th>
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</thead>
<tbody>
<tr>
<td>1 I can select appropriate software to use in my teaching</td>
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<tr>
<td>2 I can use PowerPoint in my class</td>
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<td>3 I can design technology-enhanced learning activities for my students</td>
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<td>4 I can use e-mail to communicate with my students</td>
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<td>5 I can teach my students to select appropriate software to use in their projects</td>
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<td>6 I can teach my students how to make their own Web pages</td>
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<td>7 I can use the Internet in my lessons to meet certain learning goals</td>
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<td>8 The computer can help students understand concepts more easily</td>
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</tbody>
</table>
PART SIX: FREQUENCY OF INTEGRATION OF ICT IN TEACHING AND LEARNING

How frequently do you use the following computer aided products for teaching any of your two subjects. The choices given are: Never (0), Rarely (1), Sometimes (2), Frequently (3) and Always (4)

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<th>0</th>
<th>1</th>
<th>2</th>
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<tbody>
<tr>
<td>1</td>
<td>Internet for downloading teaching materials</td>
<td></td>
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<td>2</td>
<td>Word processing (e.g., Word) for making notes for learners</td>
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<td>3</td>
<td>Word processing for making schemes of work and lesson plans</td>
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<tr>
<td>4</td>
<td>Word processing for preparation of examinations</td>
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<td>5</td>
<td>Computer storage devices e.g. CDs, Flash disks etc for keeping softcopy references for students</td>
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<td>6</td>
<td>Use of videos for demonstrations</td>
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<td>7</td>
<td>Use of power point for presentation such as models and plays</td>
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<td>8</td>
<td>Use of Educational CDs such as set books</td>
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<td>9</td>
<td>Use of computers for keeping records of work</td>
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<tr>
<td>10</td>
<td>Use of computer for preparation and keeping pupils progress records</td>
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<tr>
<td>11</td>
<td>Use of computer for preparation if merit lists</td>
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<tr>
<td>12</td>
<td>Use of computer for examination preparation and storage</td>
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<tr>
<td>13</td>
<td>Use of computer for preparation of students report cards/forms</td>
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</tbody>
</table>
PART SEVEN: SCHOOL CLIMATE AND SUPPORT

Please tick your answer: the choices are:

Please tick your answer: the choices are: Completely disagree (0), Disagree (1), Neutral (2), Agree (3) and Completely agree (4)

(1) Neutral (2), Agree (3) and Completely agree (4)

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<thead>
<tr>
<th></th>
<th>0</th>
<th>1</th>
<th>2</th>
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<th>4</th>
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</thead>
<tbody>
<tr>
<td>1</td>
<td>Other teachers encourage me to integrate computers in teaching and learning</td>
<td></td>
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<tr>
<td>2</td>
<td>The ICT coordinator encourages me to integrate computers in teaching and learning</td>
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<td>3</td>
<td>The principal encourages me to integrate computers in teaching and learning</td>
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<tr>
<td>4</td>
<td>The inspector encourages me to integrate computers in teaching and learning</td>
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<tr>
<td>5</td>
<td>I often exchange ideas about technology integration with other teachers</td>
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<tr>
<td>6</td>
<td>There are other teachers in my school who use computers in teaching and learning</td>
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<tr>
<td>7</td>
<td>In faculty meetings, we frequently discuss the subject of integrating computers in the school curriculum</td>
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<td>8</td>
<td>Teachers in my school are well informed about the value of computers in teaching and learning</td>
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<td>9</td>
<td>A variety of computer software is available for use in my school</td>
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<tr>
<td>10</td>
<td>The technical support in my school is adequate</td>
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<tr>
<td>11</td>
<td>The instructional support in my school is adequate</td>
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<td></td>
</tr>
<tr>
<td>12</td>
<td>The technical infrastructure in my school is adequate</td>
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</tbody>
</table>
Part 8: ICT enhancement Measures

1. In your own opinion how adequately does the school support the use of ICT in teaching and learning? √ Tick the appropriate choice

   Not at all [ ]
   Inadequately [ ]
   Somehow adequate [ ]
   Adequately [ ]
   Very adequately [ ]

2. State the measures that the school has put in place to enhance the use of ICT in teaching and learning.

   ........................................................................................................................................
   ........................................................................................................................................
   ........................................................................................................................................
   ........................................................................................................................................
   ........................................................................................................................................
Appendix II: Structured Interview Guide for Principals

1. In which ways do you think teachers in your school use computers in the school for their daily school work?

2. Which is the most common kind of school duties in which the teachers use computers (ICT)?

3. In your own opinion which preparedness related to the school do you think make teachers not to use ICT in doing their school work?

4. What personal reasons do you think make teachers not to use ICT in doing their school work?

5. Which measures has the school put in place to enhance the use of ICT in teaching and learning in your school?
Appendix III: Document Analysis Guides

1. Notes used by teachers: are they typed or hand written?
2. Records of work: hand written/typed
3. Schemes of work: hand written/typed
4. Lesson plans: hand written/typed
5. Pupils progress records: hand written/typed
6. Internet materials for teaching and reference: are used/not used
7. Soft copies of teacher work (e.g. notes, power point lessons etc)
### Appendix IV: Proposed Research Budget

<table>
<thead>
<tr>
<th>ACTIVITY</th>
<th>ESTIMATED AMOUNT (KSH)</th>
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</thead>
<tbody>
<tr>
<td>Writing materials</td>
<td>10,050/=</td>
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<tr>
<td>Transport and Lunch</td>
<td>20,000/=</td>
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<tr>
<td>Consultation</td>
<td>10,000/=</td>
</tr>
<tr>
<td>Typing</td>
<td>25,050/=</td>
</tr>
<tr>
<td>Printing</td>
<td>20,065/=</td>
</tr>
<tr>
<td>miscellaneous</td>
<td>10,000/=</td>
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<tr>
<td><strong>Total</strong></td>
<td><strong>95,165/=</strong></td>
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</tbody>
</table>

*Source: The researcher*
# Appendix V: Proposed Work Plan

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<tbody>
<tr>
<td>Proposal writing &amp; Corrections</td>
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<tr>
<td>Piloting</td>
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<td>Data collection</td>
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<tr>
<td>Data analysis and project writing</td>
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<td>Examination of report</td>
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<td>Making corrections and submission of final copy</td>
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