FACTORS INFLUENCING USE OF ICT IN TEACHING AND LEARNING AMONG PRIMARY SCHOOL PUPILS IN KANDARA SUB-COUNTY, MURANG'A COUNTY, KENYA.

BY

ANTHONY MW AU RA GAITHO

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2014
DECLARATION

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

Signature----------------------------------------------- Date--------------------------------

Gaitho Anthony Mwaura
L45/62141/2013

This report has been submitted for examination with my approval as university supervisor.

Signature----------------------------------------------- Date-----------------------------

Dr. Ann Nderitu
Lecturer.

Department of Distance Studies,
University of Nairobi.
DEDICATION

To almighty God for good health and energy to accomplish the work. To my beloved wife Ignasia Wangeci Mwaura and my children, Ann Njeri and Bryan Njuguna for their co-operation and moral support to make this research report possible.
ACKNOWLEDGEMENT

First and foremost gratitude goes to my supervisor Dr. Anne Nderitu of the Department of Distance Studies, University of Nairobi who took much time and patience to guide me on this research study. Secondly, I wish to convey my sincere gratitude to the Head teacher of Ng’araria Primary School who liaised with Kandara District Education Office and therefore facilitated permission granting which enabled me carry out the study with less work load. I also wish to thank my fellow members of staff for their moral support and cooperation. Last but not least, I sincerely thank Mary Wanjiku Maina for typesetting this research study report. God bless you all abundantly for your work well done.
ABSTRACT

The purpose of the study was to investigate the factors influencing use of ICT in teaching and learning among primary school pupils in Kandara Sub-County in Kenya. The main objective of the study was to identify the factors contributing to pupils ICT use in the country. It also looks at how ICT infrastructure influences their teaching and learning process, the skills that the teachers and the pupils need and how they influence them to use ICT in teaching and learning process. It also looks in to how they access these ICT tools and if the ICT equipments are available for them during their teaching and learning process. Survey methods have been used to collect data where the questionnaire has been the main data collection instrument. Stratified random sampling methods were used. The study focused on the 226 pupils and 14 teachers in primary schools in Kandara Sub-County. The findings revealed that 94.9% of pupils respondents and 92.9% of teachers had no access to power. 97.3% of pupil respondents and 92.8% of teacher respondents confirmed that they had no computers at schools. 93.3% of pupil respondents and 92.9% of teacher respondents indicated that computers are placed in offices and this had negatively affected the use of ICT in teaching and learning in primary school. 92.9% of teacher respondents and 89.8% of pupil respondent were not connected to internet in their schools. 100% of pupil respondents and 64.2% of teacher respondents reported that they had never received any training on how to use ICT devices. 100% of teacher respondents and 99.5% of pupil respondents had no technical support personnel in their schools and this was one of the barriers that resulted in computers being under utilized in classes. Teachers Service Commission is obliged to provide ICT personnel to support the teachers and pupils effectively in primary schools. 97.8% of pupils and 71.4% of teachers had never interacted with computers and therefore the respondents had no access to computers and this contributed to their inability to use ICT in teaching and learning. The government and education stakeholders should combine effort to equip schools with computing resources.
<table>
<thead>
<tr>
<th>Abbreviation</th>
<th>Description</th>
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<tr>
<td>CCK</td>
<td>Communication Centre of Kenya</td>
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<td>CEC</td>
<td>Commission of the European Community</td>
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<td>CICs</td>
<td>Community Information Centres</td>
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<td>GDP</td>
<td>Gross Domestic Product</td>
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<td>GOK</td>
<td>Government of Kenya</td>
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<td>ICT</td>
<td>Information Communication Technology</td>
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<td>ISP</td>
<td>Internet Service Provider</td>
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<td>K.I.E</td>
<td>Kenya Institute of Education</td>
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<td>KESSP</td>
<td>Kenya Education Sector Support Programme</td>
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<td>MOE</td>
<td>Ministry of Education</td>
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<td>NGO</td>
<td>Non Governmental Organization</td>
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<td>NICE</td>
<td>Network Information and Control Exchange</td>
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<td>ODL</td>
<td>Open and Distance Learning</td>
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<td>PPP</td>
<td>Purchasing Power Parity</td>
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<td>SPSS</td>
<td>Statistical Package for Social Sciences</td>
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<td>UNESCO</td>
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CHAPTER ONE

INTRODUCTION

1.1 Background of the study

Education is the cornerstone of economic and social development. It has contributed a great deal to the national development of both less and more industrialized countries. Education is a released tool for the transformation towards sustainable development, increase people’s capacities to transform their vision for society into reality. This has attracted both public support and funding due to the promises it offers (Perraton, 2001).

Primary education is the foundation on which a Nation’s vital human resources are built. It is the beginning of formal education and the focus of many development efforts. Technology we use in this stage of education process is important for a country’s participation in the Global knowledge economy, and technology is also especially suited to address the demands of primary schooling in some unique and powerful ways. (Bateman et al.2009).

The recent development of information and communication technologies (ICTs) and the move towards knowledge-intensive, interdependent and internationalized communities create new challenges for the design and delivery of education. The growing digital divide is actually leading to greater inequalities in development. This is giving rise to paradoxical situations as may be witnessed in primary schools where those who had the greatest need for e-learning (disadvantaged groups, rural communities, illiterate population or even entire country) did not have access to the tools which would enable them to become fledged members of the knowledge society. (UNESCO, 2002)

Technology is revolutionizing the way people communicate and conduct business yet, it has been slow to penetrate our schools’ curricula. During recent years, information technology has received a great deal of attention especially from industries, because of its potential to enhance efficiency in production and service delivery. It is therefore disappointing to see most schools where the next generation to enter the work force being trained-sparingly using computers. There is every reason for schools to integrate technology in the classroom (Education watch, vol.041, April – May 2011).

There is a major gap between the developed and developing countries in terms of promotion of ICT in teaching and learning in primary schools. According to Intelecom Research (2000), many developing countries are facing fundamental problems with education delivery in which ICT could come in handy.
Many governments in Africa have tried to put emphasis in education especially since independence. This has seen many government increase budget allocation in education. (UNESCO, 2000). The move is motivated by the fact that education is the cornerstone of economic growth and development. Education helps to mitigate poverty and its effects by developing human capital consequently increasing the level of social and private benefits.

Apart from expanding allocation to education, governments have been reforming their education system especially in less developed countries. Education reform efforts in less industrialized countries have aimed at making education an effective vehicle for national development (Abagi & Odipo, 1997). ICT is now at the centre of Education reform efforts that involve its use in coordination with the change in curriculum, teacher training, pedagogy, and assessment (Kozma, 2000). ICT is an effective tool that if integrated successfully forms a key pillar of education training (Tomar & Kumari, 2005).

The integration of ICT into virtually all aspects of the economy and society is creating a digitally enabled economy that is responsible for generating economic growth and prosperity (Bollou, 2006). Maguire (2003) further notes that the ICT sector has the potential to generate economic development and create pathways into the knowledge economy. The adoption of ICT into the practice of education is not something that began with the emergence of the new digital technologies; technologies such as radio, telephone and television have been and are still being used at present; what is new are the many ways that they can be combined and mixed with new technologies which mainly consider use of computers (Farrell, 2007).

There is a growing interest in using computers to improve instruction which involves a variety of application, mainly utilizing internet access (Murphy, et al., 2007) and create the opportunity to exchange ideas, consult experts, take students on virtual field trips, and access online libraries (wartkins, 2009). According to Spence and smith (2009) ICT- enabled communications, build human capabilities and freedoms and also offer students the opportunity to learn how to use electronic tools to access information and develop research skills in solving problems. United Nations and World Bank reported that ICT can increase access to education network for students, train teachers and, broaden availability of quality education material for emerging global Economies (WorldBank, 2003).

Many schools are restructuring to accommodate ICTS as it is of great help in providing multimedia information and allow access to a broader range of instructional resources. Most teachers see ICT as an important tool for motivating students, providing excellent tools for supporting teaching and also help learning (Olooo, 2009).
However, they face severe challenge of acquiring the required skills and resources to address such opportunities. They also have major problem of putting into place a policy environment with which they are comfortable and not seen as being dictated upon by International donors. ICT and Global education report (2008), states that African continent is known to be confronted with several difficulties including high level of poverty, illiteracy, political instability, low per capita income and poor infrastructure among others. Africa has the least internet penetration (5.3%) compared to that of North America of 73.1%, Oceania and Australia (57.05%) and Europe (47.7%).

While ICT continues to advance in Western and Asian countries, African countries still experience a lag in its implementation, and that continues to widen the digital and knowledge divides. In a recent study by Kiptalam et al. (2010), observed that access to ICT facilities is a major challenge facing most African countries, with a ratio of one computer to 150 students against the ratio of 1:15 students in developed countries. Whereas results indicate that ICT has penetrated many sectors including banking, transportation, communications, and medical services, the Kenya educational system seems to lag behind. Further, recent report by the National council for Science and Technology (2010), indicated that computer use in Kenya classrooms is still in its early phases, and concluded that the perceptions and experiences of teachers and administrators do play an important role in the use of computers in Kenya.

Almost all African countries basic ICT infrastructures are inadequate; this is as a result of lack of electricity to power the ICTs materials, poor telecommunication facilities, and poor postal system (Yusuf, 2005). Access to reliable supply of electricity is a general problem. Poor connectivity infrastructure manifests in lack of affordable access to personal computers (pcs), internet services, modems, telephone lines and internet connections (Rao, 2001). Slow connectivity in Africa is characterized by; scarce resources – absence of access or lack of ICT, the lack of integration of the local languages into the system, varying and updating the contents of materials that are posted on the websites (Kamell & Wigler,2001). The major constrain of most African countries is limited to access to new technology due to high costs of establishing, using and maintaining the necessary infrastructure, lack of adequate local expertise and low computer literacy rate among user groups. (Neil, 2003).

The high costs of both hardware and software are quite prohibitive and most African schools can neither afford them nor cope up with changes in terms of costs and relevance since technology is dynamic. So as wealth and poverty becomes more extreme amongst pupils, technology gap widens.
Other obstacles include lack of ready market for the products, mishandling of gadgets and political instability, as well as difficulties in accessing market prices and sharing information on expenses and best practices (Albrini, 2008).

Africa is facing today the uneven access to and skills in information and communication technology (ICT) which results to digital divide with the developed countries. This has resulted to over dependence on the developed Western countries Zheng (2009) notes that Western values and advice have been often imported without deep reflection and consideration of their compatibility with local conditions. Conradie et al. (2003) argue that since technology is coming outside, sometimes it does not address the local problems.

Kenya is lagging behind in information superhighway technology in terms of infrastructure development, the growth of the fixed telephone network throughout. Kenya has been below expectations. (Lagmia, 2006). According to the central bureau of statistics (2006) the fixed line teledensity was 1.025 (number of fixed line per one hundred population) during the year 2003 but this was really deteriorated since then due to steady population increase in the absence of infrastructural development. Most of these fixed lines subscribers are connected in urban areas which account for 94% of the fixed lines while 6% are in rural areas. (Central bureau of statistics, 2006).

Kenyan schools that have computers lab can be an issue when schools have a pupil-teacher ratio as high as 80:1. This presents as many challenges as opportunities as there may only be a computer lab of 10-20 computers for the entire school. This sporadic use of computer technology does not give either the teachers or learners the prolonged exposure that is needed for ICT- literacy (Education watch, vol.051 May 2013).

The Kenya curriculum has been lacking digital curriculum support materials for a long time since traditional classroom teaching was the only viable option. Even the schools with computers have used them for computer studies as a subject (Education watch, vol.051 May, 2013). ICT in Kenya fails due to inadequate equipment, lack of content, lack of guidance on how best to leverage the existing infrastructure, lack of curriculum support on the use of ICTs and lack of maintenance and technical support structures to keep the existing infrastructures operational (Education watch, vol.051 May, 2013).

While there has been an ongoing push to bring information and communication technologies into classrooms and to integrate them into curriculum, until recently little attention has been given to how such integration might be measured outside by simply counting the number of machines or calculating student to computer ratios. (Education watch, vol.051, May, 2013).
Key issues affecting ICT provision in primary schools in Kandara sub-county located in rural areas in Murang’a County is the limited access to electricity and where this exists, frequent power disruptions due to vandalism of power lines, fragmented population distribution in some areas hampers rural electrification and high connection fee for rural electrification. Further, high costs of internet provision and other costs associated with ICT; equipment, infrastructure and support costs are obstacles to rolling out ICT programme in the medium term (Murang’a Governor’s Tool Kit, 2013).

1.2 Statement of the problem

According to the taskforce on the re-alignment of the education sector to the constitution of Kenya 2010 report, limited use of ODL approaches in primary and secondary schools in Kenya hinder the delivery and access of education among pastoral and other marginalized communities (GOK, 2012). Access to reliable supply of electricity is a general problem particularly in rural areas. Connectivity to national electrical grids is inadequate (Farrel & Shafika, 2007)

The challenges facing ICT in education sector in Kenya include access, funding, inadequate ICT facilities, high cost of development of interactive e-learning content, ICT is not embraced as medium of instruction and management tool, inadequate capacity for teachers, absence of ICT curriculum at ECD and primary levels, dynamic nature of ICT technology, inadequate capacity for maintaining ICT equipment, inadequate use of ICT by the Ministry of Education and inadequate capacity to monitor utilization of ICT in schools (GOK,2012). According to ICTs in education session paper no.1 of 14th June, 2005, ICT policy framework is lacking in public schools. Public institutions lack integration of ICT in delivering of curricula as compared to private institutions.

Kenya has 20,367 primary schools with 10.5 million pupils and so far, about 10,157 schools have been already connected to electricity,(Daily Nation, February 17,2014). Most primary schools in Kenya are in the rural areas and they face a number of challenges including; high level of poverty, limited rural electrification and frequent power disruptions, inadequate connectivity and network infrastructure. This creates a digital divide between rural and urban schools.

Key issues affecting ICT provision in primary schools in Kandara Sub-county which is located in rural areas in Murang’a County is limited access to electricity and where this exists, frequent power disruptions due to vandalism of power lines, fragmented population distribution in some areas hampers rural electrification and high connection fee for rural electrification. Further, high costs of internet provision and other costs associated with ICT; equipment, infrastructure and support costs are obstacles to rolling out ICT programme in the medium term. (Murang’a Governor’s Tool Kit, 2013).
However, there are gaps which need answers towards this problem. The major gap that needs an answer is on the factors influencing the use of ICT in teaching and learning among primary school pupils.

The study focused on factors influencing the use of ICT in teaching and learning among primary schools in Kandara Sub-County. Noting the concern for the people in Kandara Sub-County on the growing challenge of use ICT in the region, the study would guide administrators when implementing ICT in primary schools.

1.3 Purpose of the study.

The purpose of this study was to investigate the factors influencing the use of ICT in teaching and learning among primary school pupils in Kandara Sub-County, Murang’a County in Kenya.

1.4 Objectives of the study

The research was therefore guided by the following objectives.

1. To determine how ICT infrastructure influences the use of ICT among primary school pupils in Kandara Sub-County.
2. To assess how accessibility to ICT influences the use of ICT among primary school pupils in Kandara Sub-County.
3. To assess how skills in ICT influences the use of ICT among primary school pupils in Kandara Sub-County.
4. To examine how availability of ICT equipments influences the use of ICT among primary school pupils in Kandara Sub-County.

1.5 Research questions

The questions that the researcher looked into were the following.

1. How does ICT infrastructure influences the use of ICT among primary school pupils in Kandara Sub-County?
2. How does accessibility of ICT influences the use of ICT among primary school pupils in Kandara Sub-County?
3. To what extent have the skills in ICT influences the use of ICT among primary school pupils in Kandara Sub-County?
4. How does the availability of ICT equipment influences the use of ICT among primary school pupils in Kandara Sub-County?
1.6 Significance of the study.

The use of ICT is revolutionizing the way to communicate and conduct business, yet it has been slow to penetrate to school curricula. Precisely pupils using ICT in Kandara Sub-County could be associated with the following factors, ICT infrastructure, accessibility, ICT skills, ICT equipment and availability. The primary schools management would realize that both infrastructure and human resource was paramount towards the implementation of ICT. This would particularly be centred on challenges currently facing standard one pupils using the laptops.

The primary schools were investing a lot of money in ICT infrastructure therefore the findings highlighted out some of the factors that influenced the use of ICT in primary school education. The curriculum developers were enlightened by this study that ICT syllabus for primary, secondary and tertiary institutions needs to be put in place. The government was made aware that there was need to implement the ICT policy in order to put it in use in the education sector.

1.7 Limitation of the study.

Limitation is some aspect of the study that the researcher knows may negatively affect the results or generalizability of the results, but over which he/she probably has no control (Mugenda & Mugenda, 2003). The researcher was a working adult so time was a limiting factor on timely collection of questionnaires and did the research outside the normal working hours. The research also required a lot of funds and hence stressed the researcher financially.

1.8 Delimitation of the study

This study was carried out at primary schools in Kandara Sub-County Based to the Standard Eight pupils and ICT teachers.

1.9 Basic Assumptions

Primary school pupils were familiar with ICT and they used it during their learning process. The instrument chosen for the research was reliable enough. The respondents i.e. the school pupils and the teachers were going to co-operate with the researcher in filling the questionnaires appropriately. ICT learning equipments were available at Primary Schools and pupils used them during their learning process. The sampling was done such that it was representative to the population. Concepts and terms were clarified to the respondents.
### 1.10 Definition of significant terms

**Access**
- Ability to experience or make use of something without any obstacles.
- Ability to use ICT hardware and software network and a good receptive wave.

**Affordability**
- Ability to purchase the ICT equipment without unacceptable difficult.
  This includes the airtime for broadband and internet access.

**ICT**
- Information communication and technology.

**ICT USE**
- Manipulation of ICTs to create, access, store, transmit and manipulate information.

**ICT Infrastructure**
- Physical equipment/hardware and software that enables network to function.

**Learning process**
- Continuity in learning.

**Skills**
- The know how after training or experience.
1.11 Organization of the study.

The study is organized into five chapters. Chapter One consists of a detailed background of the study where factors influencing the use of ICT were discussed globally, in Africa and in Kenya. The statement of the problem is discussed globally, in Africa and in Kenya. The statement of the problem gives out the problem under investigation and also the purpose of the study is stated. The objectives are mentioned from which the research questions are retrieved. The significance of the study is explained to show the study benefits and how. The basic assumptions are discussed and also the significant terms are defined to bring out the meaning of the terms in the study clearly.

Chapter Two consists literature review. Chapter Three consists research methodology which include research design, target population, sample and sampling procedures, research instrument, instrument validity, instrument reliability, data collection procedures and data analysis techniques. Chapter Four consist analysis of data and description of findings. Chapter Five consists summary, discussions, conclusion recommendations and suggestions for further research.
CHAPTER TWO

LITERATURE REVIEW

2.1 Introduction

This chapter contained literature review that looked into the findings of previous investigators on the subject of the present study proposal. It reviewed literature that showed how important ICT is to distance education. It also showed how teaching and learning had been influenced by ICT infrastructure, accessibility of ICT, lack of ICT skills, availability of ICT equipments had affected usage of ICT especially by primary school pupils.

2.2 Importance of ICT in distance education

Information and communication Technology (ICT) are advances in technologies that provide rich global resources and collaborative environment for dissemination of ICT literacy materials, interactive discussions, research information and international exchange of ideas, which are critical for advancing meaningful educational initiative, training a high skilled labour force, and understanding issues related to economic development (Yusuf, 2006).

In the first few decades there has been major transformations occurring in the education sector, as well as in the other areas that are important for enabling people to develop new capacities necessary for the knowledge or information society (Mansell et al. 2001). These changes are partly due to the development of ICTs as well as the forms of interactive learning that it facilitates (Happell, 2000). Access to information through ICT increases the information accessible to individuals and support them in trying new strategies, thinking and creativity that are reflective in practice aimed engaging them to new innovations through the use of ICTs (Ololube, 2006).

ICT serves as a valuable tool for the development of individuals as well as countries across the world. As the former president Thambo Mbeki of South Africa at the opening of the Biennial meeting of the association for development of education in Africa said ‘we must encourage the use of information technology in Education, so as to link for flung places and institutions of learning to bridge the gap between urban and rural areas, to enable African children to advance scientifically so as to compete on an equal footing with the rest of the world’ (Mbeki cited in ADEA, 2000) this is how important ICT is.

The use of technology in teaching and learning is highly beneficial to pupils and teachers. Not only does it prepare students for the ‘real world’ by stimulating real world environment but it also improves many skills that might not otherwise be fully cultivated in a traditional learning
setting. When using technology pupils share their experiences with other pupils and promote peer-to-peer learning. (Education watch, vol.041, April- May 2011).

The use of ICT tools in teaching and learning have helped students, academic and non-academic staff to communicate with other more effectively during formal and informal teaching and learning (Yusuf.2005). Kozma (1991, 1994) argued that ICT tools enable learners to elaborate their mental models and correct their misconceptions with the use of a macro world; ICT enable learners to connect their symbolic learning in school to real world situations and enable learners to share ideas across different cultures.

The use of ICT tools in teaching and learning have helped learners to improve greater autonomy in learning, stimulate students’ sensory and cognitive curiosity, develop life skills, boost self-confidence and facilitate the learning of abstract ideas and theories. This can be achieved for as long as the ICT based teaching and learning materials are interactive, engaging, multimedia, visually robust, and are integrated in the classroom lessons. (Education watch, vol.041, April- May 2011).

Teachers can use computers for research. They can easily use search engines such as google to find what they need or want to know at a click of a button. In schools where there is internet connection, a teacher who wants to integrate technology in the classroom can teach pupils how to use various search engines to locate useful information sources. A teacher can collaborate with other teachers in other schools who can be reached through email or through social-networking sites. With the help of ICTs, teachers can creatively design learning programs that are learner-centred which promote quality learning. (Education watch, vol.041, April- May 2011).

The use of ICT in teaching and learning help pupils to acquire digital skills which they increasingly use to explore and exploit the world of information and they craft that into knowledge. ICT facilities the opportunity for more student-centred teaching, more self-learning and more peer teaching. It also provides greater opportunity for teacher-to-teacher, and student-to-student communication and collaboration and access to the world wide web and the learning resources contained thereon.

Computers have the capacity to enable learning even when important learning tools are absent. In primary schools, where physical resources such as microscopes, atlases and encyclopedias could be relatively scarce, computers can be used as a proxy for these tools. For example, children can learn about the microorganisms that live in ponds and the basic
concepts of germs by viewing pictures or micrographs online. They can also use google to search earth, moon and mars to learn about planet and beyond (Bateman, 2009).

Computers are well-suited with individualized assessments and allow teachers to track student progress. Most governments require standardized tests that primary school students must pass to progress to the next step in their education. Computer-based assessment aligned with these tests could reveal to teachers how well-prepared students are for these important education milestones. Educators could also take advantage of instantaneous assessments to gauge where students are during a lesson. Feedback from students and teachers assessments could be used by policy makers to inform future content and deployment strategies (Bateman et al., 2009).

When effectively integrated into a high-quality learning environment, researchers have demonstrated that ICT can help deepen students’ content knowledge, engage them in constructing their own knowledge, and support the development of complex thinking skills (Kozma, 2005; Kulik, 2003; Webb & Cox, 2004). However, ICT alone cannot create this kind of teaching and learning environment. Teachers must know how to construct lessons, select resources, guide activities, and support this learning process; many traditionally trained teachers are not prepared to take on these tasks.

Rigorous studies of primary school computing initiatives in Mexico and India have found improvements in test scores among students provided access to computer learning tools compared to control groups that did not have access to these tools. In Mexico, primary school pupils who were given access to computers for use in math instruction outperformed children without such access. The same held true in 100 primary schools in India, where a third-and-fourth grade students that had access to computer-assisted math program showed significant improvements in math achievement compared to those that did not have access to the program. (Bateman et al, 2009).

For behavioral and "soft" educational outcomes such as student motivation and attendance, the evidence of the benefit of technology in primary schools is even stronger. Numerous studies have found that both students and teachers that use computers have increased enthusiasm. One large-scale study in Britain of special education schools found improvements in a range of behavioral measures associated with the use of computers in a variety of settings. These benefits were especially strong in subject related to research, writing and presentation of work. Students including primary school children in Egypt that
have participated in iEARN online collaborative projects state that they are more confident in expressing themselves to others, dealing with students from different backgrounds and working in groups. (Bateman et al, 2009).

Benefits of ICT in teaching and learning process Technology transformation emphasis the use of technology to teach which was not possible when technology was unavailable. Education technology concerns the technology that is used to facilitate the teaching and learning process. Electronic learning and multi media have been recognized as an effective tool to provide great possible array of students input and interaction. (Dringus 1995, Safres, Gundersen Behana 1998 & Delvin and James 2003). In the process of education ICT in used as:- An information tool that provides vast amount of information in various formats such a audio and video, a constructive tool that manipulates data and generates analysis, a communication barrier such as that of time and space and a situation tool that creates situations in which students experience real life situations such as simulation and virtual reality.

The use of ICT in learning and teaching may reduce inequalities between various communities within countries. In many locations, gaps remain between male, female pupils and between urban and rural pupils. Computers in primary schools show early promise in the struggle to bridge these divides.

There are many studies whose results show that the use of technology for instructional purposes enhances reasoning, provokes critical thinking, and deepens understanding. For instance a study by Netherlands (Cf.Lohner et al.2005) shows how students collaborate in building runnable computer models in a discovery learning environment. Hiltz (1995) also reported that students in collaborative learning conditions had more constructive learning processes and attained higher grades than students in other conditions.

2.3 ICT infrastructure and use of ICT in teaching and learning

Isaacs, (2000) specifies the main obstacles that face the African schools (and tertiary institutions too) with respect to internet access. These are lack of infrastructure, high telephone and internet costs, limited expertise and ICT skills level and lack of enabling policy environment. The level of technology is very low compared to developed countries.

According to Hennessy et, al, (1997) has indentified physical and cultural factors that affect the use of ICT by teachers, including lack of reliable access to electricity, limited technology infrastructure (especially internet access, bandwidth, hardware and software provision).
In an article from Ghana, ICT and Global education (2008), it was commented that the African continent is known to be confronted with several difficulties including high levels of poverty, illiteracy, political instability, low per capita income and poor infrastructure among others. It is also quoted that Africa has the least internet penetration (5.3%) compared to that of North America of 73.1%, Oceania and Australia 57.0% and Europe (47.7%). (International commission of Education for the 21st century, 1998).

African continent is confronted with several problems including lack of robust telecommunications, infrastructure with sufficient reliable bandwidth for internet connections, high costs, lack of financial resources, inadequate ICT equipments and low level of computing technology and literacy skills as well as cultural and behavioral attitudes. (International commission of Education for the 21st century, 1998)

The essential services and infrastructure like electricity, telecommunications and postal services must be developed to the level that they could support the declared scale of open and distance education in order to increase administrative networks and develop proper link between institutions and students (Commonwealth of learning international 2001)

In Rwanda, creating access to ICT infrastructure is at the heart of vision 2020 and the Government is being widely recognized and applauded for the achievements since the promulgation of its ICT policy plans. However, there remain plenty of challenges: the extent and quality of ICT infrastructure and access to the internet varies widely, computers hardware is in short supply, the skilled resource pool is small, and financial resources are scarce (Farrell, 2007).

Findings from a recent feasibility study on community information centres (CICs) are indication of the task ahead. Although the idea of setting up CICs appeals to Rwandans, the study findings reveal that only 7% of the population has ever used the internet, and 71% have never even heard of it. Not surprising gives that the vast majority of Rwandans live in rural areas. Rwanda is still a predominantly rural society with lack of access to electric power, equipments and trained teachers in schools and lack of awareness of ICT generally. (Farrel, 2007).

ICTs in Education session paper no.1 of 14th, June, 2005 pg.52 discusses the way in which ICTs can support and improve delivering of quality education to Kenyans. From the policy documents, the government hopes to raise digital infrastructure to 80% in secondary schools and 10% in primary schools by 2011. It also proposes to increase computer - student ratio to 1:50; connectivity and network infrastructure to 70% for secondary schools and 10% in primary schools.
It is observed that ICT policy frameworks on ICT are lacking in public schools. Public institutions lack integration of ICT in delivering of curricula as compared to private institutions.

The government should work on ICT in education policy to enhance the pedagogical integration of ICT in institutions. The study also examined the status of ICT equipment, connectivity and access in schools and extent to which it facilitates teaching and learning. The findings show that 9/10 of institutions had computers. However, only (6/10) and 38% (128/334) of the computers were connected to the internet. The government like all others in the world has made commitments to make education accessible to its citizenry through use of ICT in teaching and learning (Olusola & Alaba, 2011).

An ICT unit has been established at the Ministry’s Head Office to ensure that systematic efforts are being made towards strengthening, adoption and use of ICT in Education sector in general. The Kenya ICT trust fund is helping to implement this strategy. It is a registered consortium in the form of NGO in Kenya that mobilized partners from public, private and civil society sectors (Wambui & Barasa, 2007).

It mobilized funds for the purpose of setting up computer laboratories in all Kenya secondary schools in 4-5 years (CCK, 2005). The Microsoft partners in learning has reported having a five day training course to 5000 secondary schools teachers and also helped organize and direct over $ 80,000 contribution from trust funds members and donated computers (Microsoft, 2006).

2.4 Access to ICT and use of ICT in teaching and learning

Poor connectivity infrastructure manifests in lack of affordable access to personal computers (PCs), internet services, modems, telephone lines and internet connections, (Rao, 2001). Although ICT occupies a place that has become more and more in the daily lives of large number of persons, the influence of ICTs on societies does not manifest itself in a uniform manner (Karsanti, 2006). The major constraint of most African countries is limited access to new technology due to high costs of establishing, using and maintaining the necessary infrastructure, lack of adequate local expertise and low computer literacy rate among user groups. (Neil, 2003)

Schools have to be equipped with necessary ICT infrastructure in order to provide the next generations with the needed tools and resources for access and use to attain the expected skills (Gulbahar & Guven, 2008). Schools are equipped with different kinds of technological infrastructure and electronic resources available; hardware, software and network
infrastructure must be available to integrate ICT in Education (Afshari, 2009). He further argues that limited access to computers is a barrier to effectively using computers in classes.

The use of technology in teaching and learning depends on the availability of hardware and software and the equity of access to resources by teachers and pupils. Use of ICT in teaching and learning must be accompanied by a corresponding change in curriculum. Tin (2002) explains that proper integration of ICT may require substantial pedagogical component in the ICT curriculum of any teacher education program. He cautions that teaching ICT as an isolated discipline is not an effective way to encourage the use of ICT in learning.

Ayere, et al(2010) attributed more use of ICT in teaching and learning to availability of internet and other ICT equipment and materials which made integration easier as teachers easily accessed the materials or directed learners to relevant sources. Schools that had more access to the internet and e-libraries recorded more integration of ICT in teaching and learning. The study recommended that school that has an ICT programme should seek to be connected to internet and to be in possession of e-content relevant to curriculum taught.

In a study conducted by Marshall (2005) and based on data collected from six Newzealand Universities and three polytechnics, which evaluated capabilities to sustain and deliver e-learning, it was revealed that the main weakness in adoption of e-learning was directly related to the teaching and learning aspects of e-learning system. It was observed that learning objectives were used poorly in e-learning papers in most institutions. Even when stated the learning objectives were used poorly in e-leaning papers in most institutions and even when stated the learning objectives were often `dominated by recall and comprehension rather than by analysis and evaluation. The report also indicates that there was lack of clear relationship between e-learning technologies and the desired educational outcomes.

According to Adeya and Oyeyinka, (2002), internet access and cost of accessing are significantly related. In other words, societies with predominantly low income groups are less likely to have access to internet. Knowledge acquisition was for this reason constrained by low income and low levels of education due to unequal access and more so because of unequal utilization of technology. Access to the internet and World Wide Web (www) is ubiquitous within United States. Given that online information is so readily available, the internet has become a potential driving force of the economy, society, and education. People use internet to access the needed information. As a result, societal and educational organizations are challenged to use the internet more efficiently.
According to UNESCO (1998), Igwe (2005), Nwagwu and Ahamihe (2006) effort to improve ICT access in Africa has been hampered by a number of factors; these are summarized as follows: Prospective ICT users that have the expertise, competence and equipment to benefit from access to electronic information networks are minute in number; the shortage and high cost of equipment, software and information compared to situations in industrialized nations; the lack of reliable and accessible physical telecommunications infrastructure; telecommunication monopoly, associated with overly restrictive regulations and high costs, and lack of interregional networking and cooperation amongst national university and international institutions.

According to Hafkin and Taggard (2001), locations of technological facilities constrain women’s access to ICT. In developing countries, most of the technological facilities are concentrated in urban areas. There is lack of adequate infrastructure such as telephone facilities, satellite facilities, electricity and communication centres in the rural areas. This therefore, indicates that male/female attitudes towards ICT would depend on the geographical location (rural or urban). Female have also more negative attitude towards computer (Bebetsos & Antoniou, 2008), thus they are often less computer literate than males (Kadel, 2005; Schaumberg, 2001; Townsend, 1970), this may result in different ways of using computer (Jackson, Ervin, Gardener & Schmitter, 2001)

There is inadequate connectivity and network infrastructure although a small number of schools have direct access to an internet service provider (ISP). There is limited penetration of the national physical communication infrastructure in rural areas and low income areas. Consequently there is limited access to dedicated phone lines and high speed connectivity for email and internet even where access to high speed connectivity is possible, high cost remain a barrier to access (Farrel, 2007)

Farrel (2007) brings out the challenges of implementing ICT in education. He mentions the factors that would hinder the implementation of ICT in education. These factors include; infrastructure and access, human resource and learning content. Infrastructure and access is constrained by lack of National infrastructure with seriously constrains the use of ICT in schools particularly in rural areas. The lack of reliable and affordable access to internet is a further serious constraint. Human resource capacity is another factor that could also be constrained by the current deficit of human resources capacity as it is recognized in the ICT plans by the Ministry. Skills also set in the school system are very low.
The need for training of school managers and teachers is widely recognized and is being addressed though huge and might take time. This constraint is much more pronounced especially in the primary level (Farrel, 2007).

Learning content is constrained since currently there is no much digital content available. There is need to develop content in local languages as well as English. Procurement regulations are constrained since the duties and levies currently levied on ICT products are making them expensive. The strategies of sustaining are being developed at local levels through community involvement and service provision. This factor is constrained by the expensive of projects failing once project funding is over giving rise to some cynicism (Glen Farrel (2007).

In his doctoral dissertation, Ottesen (2006) reveals that one fundamental problem facing ICT policy implementation and integration in school is the lack of complementing infrastructure. In a related study Norris et al, (2003) reveal that appropriate access to technology infrastructure is another key factor in the effective technology implementation process. The study reveals substantive correlation between technology access and use.

2.5 Skills in ICT and use of ICT in teaching and learning

Warschaver (2004), consider information literacy as part of the electronic literacy spectrum, which includes the ability to operate a computer. One barrier to the efficient utilization of ICT in developing countries is the relatively low level of information literacy (Tilvawala, K; et al, 2009).

Doyle (1992) defines information literacy as the ability to access, evaluate and use information from a variety of sources. Bruce (2003) from an educational perspective defines information literacy as the ability to access, evaluate, organize and use information in order to learn, problems solve, make decisions in formal and informal learning contexts, at work, at home and in educational settings.

Ralph (1999) as cited in Bruce (2003) considers information literacy as a key to "lifelong learning_ which includes computer literacy, information technology literacy, library skills, information skills and learning to learn. Information literacy refers to the ability to seek information using a variety of effective computer search strategies (Anastasi & Cochrane, 2006).
In order to utilize the growing range of electronic resources, students must acquire and practice the skills necessary to exploit them (Obuh, 2009). Blandy and Libutti (1995) argue that for the students using variety of on-line databases, it is as though they were parking lot attendants, where every vehicle is not only a different configuration. As Dutton (1990) suggests, the skills required to maximize the potential of electronic resources are much greater than those required for searching printed resources. These resources include knowledge of the structure of the database and the instructions which must be input into the computer by the searcher, as well as an understanding of the way in which the instructions are linked with one another.

Along with ICT training, one needs an ICT related support mechanism to gradually induce the integration (Lai and Pratt, 2006). Teachers need support in use and integration of ICT into the curriculum and teaching methods. According to the 1997 report by National Council for the Accreditation of Teacher education (NCATE), lack of technical support was one of the barriers that resulted in computers being under utilized in classes. This was because teachers were afraid of using computers when they were not sure where to turn for help when something went wrong.

National Policies identify ICT literacy as a set of competencies needed to participate in society (OECD/CERI, 2001). The eEurope 2002 objectives of the Lisbon summit stipulate that all school learners must be digitally literate in order to prepare for a knowledge based economy (commission of the European communities, 2000). In the height of the socio-economic rationale; many countries have introduced ICT as a separate school subject in order to teach pupils a number of technical ICT skills (Plomp, Anderson, Law & Quale, 2003).

As reported by Callinan (2005) on research conducted at University college, Dublin compared final year biochemistry students and first year biology students, it was found that 27% of the first year Biology students and 56.5% of final year biochemistry students were under educated in the information seeking technology and processes.

In another study by Rowley, Banwell, Gannon-Leary, Urquhart and Armstrong (2002) in the UK, it was showed that higher education students make insufficient use of electronic learning systems in overall. The study also observed that non-traditional students in higher education generally had extensive tutorial assistance by e-learning staff in the initial stages of their study programme.
Brophy (1993) states that the users do not often appreciate the skills required to search these sources, stating they are deceptively easy to use. The ability to use and retrieve information effectively is a transferable skill useful for future life as well as enabling the positive and successful use of the electronic resources. In order to make the best use of information, people need to be information literate.

ICT tools facilitates the storage, reception and transmission of information, extending its reach, but the process of processing that information requires information literacy skills (Walsham, 2001).

A study conducted in four African countries identified that while in principles girls are given the same opportunity as boys of access to the computer, gender equity does not exist in practice. (Derbyshire, 2003) studies had established that females tend to be less interested to computer and use them less often in their space time (Schaumberg, 2001). The three computer related occupation (computer scientists, computer engineers and system analysts and computer science and engineering) are top career choices for boys (Derbyshire, 2003).

Female have also more negative attitude towards computer (Bebetsos & Antoniou, 2008) thus they are often less computer literate than males (Kadel, 2005, Schaumberg, 2001; Townsend, 1997) and this may result in different ways of using computer (Jackson, Ervin, Gardener & Schmitter, 2001). Sefyrin (2005) study showed that competence in ICT could be a question of interest in ICT, where men are more interested in ICT than women. The study thus confirmed the view of gender and competence as actively constructed in a social process. This is because understandings of the terms were negociated among individuals who understand themselves and their behaviours.

Electronic databases are another source of information; it is the user’s ability that makes the difference when accessing them. That is why ICT skills without enhancing information literacy is of little help; they both should be developed in conjuction with each other (Cattsand Lau, 2008). Ultimately, it is information literacy that informs people’s practices when accessing technological tools (Mcmahon and Bruce, 2002).

GOK (2005) asserts that information and communications technology skills play a key role in promoting economic development of a country. Many of the productivity gains in the developed world economies over the past two decades, can be a great extent be attributed to the impact of ICT. The Government appreciates and recognizes that an ICT literature workforce is the foundation on which Kenya can acquire the status of the knowledge
In order to realize the national development goals and objectives for wealth and employment creation, the government made information-based society a priority (Poghisio, 2008). In view of this background, the government aims at making ICT education the natural platform for equipping the Nation with ICT skills in order to create a dynamic sustainable economic growth.

Teachers who do not have positive expectations for ICT use do not instill or support a culture of technology use; integration is inhibited (Anderson & Dexter, 2000). Therefore, teachers should have knowledge, skills and positive attitude towards implementing ICT to schools and they must know new administrative techniques to manage their schools effectively (Tyack & Cuban, 2005).

Teacher professional development is a crucial component of the educational improvement (Tin, 2002). Thus the teacher pre-service and in-service training is a must for proper integration of ICT in the education system in any country. Teachers need to be prepared to empower pupils with the advantages technology can bring. More to this the teacher is responsible for establishing the classroom environment and preparing the learning opportunities that facilitate pupils’ use of technology to learn, and communicate (UNESCO, 2008). Research finding have revealed that most teacher training courses focused on basic computer operations rather than advanced computer skills and subject-specific pedagogical applications (Tin, 2002). Sarason, 2003 asserts that teacher training is a vital component in the introduction of innovation and improvement in schools.

Use of new technologies requires new roles, new pedagogies, and new approaches to teaching and learning. Before teachers have developed the ability to achieve all of the above, they must have a comfortable level of ICT skills. Unless teachers are functioning at a comfortable level of ICT skills and knowledge, they will be unable to use ICT as a primary tool for teaching and learning across the curriculum. Teachers need to be competent and confident users of hardware and software, to understand how to organize the classroom to structure learning tasks so that ICT resources become a necessary and integral part of learning rather than an “add-on technical aid” (Tin, 2002). Teaching becomes a process to initiate, facilitate, and sustain pupils’ self-learning and self-actualization; therefore, teachers should play as a facilitator who supports students; learning. Ololube (2006) who emphasis that teachers need training not only in computer literacy but in application of various educational software in teaching and learning.
The focus of teaching is to arouse students’ curiosity and motivation to think, act, and learn. The change from the traditional chalk-n.-talk pedagogy to the new modes of pedagogy within primary schools might introduce much uncertainty which tend to induce teachers; anxiety and cause them to feel frustrated in work. Hence many teachers have been found to offer stiff resistance to change involving technology intervention, technology integration and technology incorporation (Albirini, 2007).

Preparing pupils for real life in our technological and diverse world requires that teachers embed ICT in significant learning experiences (Braun & Kraft, 1995). Research findings indicate the use of ICTs alone does not change traditional teaching practices and that ICTs need to be supported by innovative pedagogic techniques to enhance students; self-learning and active interaction.

Technology, like other tools, is only powerful if it is used correctly. Teachers will often use technology if instructed to do so, but computers will be most effectively used when coupled with adequate training, from India to Mexico, Rwanda to Turkey, Primary-school teachers have reported that they did not feel adequately trained on technology they were expected to use. These teachers were unable to take full advantage of the technology and sometimes reject it (Bateman et al, 2009)

2.6 ICT equipment and availability and use of ICT in teaching and learning

The fastest growing and most popular ICT in Kenya is mobile phones. At present there are four mobile service providers who have enabled various mobile services (e.g. mobile banking). The reliance on mobile communication and services was well reflected during the election chaos in January 2008 where people used pre-paid cards as a currency by trading them for food and medicine (Zephoria, 2008). Infact, the number of mobiles subscribers increased from 9.3 million in 2007 to 12.8 million in 2008 (Oparanya, 2009). Annan (United Nations, 2003) asserted that, ‘while education unlocks the door to development, it is information technologies that can unlock the door to education.’

Kenya experience many of the problems typical of sub-Saharan Africa. Langmia (2006) asserts that, Kenya is lagging behind in information superhighway technology in terms of infrastructure development, the growth of the fixed telephone network throughout. Kenya has been below expectations. According to the central bureau of statistics (2006) the fixed line teledensity was 1.02%(number of fixed lines per one hundred population) during the year 2003 but this was really deteriorated since then due to steady population increased in the
absence of infrastructural development. Most of these fixed lines subscribers are connected in urban areas which account for 94% of the fixed lines while 6% are in rural areas (central bureau of statistics, 2006).

In 1995 distance learners at Athabasca University were surveyed about their access to and use of computers in their learning about 25% of those surveyed responded that they had access to computers and internet. The same research also noted that by the year 2000, the number of student with access to the world-wide-web had grown to 93% and the pioneers were smugly standing by watching their colleagues reinvent the online learning wheel (Athabasca University, 2002).

But as technology may have many cheerleaders, not everyone gets to be a play wealth and class influence computer access both at college and at home (National Centre for Education Statistics, 1998). This research further revealed that in the late 1990’s, 84% of wealthier suburban schools enjoyed internet access, while 63% of schools with high percentage of poor students were connected.

Another survey carried out by the African Virtual University revealed that internet connectivity in tertiary institutions in Africa is inadequate, expensive and poorly managed (Twinomugisha, Magochi & Alouch, 2004). In support, Yieke (2005) said that there is scarcity of computing resources. The high costs of both hardware and software are quite prohibitive and most African Universities can neither afford them nor cope up with changes in terms of costs and relevance since technology is highly dynamic. So as wealth and poverty becomes more extreme amongst students, technology gap widens. This was confirmed by the fact that African Americans between the ages of 19 and 54 who formed largest learning group in America did not use computers because their average salary was low (National centre for Educational statistics, 1998).

Despite the current successes the initiative faces many hurdles, including inadequacies in infrastructure, access to electricity, security of housing facilities and internet connectivity. Other obstacles that have been listed include lack of ready market for the products, mishandling of gadgets and political instability, as well as difficulties in accessing market prices and sharing information on expenses and best practices.

The inability of the groups to organize and function effectively and equitably to maximize shared benefits from their livelihood activities is a further recognized hindrances (Albrini, 2008).
In a research project (Kenya school Net, 2003) conducted in November 2002 was based on the finding of a questionnaire to which 69 secondary schools responded coming from all provinces and 46 Districts. The researcher reported that only 46.4% of the sampled school had computer although they did appear to be high level of awareness of the benefits of computers in schools (Makau, 1990).

It was suggested that e-mail was yet to be recognized as a tool for collaboration among teachers as only one school had a website and only two reported having networked their computers to the internet. It went on to assert that in those schools access to the internet was severely limited and when available was only for administrative use (Kenya school Net, 2003).

The school net research found that almost 40% of schools had less than 10 computers and therefore inadequate numbers for testing and learning. More than 20% had less than 5 computers indicating that the computers were largely for administrative purposes.

The research found out that some schools were using very old equipment and that heavy reliance on the donation of computers as opposed to sourcing locally reduced the capacity of the school to determine the makes of computer they used.

In a research study based on the experience of managers and computer teachers in eight schools in Uasin Gichu District, Western Kenya (Ndiku, 2003) focused on the problems encountered in the implementation of Educational ICT projects. The research identified the following as the most important factors inhibiting the success of computer development projects; insufficient numbers of computers and peripheral devices; teachers’ lack of knowledge; inadequate software for instruction and inadequate technical assistance.

Computer teachers themselves were found to have the additional problems of integrating computer usage in to school curriculum and frustrations with outdated computers which were not relevant to the current needs (Ndiku, 2003). The available open source software which might be seen as best choice for software, meets the challenge of few expertise to develop e-learning platforms for students and lecturers to use (Lungeo & Kaasobol, 2007).

There are options in implementing e-learning using mobile phones, CDS, DVDs, audio tapes for delivery of learning materials. In using phones it has been noted that there are more hidden cost to the students, and thus makes higher and open distance learning more expensive using offline technologies meets challenges of equipment to read the materials stored in equipment to store documents for later retrieval.
Taking into consideration to people with disabilities, both acquisition and skill training on use of equipment are challenges to students and teachers, especially those with visual impairment.

Where the technology is available literacy use of ICT equipment such as computers and mobile phones to access information might be another hindering block to implementing e-learning in developing countries (Gunawardana, 2005). Gachau (2003) conducted a research on e-learning readiness in tertiary institutions in Kenya, a case study of Kenya polytechnic. Her study investigated e-learning environment. Her key findings of the factors that determine e-learning readiness were computer and internet availability, computer literacy, motivation of users and management support (Watkins et al, 2003).

2.7 Theoretical framework

This study was embedded in the open systems theory as espoused by Kast and Rosenzweig (1985). The theory is one which continuously interacts with its environment. The interaction can take the form of information, energy, or material transfers into and out of the system boundary, depending on the discipline which defines the concept.

The incorporation of ICT into the day-to-day functions of educational institution has marked impact on every aspect of management structure and dynamics (Bosch, 2004). It means the study of ICT introduction in the school would not have been exhaustive if the social and technical aspects were not considered in their entirety explaining the reason for the socio-technical approach in this study which has its basis on the Kenyan ICT policy and its implementation exercise in primary schools (Bosch, 2007).

In the open system theory, the school is viewed as an open socio-technical system composed of five (5) major, partly overlapping and interdependent subsystems namely: Managerial structural, psychological, goals and values and technical (Bosch, 2007; Dubridge, 2004).

The school’s five subsystems interact with the environment in such a manner that bringing change in all the others. Therefore, when considering the introduction of innovations in schools, it is prudent to take cognizance of the inter-dependencies and Interactions first between the five sub-systems and secondly with the external environment (Cuban, 1999).

As stated earlier, this was chosen to guide this study to its all encompassing nature to get the total pictures of the factors that influence the use of ICT in teaching and learning in schools, as this avoids an overemphasis of some elements over others.
2.8 Conceptual framework

The factors that influence the use of ICT in teaching and learning process of the primary school students are ICT infrastructure thus electricity, ICT accessibility, their ICT skills and ICT equipments like computers, Video teleconferencing equipment, playback systems and CD-ROMs.

Figure 1: Conceptual framework
2.9 Summary and Research gaps

ICT had been discussed as indispensable in the success of learning with the availability of effective infrastructure and access which had not been uniformly distributed, although skills are also necessary but had been constrained by inadequate skills and illiteracy, costs, internet penetration rates and infrastructure.

Shifting to ICT-enabled education requires the creation and/or usage of digital content. The ICT in primary education sets the learning objectives of the program, which shed light on the areas in which the content was required. The content requirements needed to be compared against the existing content to determine any gaps and which new content had to be secured or developed. There was also financial and human resources gaps that existed between the current technology infrastructure that needed to be closed. The gap existed when access of ICT technical support was limited because of inadequate technical training and fast evolution of ICTs which required regular in-service technical training.
CHAPTER THREE
RESEARCH METHODOLOGY

3.1 Introduction

This chapter gives a description of the research methodology which was applied during the study. It discusses the research design, target population, sample and sampling procedures, research instrument, instrument validity, instrument reliability, data collection procedures and data analysis techniques.

3.2. Research design

The descriptive survey was used to identify factors influencing the use of ICT in teaching and learning among primary school pupils in Kandara Sub-County. According to Orodho (2003) descriptive survey is a method of collecting information from respondents by interviewing or administering a questionnaire to a sample of individuals. It was used to collect information about people’s attitudes, opinions, habits or any of the variety of education or issues (Orodho & Kombo, 2002).

The survey method was used since the respondents were primary school pupils on the ground and all the objectives targeted them. Other questionnaires developed were for the ICT teachers to ensure the objectives on the ICT equipment availability in the schools were fully answered. As Guba and Lincoln (1940) assert that research can be conducted only through interaction between and among investigators and respondents.

The study aimed at identifying factors influencing the use of ICT in teaching and learning in Kandara Sub-County in order to enable ICT educators to effectively work out strategies to ensure the success of the programme. Being a sample study data collection was done using questionnaires as the instrument (Eysenck, 1994, Shaughnessy et al, 2003) both for pupils and ICT teachers in the respective sampled schools. ICT teachers were included in the study because they interacted and assisted pupils using ICT devices and they provided information vital to the study.

3.3 Target population

According to Kombo and Tromp (2006), a population is a group of individuals, objects or items from which samples are selected for information gathering which is used for measurement. Oso and Onen (2008) define target population as a group of persons or objects
about which the researcher wishes to collect information in order to draw conclusions on the issue under investigation or study.

The target population for this study was primary school teachers and pupils from two educational zones in Kandara Sub-County from ten schools. Seven of them were mixed day primary schools, two mixed boarding schools and one mixed/boarding school in Kandara Sub-County. The average number of pupils per class in standard eight is fifty five. The total population of pupils in ten schools was about 550. The average number of teachers per school was about 15. The total population of teachers in ten schools was about 150. Therefore; the target population for this study was seven hundred (700).

3.4 Sample size and sampling techniques

According to Amin (2005), an ideal sample should be large enough to serve as adequate representation of the population about which the researcher wishes to generalize and small enough to be selected economically in terms of subject availability, expenses in time and money. According to Mugenda and Mugenda (1999) for descriptive study 10% of accessible population is enough given that the target population was heterogeneous due to the nature of the schools in the region. The study used the stratified sampling design. This was because the population was not homogenous in that Primary schools can be divided into three major categories namely mixed day, mixed boarding and mixed Day/Boarding.

Kathuri (1990) observed that the general rule in sampling is to get the largest sample possible. In their (1970) article in education and psychological measurement Krejcie and Morgan (1970) provided a table for determining needed size of a randomly chosen sample from a given finite population.

To determine an appropriate sample size appendix iv provided by Krejcie and Morgan (1970) was used. The target population of pupils was about 550 and teachers 150. The possible respondent of the study are 226 pupils and 14 teachers. The sampled size therefore in the study was 240 respondents.

3.4.1 School selection procedure

After getting information from the local DEO’S office on establishment of and registered schools in five educational zones in the area (Kandara), probability sampling technique was used for sampling identification in the two educational zones. In identifying the schools to form the study sample, stratified random sampling was used in which the schools were first categorized into Mixed Day Primary schools, Mixed Boarding Primary Schools and
Mixed Day/Boarding. This gave equal chances to schools in all the categories to be selected for study thus removed the sample biasness due to over-or-under representation of the categories. After stratification process, simple random sampling was done amongst schools in each stratum in order to identify the schools that was to represent each stratum in the study sample. The researcher wrote all the schools in each stratum and put them on the table. Then the researcher would pick the schools at random in each stratum. This technique ensured that each school had an equal opportunity of being included in the sample thus reducing the sampling biasness.

Primary schools in Kandara

Primary schools in Kandara Sub-County. This is presented in Table 3.1.

Table 3.1 Primary schools in Kandara

<table>
<thead>
<tr>
<th>Type/Category</th>
<th>Population</th>
<th>Sample</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mixed Day</td>
<td>77</td>
<td>7</td>
</tr>
<tr>
<td>Mixed Boarding</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>Mixed Day/Boarding</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td><strong>TOTAL</strong></td>
<td><strong>80</strong></td>
<td><strong>10</strong></td>
</tr>
</tbody>
</table>

From the Table 3.1, 7 schools were sampled from 77 mixed day primary schools, 2 were sampled from 2 mixed Boarding Primary schools and 1 school was sampled from Mixed day/Boarding Primary schools in Kandara Sub-County.

3.4.2 Respondent selection procedure

The ten registered Primary Schools from two educational zones in Kandara Sub-County was categorized into Mixed Day, Mixed Boarding and Mixed Day/Boarding. Each school was assigned 23 respondents (pupils) and 1(one) teacher respondent in charge of ICT departments was involved. They were drawn from selected primary schools in Kandara Sub-County. In identifying the respondents (pupils), different techniques was used depending on the category of the school. In mixed primary schools, stratified sampling was done based on gender, therefore simple systematic sampling was carried out to identify the respondents.
Whereby every third subject in the official class registers had to be picked starting from the first entrant in the class. In that case therefore, every third entrant in the class register became part of the sample.

The total of 226 pupils were identified as respondents from the sampled schools and 14 teachers of ICT Department, each from selected registered primary schools from two educational zones in Kandara Sub-County. This put the total number of 240 respondents.

**Pupil respondents sample**

The pupil respondents sampled from two Educational Zones in Kandara Sub-County. This is presented in Table 3.2.

**Table 3.2 Pupil respondents sample**

<table>
<thead>
<tr>
<th>TYPE/CATEGORY</th>
<th>SCHOOLS</th>
<th>SAMPLE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mixed Day (MD)</td>
<td>7</td>
<td>158</td>
</tr>
<tr>
<td>Mixed Boarding (MB)</td>
<td>2</td>
<td>45</td>
</tr>
<tr>
<td>Mixed Day/Boarding (MDB)</td>
<td>1</td>
<td>23</td>
</tr>
<tr>
<td><strong>TOTAL</strong></td>
<td><strong>10</strong></td>
<td><strong>226</strong></td>
</tr>
</tbody>
</table>

From the Table 3.2, 158 pupils were sampled from 7 mixed day primary schools, 45 pupil respondents were sampled from 2 Mixed Boarding Primary Schools whilst 23 pupil respondents were sampled from Mixed Day/Boarding Primary Schools.

**Teachers’ respondent sample**

The teacher respondents sampled from two Educational Zones in Kandara Sub-County. This is presented in Table 3.3.

**Table 3.3 Teachers’ respondent sample**

<table>
<thead>
<tr>
<th>TYPE/CATEGORY</th>
<th>SCHOOLS</th>
<th>SAMPLE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mixed Day (MD)</td>
<td>7</td>
<td>10</td>
</tr>
<tr>
<td>Mixed Boarding (MB)</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>Mixed Day/Boarding (MDB)</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td><strong>TOTAL</strong></td>
<td><strong>14</strong></td>
<td></td>
</tr>
</tbody>
</table>
From the Table 3.3, it is clear that 10 teacher respondents were sampled from 7 Mixed Day Primary schools, 3 teacher respondents were sampled from 2 Mixed Boarding and only 1 teacher respondent was sampled from Mixed Day/Boarding Primary Schools from two Educational Zones in Kandara Sub-County. A total of 14 teacher respondents were sampled from 10 primary schools.

3.5 Research Instrument

The research instrument for collecting data in this study was questionnaire for it allowed collection of data from many respondents which was time effective, reliable and with reasonable cost (Shaugnessy, 2003; coolican, 1996). Questionnaire also ensured that the answers given, data collected was fairly standard for easier analysis.

3.5.1 The questionnaire

A questionnaire is a research instrument that gathers data over a large sample (Kombo and Tromp, 2006). Two types of questionnaires were used, one for the students (Appendix ii) and the other for ICT teachers (Appendix iii) formed the major data collection instruments of the study. They contained both open and closed ended questions. Open ended questionnaire enabled the respondents to write and respond to what they knew exhaustively. Questions were based on variables. The questions were divided into sections. Section A for demographic information and other sections for research information. The students’ questionnaire contained 31 items whereas the teachers’ questionnaire contained 26 items. In each sampled school, only the teacher incharge of ICT Department was given a questionnaire schedule to obtain the necessary information on ICT use by primary pupils. The first step was designing the questionnaire items both for pupils respondents as well as for the teacher respondents. The next step was pre-testing of the instrument which was not included in the main study.

3.5.2 Pre-testing research instruments

The questionnaires were subjected to pre-testing exercise prior to the actual study. This was meant to detect any weakness and ensure clarity of the questions. Besides this, the researcher was able to detect problems in ambiguity, clarity and wording of items before the actual administration and thus was not found necessary to reframe the items, fill the omission and ensure objectivity, validity and reliability of the research instrument used.

3.5.3 Validity of data collection instruments

Validity of a data collection instrument was the accuracy and meaningfulness of inferences, which were based on the research results. (Mugenda & Mugenda, 2003). Mugenda (1999)
found that validity was the degree to which results obtained from analysis of data actually represent the phenomenon understudy. Therefore, it was necessary to test its validity before it was used. Therefore, for the purpose of this study the supervisor examined the questionnaires, the interview schedules and provided a feedback to the researcher and also validity was checked by an expert. Essentially validity was concerned with establishing whether the questionnaire content measured what it was supposed to measure.

3.5.4 Piloting of data collection instrument

A pilot study was conducted to check if the questions were well understood. Bell (1943) stated that the purpose of the pilot exercise was to get bugs out of the instruments so that the participants in the main study did not experience any difficulties in completing it and so that one could carry out a preliminary analysis to see whether the wording and format of the questions would present any difficulties when the main data was analyzed.

A pilot study was carried out in three schools i.e. one mixed day, mixed boarding and mixed/boarding schools (selected randomly) with all teachers filling in the questionnaires. The school used in the pilot study were chosen randomly and were omitted in the final study. The researcher personally administered the questionnaire within a day (agreed upon) in the school with a view of identifying areas that needed changes in the wording of some items. Validity was tested by an expert.

3.5.5 Reliability of data collection instrument

The reliability of the study was able to address the similarity of the results through repeated trials. Reliability is the degree to which a question consistently measures. (Kombo and Tramp, 2006). The identified problems were supplied with the instruments and was scored manually by the researcher for the consistency of results. According to Mugenda and Mugenda (2003) a coefficient of 0.08 or more implies that there's high degree of reliability. Pearson product moment correlation was used as a tool of correlation to analyze the relationship between independent and dependent variables (Orodho 2009, Kombo.2006). The responses were analyzed after which one week period was allowed to pass before the same treatment is to be applied to the same respondents and analysis done. The results were recorded accordingly. Reliability index for the teachers questionnaires was 0.89 and 0.85 for the pupils.

3.6 Data collection procedures

Before undertaking this research, a researcher permit was obtained from the office of the president through the Ministry of Education, Science and Technology. The copies of permit were availed to the District Education Officer and District Commissioners, Murang’a.
The instrument was hand delivered to the respective schools by the researcher. The researcher administered the questionnaire in person by getting the respondents only identified through the probability sampling techniques as stated above.

This was done through giving them questionnaires to fill in, and then collected them immediately on completion. However, the respondents were expected to complete the questionnaire independently. The school head teacher’s was informed one or two days in advance.

3.7 Data analysis techniques

Kerlinger (1986) defined data analysis as categorizing, manipulating and summarizing of data in order to obtain answers to research questions. Data obtained by the research instruments was first checked for completeness and accuracy. It then coded and classified into meaningful categories to bring out the essential pattern. Data from ICT teachers and pupils questionnaires were first coded and entered into statistical package for social sciences (SPSS) computer software for windows programme to enable analysis. Frequencies, percentages and correlation analysis obtained was used to answer the research questions. Factors influencing the use of ICT in teaching and learning among primary schools pupils in Kandara Sub-County. Tables were used to present the information from which interpretation was done by comparing the frequencies and percentages.
<table>
<thead>
<tr>
<th>OBJECTIVE</th>
</tr>
</thead>
<tbody>
<tr>
<td>To determine how ICT infrastructure influences the use of ICT among primary school pupils in Kandara Sub-County.</td>
</tr>
<tr>
<td>To assess how accessibility to ICT influences the use of ICT among primary school pupils in Kandara Sub-County.</td>
</tr>
<tr>
<td>To assess how skills in ICT influence the use of ICT among primary school pupils in Kandara Sub-County.</td>
</tr>
<tr>
<td>To examine how ICT equipment availability influences the use of ICT among primary school pupils in Kandara Sub-County.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>VARIABLE</th>
<th>INDICATORS</th>
<th>MEASUREMENT LEVEL</th>
<th>DATA COLLECTED METHOD</th>
<th>DATA ANALYSIS</th>
</tr>
</thead>
<tbody>
<tr>
<td>ICT Infrastructure</td>
<td>Electricity Internet connecting Hardware/Computer Software/ICT program</td>
<td>Ratio and Nominal</td>
<td>Survey</td>
<td>Descriptive</td>
</tr>
<tr>
<td>ICT Accessibility</td>
<td>Internet access Computer hardware Internet Infrastructure</td>
<td>Ratio and Nominal</td>
<td>Survey</td>
<td>Descriptive</td>
</tr>
<tr>
<td>Skills in ICT</td>
<td>Mode of communication Computer skills Local expertise Computer training</td>
<td>Ratio</td>
<td>Survey</td>
<td>Descriptive</td>
</tr>
<tr>
<td>ICT Equipment Availability</td>
<td>Computers Telephone Mobile phones Internet Playback - devices</td>
<td>Ratio</td>
<td>Survey</td>
<td>Descriptive</td>
</tr>
</tbody>
</table>
CHAPTER FOUR
DATA ANALYSIS, PRESENTATION AND INTERPRETATION

4.1 Introduction

This chapter contains findings of the study out of the research questions investigated on factors influencing the use of ICT in teaching and learning among primary school pupils in Kandara Sub-County Murang’a, Kenya. Data was analyzed as per the study objectives data was presented using tables. The presentations were done based on the research objectives.

4.2 Questionnaire return rate

This refers to the percentage of the sample that dully filled and submitted the filled questionnaire to the researcher for analysis. In the study 226 pupils and 14 teachers were sampled. 226 pupil respondent (100%) and 14 teacher respondents (100%) returned the questionnaires. This is presented in Table 4.1

Table 4.1: Questionnaire return rate

<table>
<thead>
<tr>
<th>INSTRUMENT</th>
<th>FREQUENCY</th>
<th>PERCENTAGE (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Questionnaires For Teachers</td>
<td>14</td>
<td>100</td>
</tr>
<tr>
<td>Questionnaires For Pupils</td>
<td>226</td>
<td>100</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>240</strong></td>
<td><strong>100</strong></td>
</tr>
</tbody>
</table>

Return rate of questionnaires was important in determining whether the respondents turnout was statistically admissible to work with. The return rate of questionnaires was 100%. This was achieved through making immediate follow-ups for all the questionnaires issued.

4.3 General characteristics of respondents

The general information on respondents in this study was obtained using a questionnaire which focused on the gender, age and teaching experience. The teachers’ gender, age and teaching experience were obtained. The pupils’ gender was also obtained.
4.3.1 Type of school

The pupil respondents were asked to give the information about the type of school from which he/she learn. This is presented in Table 4.2

Table 4.2: Type of school according to pupil respondents

<table>
<thead>
<tr>
<th>TYPE OF SCHOOL</th>
<th>FREQUENCY</th>
<th>PERCENTAGE (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mixed day</td>
<td>158</td>
<td>69.9</td>
</tr>
<tr>
<td>Mixed boarding</td>
<td>45</td>
<td>19.9</td>
</tr>
<tr>
<td>Mixed day/boarding</td>
<td>23</td>
<td>10.2</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>226</strong></td>
<td><strong>100.0</strong></td>
</tr>
</tbody>
</table>

It is clear from the Table 4.2 that more than half at 69.9% learn at mixed day primary schools, 19.9% at mixed boarding and only 10.2% attended mixed day/boarding school.

4.3.2 Type of school

The teacher respondents were asked to give the information about the type of school from which they taught. This is presented in Table 4.3

<table>
<thead>
<tr>
<th>TYPE OF SCHOOL</th>
<th>FREQUENCY</th>
<th>PERCENTAGE (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mixed day</td>
<td>10</td>
<td>71.4</td>
</tr>
<tr>
<td>Mixed boarding</td>
<td>3</td>
<td>21.4</td>
</tr>
<tr>
<td>Mixed day/boarding</td>
<td>1</td>
<td>7.2</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>14</strong></td>
<td><strong>100.0</strong></td>
</tr>
</tbody>
</table>

From the Table 4.3, it is clear that 71.4% teach at mixed day, 21.4% at mixed boarding and only 7.2 at mixed day/boarding primary school.
4.3.3 Location of the school

The pupil respondents were asked to give information about the location of the school from which they learn.

**Table 4.4: Location of school by pupils**

<table>
<thead>
<tr>
<th>LOCATION</th>
<th>FREQUENCY</th>
<th>PERCENTAGE (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>rural</td>
<td>203</td>
<td>89.8</td>
</tr>
<tr>
<td>urban</td>
<td>23</td>
<td>10.2</td>
</tr>
<tr>
<td>Total</td>
<td>226</td>
<td>100.0</td>
</tr>
</tbody>
</table>

From the Table 4.4 it is clear that 89.8% attended rural schools whilst 10.2% attended urban schools.

4.3.4 Teachers’ gender

The teacher respondents were asked to give information about their gender. This is presented in Table 4.5.

**Table 4.5: Gender of teacher respondents**

<table>
<thead>
<tr>
<th>GENDER</th>
<th>FREQUENCY</th>
<th>PERCENTAGE(%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Male</td>
<td>6</td>
<td>42.9</td>
</tr>
<tr>
<td>Female</td>
<td>8</td>
<td>57.1</td>
</tr>
<tr>
<td>Total</td>
<td>14</td>
<td>100.0</td>
</tr>
</tbody>
</table>

From the Table 4.5, majority of teacher respondents 57.1% were female with 42.9% being male.
4.3.5 Gender of pupil respondents

The pupil respondents were asked to give information about their gender.

This is presented in Table 4.6

**Table 4.6: Gender of pupil respondents**

<table>
<thead>
<tr>
<th>GENDER</th>
<th>FREQUENCY</th>
<th>PERCENTAGE (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Male</td>
<td>115</td>
<td>50.6</td>
</tr>
<tr>
<td>female</td>
<td>111</td>
<td>49.4</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>226</strong></td>
<td><strong>100.0</strong></td>
</tr>
</tbody>
</table>

Table 4.6, showed that majority of respondents were boys at 50.6% whilst 49.4% were girls. This indicated that both genders were well presented in the sample.

4.3.6 Age of teacher respondents.

The age of teacher respondents was analyzed and presented in Table 4.7.

**Table 4.7: Age of teacher respondents**

<table>
<thead>
<tr>
<th>AGE BRACKET</th>
<th>FREQUENCY</th>
<th>PERCENTAGE (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>More than 40 years</td>
<td>7</td>
<td>49.9</td>
</tr>
<tr>
<td>Between 35-39 years</td>
<td>4</td>
<td>28.7</td>
</tr>
<tr>
<td>Between 30-34 years</td>
<td>3</td>
<td>21.4</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>14</strong></td>
<td><strong>100.0</strong></td>
</tr>
</tbody>
</table>

From the Table 4.7, showed that most of the teacher respondents were above 40 years those between 35-39 years represented 28.75 and 21.4% were between 30-34 years.
4.3.7 Age of pupil respondents

The pupil respondents were asked to give information about their age. This is presented in Table 4.8

**Table 4.8: Age of pupil respondents**

<table>
<thead>
<tr>
<th>AGE BRACKET</th>
<th>FREQUENCY</th>
<th>PERCENTAGE (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>More than 15 years</td>
<td>18</td>
<td>8.0</td>
</tr>
<tr>
<td>12-14 years</td>
<td>208</td>
<td>92.0</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>226</strong></td>
<td><strong>100.0</strong></td>
</tr>
</tbody>
</table>

From Table 4.8, showed that most of the pupil respondents were age between 12-14 years (92.0 %), and 8.0% were above 15 years.

4.3.8 Teaching experience

The teacher respondents were asked their teaching experience in primary schools. This is presented in Table 4.9

**Table 4.9: Teaching experience by teachers**

<table>
<thead>
<tr>
<th>YEARS</th>
<th>FREQUENCY</th>
<th>PERCENTAGE (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>16 and above</td>
<td>2</td>
<td>14.3</td>
</tr>
<tr>
<td>11-15 years</td>
<td>7</td>
<td>50.0</td>
</tr>
<tr>
<td>3-10 years</td>
<td>5</td>
<td>35.7</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>14</strong></td>
<td><strong>100.0</strong></td>
</tr>
</tbody>
</table>

From the table 4.9, it can be established that majority of teacher respondents at 50% had teaching experience between 11-15 years, 35.7% were between 3-10 years whilst 14.3% were above 16 years of teaching experience.
4.4 Utilization of ICT tools and use of ICT in teaching and learning.

The respondents were asked whether they had problems in ICT utilization. This is presented in Table 4.10

Table 4.10: Challenges in ICT utilization.

<table>
<thead>
<tr>
<th>CHALLENGES</th>
<th>TEACHERS</th>
<th>FREQUENCY</th>
<th>PERCENT</th>
<th>PUPILS</th>
<th>FREQUENCY</th>
<th>PERCENT</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lack of power</td>
<td>13</td>
<td>92.9</td>
<td></td>
<td>214</td>
<td>94.7</td>
<td></td>
</tr>
<tr>
<td>Telephone</td>
<td>1</td>
<td>7.1</td>
<td></td>
<td>12</td>
<td>5.3</td>
<td></td>
</tr>
<tr>
<td>TOTAL</td>
<td>14</td>
<td>100.0</td>
<td></td>
<td>226</td>
<td>100.0</td>
<td></td>
</tr>
</tbody>
</table>

From Table 4.10, 94.7% of pupils and 92.9% of teachers indicated that they had no power in schools, 7.1% teacher and 5.3% of pupils indicated that they had no access to telephone facilities in schools.

4.4.1 Availability of electricity and use of ICT in teaching and learning.

The pupil respondents were asked whether the school is connected to electricity. This is presented in Table.4.11.

TABLE 4.11. Availability of electricity by pupils

<table>
<thead>
<tr>
<th>AVAILABILITY</th>
<th>FREQUENCY</th>
<th>PERCENTAGE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Yes</td>
<td>200</td>
<td>88.4</td>
</tr>
<tr>
<td>No</td>
<td>26</td>
<td>11.6</td>
</tr>
<tr>
<td>Total</td>
<td>226</td>
<td>100.0</td>
</tr>
</tbody>
</table>

The findings on the Table 4.11, revealed that a greater proportion of the 88.4% of the respondents do not have access to electricity and only 11.6% had access to electricity.
4.4.2 Availability of computers and use of ICT in teaching and learning.

The respondents were asked whether their schools own computers. This is presented in Table 4.12

Table 4.12: Availability of computers

<table>
<thead>
<tr>
<th></th>
<th>TEACHERS</th>
<th></th>
<th>PUPILS</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>FREQUENCY</td>
<td>PERCENTAGE</td>
<td>FREQUENCY</td>
<td>PERCENTAGE</td>
</tr>
<tr>
<td>Yes</td>
<td>1</td>
<td>7.2</td>
<td>6</td>
<td>2.7</td>
</tr>
<tr>
<td>No</td>
<td>13</td>
<td>92.8</td>
<td>220</td>
<td>97.3</td>
</tr>
<tr>
<td>TOTAL</td>
<td>14</td>
<td>100.0</td>
<td>226</td>
<td>100.0</td>
</tr>
</tbody>
</table>

The Table 4.12, showed that 97.3% of pupils and 92.8% of teachers confirmed that they had no computers at schools. Only 7.2% of teacher and 2.7% of pupils had computers at schools.

4.4.3 ICT tools lacking in schools and use of ICT in teaching and learning.

When the pupil respondents were asked to name the ICT tools they lack in school that would be important for quality teaching and learning. This is presented in the Table 4.13.

Table 4.13: ICT tools lacking in schools

<table>
<thead>
<tr>
<th>ICT TOOL</th>
<th>FREQUENCY</th>
<th>PERCENTAGE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Laptops</td>
<td>147</td>
<td>65</td>
</tr>
<tr>
<td>Computers</td>
<td>103</td>
<td>33.7</td>
</tr>
<tr>
<td>Radio</td>
<td>6</td>
<td>1.3</td>
</tr>
<tr>
<td>Total</td>
<td>226</td>
<td>100.0</td>
</tr>
</tbody>
</table>
Table 4.13 showed that 65% pupils admitted that they had no laptops, 33.7% lack computers and only 1.3% indicated radio.

4.4.4 Other telecommunication facilities in school and use of ICT in teaching and learning.

The respondents were asked to give other telecommunication facilities apart from computers in school. This is presented in Table 4.14

Table 4.14: Other telecommunication facilities

<table>
<thead>
<tr>
<th>FACILITY</th>
<th>TEACHERS</th>
<th>PUPILS</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>FREQUENCY</td>
<td>PERCENT</td>
</tr>
<tr>
<td>Radio</td>
<td>13</td>
<td>92.9</td>
</tr>
<tr>
<td>TV,DVD</td>
<td>1</td>
<td>7.1</td>
</tr>
<tr>
<td>TV</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>TOTAL</td>
<td>14</td>
<td>100.0</td>
</tr>
</tbody>
</table>

From the table 4.14, 93.8% and 92.9% confirmed that they had radio in their schools, 7.1% and 5.4% indicated that they had TV and DVD.
4.4.5 Uses of other telecommunication facilities and use of ICT in teaching and learning.

The respondents were asked the uses of other telecommunication facilities in school. This is presented in Table 4.15.

Table 4.15: Uses of other telecommunication facilities

<table>
<thead>
<tr>
<th>USES</th>
<th>TEACHERS</th>
<th></th>
<th></th>
<th>PUPILS</th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>FREQ.</td>
<td>PERCENT.</td>
<td>FREQ.</td>
<td>PERCENT</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Access broadcast lessons</td>
<td>11</td>
<td>78.6</td>
<td>197</td>
<td>87.2</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Access CD-Rom learning materials</td>
<td>1</td>
<td>7.1</td>
<td>6</td>
<td>2.7</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Entertainment</td>
<td>2</td>
<td>14.3</td>
<td>23</td>
<td>10.1</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>TOTAL</strong></td>
<td><strong>14</strong></td>
<td><strong>100.0</strong></td>
<td><strong>226</strong></td>
<td><strong>100.0</strong></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

The results presented in table 4.15 showed that majority used telecommunication facilities to access broadcast lessons with 87.2% for pupils and 78.6% for teachers. It was also noted that 14.3% for teachers and 10.1% for pupils used telecommunication for entertainment.

4.5 Physical location of computers at school and use of ICT in teaching and learning.

The respondents were asked the location of computers at schools. This is presented in Table 4.16

Table 4.16: Location of computers at schools

<table>
<thead>
<tr>
<th>LOCATION</th>
<th>TEACHERS</th>
<th></th>
<th></th>
<th>PUPILS</th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>FREQUENCY</td>
<td>PERCENTAGE</td>
<td>FREQUENCY</td>
<td>PERCENTAGE</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Office</td>
<td>13</td>
<td>92.9</td>
<td>211</td>
<td>93.3</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Staffroom</td>
<td>1</td>
<td>7.1</td>
<td>15</td>
<td>6.7</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Computer lab</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>TOTAL</strong></td>
<td><strong>14</strong></td>
<td><strong>100.0</strong></td>
<td><strong>226</strong></td>
<td><strong>100.0</strong></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
From the Table 4.16, 93.3% of pupils and 92.9% of teachers indicated that computers are placed in offices, 6.7% of pupils reported that computers are placed in staffroom.

### 4.5.1 Access of computers and use of ICT in teaching and learning.

The respondents were asked how often they accessed computers. This is presented in Table 4.17.

**Table 4.17: Access of computers**

<table>
<thead>
<tr>
<th>ACCESS</th>
<th>TEACHERS</th>
<th>PUPILS</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>FREQUENCY</td>
<td>PERCENTAGE</td>
</tr>
<tr>
<td>Never</td>
<td>10</td>
<td>71.4</td>
</tr>
<tr>
<td>Once a term</td>
<td>4</td>
<td>28.6</td>
</tr>
<tr>
<td>Weekly</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>TOTAL</td>
<td>14</td>
<td>100.0</td>
</tr>
</tbody>
</table>

It is evident from Table 4.17 that 97.8% of pupils and 71.4% of teachers had never interacted with computers. Compared to 28.6% of teachers and 2.2% of pupils reported that they had interacted with computers once a term.

### 4.5.2 Internet connection and use of ICT in teaching and learning.

The respondents were asked whether they had internet connection in their schools. This is presented in Table 4.18.
Table 4.18: Internet connection by teachers and pupils

<table>
<thead>
<tr>
<th>ACCESS</th>
<th>TEACHERS</th>
<th></th>
<th>PUPILS</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>FREQUENCY</td>
<td>PERCENTAGE</td>
<td>FREQUENCY</td>
<td>PERCENTAGE</td>
</tr>
<tr>
<td>Yes</td>
<td>1</td>
<td>7.1</td>
<td>23</td>
<td>10.2</td>
</tr>
<tr>
<td>No</td>
<td>13</td>
<td>92.9</td>
<td>203</td>
<td>89.8</td>
</tr>
<tr>
<td>TOTAL</td>
<td>14</td>
<td>100.0</td>
<td>226</td>
<td>100.0</td>
</tr>
</tbody>
</table>

From the table 4.18, it can be established that majority of teacher respondents at 92.9% and 89.8% of pupils are not connected to internet in schools. Only 10.2% of pupil and 7.1% indicated that they are connected to internet.

4.5.3 Gadgets for accessing internet and use of ICT in teaching and learning.

The respondents were asked how internet is connected. This is presented in Table 4.19.

TABLE 4.19: Gadgets for accessing internet

<table>
<thead>
<tr>
<th>GADGETS</th>
<th>TEACHERS</th>
<th></th>
<th>PUPILS</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>FREQUENCY</td>
<td>PERCENTAGE</td>
<td>FREQUENCY</td>
<td>PERCENTAGE</td>
</tr>
<tr>
<td>Pre-paid Modem</td>
<td>1</td>
<td>7.1</td>
<td>4</td>
<td>1.8</td>
</tr>
<tr>
<td>Internet Server</td>
<td>-</td>
<td>-</td>
<td>17</td>
<td>7.5</td>
</tr>
<tr>
<td>TOTAL</td>
<td>1</td>
<td>7.1</td>
<td>21</td>
<td>9.3</td>
</tr>
</tbody>
</table>

From the Table 4.19, It can be established that 7.5% were connected to internet through internet server to access internet whilst 7.1% of teacher used prepaid modem to access the internet.
4.5.4: Uses of internet and use of ICT in teaching and learning.

The teacher respondents were asked the uses of internet. This is presented in Table 4.20

**Table 4.20: Uses of internet according to teachers**

<table>
<thead>
<tr>
<th>USES</th>
<th>FREQUENCY</th>
<th>PERCENTAGE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Search for learning and teaching materials</td>
<td>9</td>
<td>81.8%</td>
</tr>
<tr>
<td>Communicate with friends</td>
<td>5</td>
<td>9.1%</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>14</strong></td>
<td><strong>100.0%</strong></td>
</tr>
</tbody>
</table>

From the Table 4.20, revealed that majority of teacher respondents, searching for learning/teaching materials was the major use of internet which stands at 81.8% compared to 9.1% used internet to communicate with friends..

4.5.5 Affordability of internet and use of ICT in teaching and learning.

The teacher respondents were asked on affordability of internet. This is presented on Table.4.21

**Table 4.21: Affordability of internet according to teachers**

<table>
<thead>
<tr>
<th>AFFORDABILITY</th>
<th>FREQUENCY</th>
<th>PERCENTAGE (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Expensive</td>
<td>12</td>
<td>85.7</td>
</tr>
<tr>
<td>Cheap</td>
<td>2</td>
<td>14.3</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>14</strong></td>
<td><strong>100.0%</strong></td>
</tr>
</tbody>
</table>

From the Table 4.21, 85.7% of teachers indicated that cost of internet was expensive compared to 14.3% indicated that the cost of internet was cheap.
4.6 Trained to use ICT devices and use of ICT in teaching and learning.

The respondents were asked whether they had ever been trained on how to use ICT devices.

This is presented in Table 4.22

Table 4.22: Trained to use ICT devices according to both teachers and pupils respondents

<table>
<thead>
<tr>
<th>TRAINED</th>
<th>PUPILS</th>
<th>TEACHERS</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>FREQUENCY</td>
<td>PERCENTAGE</td>
</tr>
<tr>
<td>Yes</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>No</td>
<td>226</td>
<td>100</td>
</tr>
<tr>
<td>Total</td>
<td>226</td>
<td>100.0</td>
</tr>
</tbody>
</table>

4.6.1 Level of ICT education training by teachers

The teacher respondents were asked their ICT education level. This is presented in Table 4.23.

Table 4.23 Level of ICT education training by teachers

<table>
<thead>
<tr>
<th>LEVEL</th>
<th>FREQUENCY</th>
<th>PERCENTAGE (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Certificate</td>
<td>5</td>
<td>35.8</td>
</tr>
<tr>
<td>Diploma</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Total</td>
<td>5</td>
<td>35.8</td>
</tr>
</tbody>
</table>

From the Tables 4.22 and 4.23, 100% of pupils and 64.2% of teachers reported that they had never received any training on how to use ICT devices. However, 35.8% of teachers reported that they had trained to certificate level.

4.6.2 Readiness to be trained in use of ICT devices and use of ICT in teaching and learning.

Pupil respondents were asked whether they were ready to be trained in the use of ICT devices and teacher respondents on how to offer the subject(s) they teach by electronic learning.
This is presented in Table 4.24

Table 4.24: Readiness to be trained

<table>
<thead>
<tr>
<th>READINESS</th>
<th>FREQUENCY</th>
<th>PERCENTAGE</th>
<th>FREQUENCY</th>
<th>PERCENTAGE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Yes</td>
<td>10</td>
<td>71.4</td>
<td>200</td>
<td>88.4</td>
</tr>
<tr>
<td>No</td>
<td>4</td>
<td>28.6</td>
<td>26</td>
<td>11.6</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>14</strong></td>
<td><strong>100.0</strong></td>
<td><strong>226</strong></td>
<td><strong>100.0</strong></td>
</tr>
</tbody>
</table>

From the Table 4.24, the survey indicated that 88.4% of pupils and 71.4% of teachers were ready to be trained on how to offer the subject(s) they teach by electronic learning.

4.6.3: Teaching and learning methodology and use of ICT in teaching and learning.

When the pupil respondents were asked if the teaching and learning methodology when using ICT was inclusive and highly efficient in teaching and learning. This is presented in Table 4.25

Table 4.25: Teaching and learning methodology using ICT according to pupils

<table>
<thead>
<tr>
<th>METHODOLOGY</th>
<th>FREQUENCY</th>
<th>PERCENTAGE (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Agree</td>
<td>194</td>
<td>85.8</td>
</tr>
<tr>
<td>Disagree</td>
<td>20</td>
<td>8.8</td>
</tr>
<tr>
<td>Uncertain</td>
<td>12</td>
<td>5.4</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>226</strong></td>
<td><strong>100.0</strong></td>
</tr>
</tbody>
</table>

The result presented in the Table 4.25 showed that 85.8% of pupils agreed that teaching and learning methodology when using ICT was inclusive and highly efficient, 8.8% disagreed.
4.6.4 Technical support and use of ICT in teaching and learning.

The respondents were asked whether they had adequate technical support to handle ICT equipment. This is presented in Table 4.26

Table 4.26: Technical support according to teachers and pupils respondents

<table>
<thead>
<tr>
<th>TECHNICAL SUPPORT</th>
<th>FREQUENCY</th>
<th>PERCENTAGE</th>
<th>FREQUENCY</th>
<th>PERCENTAGE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Yes</td>
<td>-</td>
<td>-</td>
<td>1</td>
<td>0.5</td>
</tr>
<tr>
<td>No</td>
<td>14</td>
<td>100</td>
<td>225</td>
<td>99.5</td>
</tr>
<tr>
<td>Total</td>
<td>14</td>
<td>100.0</td>
<td>226</td>
<td>100.0</td>
</tr>
</tbody>
</table>

From the Table 4.26, it showed that 100% of teachers and 99.5% of pupils indicated that they had none.

4.6.5 Advantages of using ICT devices and use of ICT in teaching and learning.

The respondents were asked on advantages of using ICT devices. This is presented in the Table 4.27

Table 4.27: Advantages of using ICT devices

<table>
<thead>
<tr>
<th>ADVANTAGES</th>
<th>FREQUENCY</th>
<th>PERCENTAGE</th>
</tr>
</thead>
<tbody>
<tr>
<td>To enhance listening skills</td>
<td>41</td>
<td>18.0</td>
</tr>
<tr>
<td>To communicate effectively</td>
<td>55</td>
<td>24.3</td>
</tr>
<tr>
<td>To sharpen mind</td>
<td>4</td>
<td>1.8</td>
</tr>
<tr>
<td>It enhances our learning</td>
<td>10</td>
<td>4.4</td>
</tr>
<tr>
<td>To develop skills</td>
<td>16</td>
<td>7.0</td>
</tr>
<tr>
<td>Access information</td>
<td>53</td>
<td>23.3</td>
</tr>
<tr>
<td>Cheap</td>
<td>7</td>
<td>3.1</td>
</tr>
<tr>
<td>Its fast</td>
<td>2</td>
<td>0.9</td>
</tr>
<tr>
<td>To safe information</td>
<td>24</td>
<td>10.6</td>
</tr>
<tr>
<td>To improve understanding</td>
<td>14</td>
<td>6.6</td>
</tr>
<tr>
<td>Total</td>
<td>226</td>
<td>100.0</td>
</tr>
</tbody>
</table>
This is presented in Table 4.27 showed the advantages of using ICT tools. Most respondents used ICT devices to communicate effectively at 24.3%, 23.3% to access information, 18.0% to enhance listening skills, 4.4% to enhance learning, 6.6% to improve understanding.

4.7 ICT tools used by pupils at home and use of ICT in teaching and learning.

The respondents were asked to name the ICT tools used by pupils at home. This is presented in Table 4.28.

Table 4.28: ICT tools used by pupils

<table>
<thead>
<tr>
<th>ICT TOOLS</th>
<th>FREQUENCY</th>
<th>PERCENTAGE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mobile phones</td>
<td>150</td>
<td>66.4</td>
</tr>
<tr>
<td>Radio</td>
<td>66</td>
<td>29.2</td>
</tr>
<tr>
<td>Computers</td>
<td>10</td>
<td>4.4</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>226</strong></td>
<td><strong>100.0</strong></td>
</tr>
</tbody>
</table>

From the Table 4.28 above, it is evident that 66.4% used mobile phones, 29.2% used radio whilst 4.4% used computers.

4.7.1 Availability of computers at schools and use of ICT in teaching and learning.

The pupil respondents were asked whether their schools own computers. This is presented in Table 4.29.

Table 4.29: Availability of computers

<table>
<thead>
<tr>
<th>COMPUTERS</th>
<th>FREQUENCY</th>
<th>PERCENTAGE (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Yes</td>
<td>6</td>
<td>2.7</td>
</tr>
<tr>
<td>No</td>
<td>220</td>
<td>97.3</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>226</strong></td>
<td><strong>100.0</strong></td>
</tr>
</tbody>
</table>
Table 4.29 showed that 97.3% had no computers in their schools. Only 2.7% confirmed that they had computers in their schools.

4.7.2 Affordability of ICT devices and use of ICT in teaching and learning.

The respondents were asked whether the ICT devices available around the school were affordable. This is presented in Table 4.30.

Table 4.30: Affordability of ICT.

<table>
<thead>
<tr>
<th>Cost</th>
<th>Teachers</th>
<th></th>
<th>Pupils</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Frequency</td>
<td>Percentage</td>
<td>Frequency</td>
<td>Percentage</td>
</tr>
<tr>
<td>Expensive</td>
<td>10</td>
<td>71.4</td>
<td>224</td>
<td>99.1</td>
</tr>
<tr>
<td>Cheap</td>
<td>4</td>
<td>28.6</td>
<td>2</td>
<td>0.9</td>
</tr>
<tr>
<td>TOTAL</td>
<td>14</td>
<td>100.0</td>
<td>226</td>
<td>100</td>
</tr>
</tbody>
</table>

It is evident from the Table 4.30 that 99.1% of pupils and 71.4% of teachers had opinion that ICT devices were expensive.
4.8 Summary

This chapter has focused on analysis, presentation and interpretation of data collected from the field. Questionnaires collected data on factors influencing the use of ICT in teaching and learning among primary schools in Kandara Sub-County. The return rate was 100%. 
CHAPTER FIVE
SUMMARY OF FINDINGS, DISCUSSIONS, CONCLUSION AND RECOMMENDATIONS

5.1 Introduction

This chapter summarizes the findings of the study and presents conclusions, recommendations and suggestions for further research.

5.2 Summary of the findings.

The purpose of this study was to investigate the factors influencing use of ICT in teaching and learning among primary schools in Kandara Sub-County.

Research question one sought to determine how the infrastructure influenced the use of ICT among primary school pupils in Kandara Sub-County, research question two aimed at accessing the use ICT in teaching and learning among primary school pupils in Kandara Sub-County, research question three sought to establish the extent to which skills in ICT has influenced the use of ICT in teaching and learning among primary school pupils in Kandara Sub-County and finally, research question four sought to determine how the availability of ICT equipment has influenced the use of ICT in teaching and learning among primary school pupils in Kandara Sub-County.

5.2.1 ICT infrastructure and use of ICT in teaching and learning.

The first objective of the study was to determine the influence of ICT infrastructure to ICT use on primary school pupils in teaching and learning. Results of data analyzed showed that 94.7% of pupils and 92.9% of teachers indicated that they had no access to power in schools, 5.3% of pupils and 7.1% teacher had no access to telephone facilities schools, 88.4% of pupils were not connected to electricity and only 11.6% had access to electricity. This implied that lack of power particularly in rural schools and where this exists, frequent power disruptions due to vandalism of power lines is a factor that has often hindered ICT tool use.

Majority of respondents 97.3% of pupils and 92.8% of teachers confirmed that they had no computers at schools only 2.7% of pupils had computers at school. This implied that inadequate number of computers hindered the use of ICT in teaching and learning in primary schools.
On the issue of ICT tools lacking in schools 65% of pupil respondents admitted that they had no laptops, 33.7% had no computers whilst 1.3% indicated that they had no radios. This high percentage of schools without ICT tools in schools would slow down the rate of adopting distance education in primary schools and hence create a gap between urban and rural areas. Majority of respondents at 93.8% of pupils and 92.9% confirmed that they had radio in their schools and 87.2% of pupils used and 78.6% used telecommunication facilities to access broadcast lessons.

5.2.2 Access ICT accessibility and use of ICT in teaching and learning.

The second objective of the study was to assess the ICT accessibility to ICT use on primary school pupils in teaching and learning. The physical location of computers was considered an important factor for teachers and pupils to access computers. Results of data analyzed showed that 92.9% of teachers and 93.3% of pupils indicated that computers are placed in offices, 6.7% of pupils reported that computers are placed in staffroom. This implied that access to computers was very low. On the issue on access to computers 97.8% of pupils and 71.4% of teachers had never interacted with computers compared to 28.6% of teachers and 2.2% of pupils had interacted with computers once a term. This implies that the respondents had no access to computers and therefore this contributed to their inability to use ICT. My observation is that access to computers is a significant factor that contributes to ICT use of teaching and learning was more likely where computers were accessible.

Majority of respondents at 92.9% of teachers and 89.8% of pupils were not connected to internet in their schools. This implied that internet is not readily available to primary schools and they can’t access the needed information. However even though 7.1% of teacher was connected to internet through pre-paid modem compared to 1.8% of pupil respondents connected to internet through internet server. Once they are at school, power for operating computers may not be guaranteed. Majority of the teacher respondents at 81.8% indicated that they used internet to search for teaching and learning materials compared to 9.1% used internet to communicate with friends. This implied that online information is so readily available and has become a driving force to education.

Majority of teacher respondents at 85.7% indicated that the cost of internet was expensive compared to 14.3% indicated that the cost of internet was cheap. This implies that teachers could not afford.
5.2.3 Skills in ICT and use of ICT in teaching and learning.

The third objective of the study was to assess the influence of ICT skills to ICT use on primary school pupils. Of the learners sampled 100% and 64.2% of teachers reported that they had never received any training on how to use ICT devices. However, 35.8% of teachers reported that they had trained to certificate level. This implied that unless teachers and pupils are functioning at a comfortable level of ICT skills and knowledge, they will be unable to use ICT as a primary tool for teaching and learning across the curriculum.

Findings on readiness to be trained on how to use ICT devices, 88.4% were ready to be trained on how to use ICT devices, 71.4% of teachers were also ready to be trained on how to offer subjects they taught through electronic learning. Majority of pupil respondents at 85.8% agreed that teaching and learning methodology when using ICT is inclusive and highly efficient, 8.8% disagreed. This implies that the respondents knew how much they could gain if they use ICT in teaching and learning. It was quite clear if this knowledge was given to the respondents, definitely it could have positive contribution to academic work.

Majority of the teacher respondents at 100% and 99.5% of pupils indicated that they had no technical support in their schools.

5.2.4 ICT Equipment and availability and use of ICT in teaching and learning.

The forth objective of the study was to examine the influence of ICT equipment and availability to ICT use on primary school pupils in teaching and learning. Findings on the ICT tools use by pupils at home 66.4% indicated that they used mobile phones, 29.2% used radio. This implies that pupils embrace technology. Findings on availability of computers 97.3% of pupil respondents confirmed that they had no computers in their schools.

Findings on the affordability of ICT devices 99.1% of pupils and 71.4% of teachers had opinion that ICT devices were expensive. This implied that teachers and pupils can’t afford ICT devices and hence they can’t use them in teaching and learning.

5.3 Discussions of the findings.

5.3.1 ICT infrastructure and use of ICT in teaching and learning.

The first objective of the study was to determine the influence of ICT infrastructure to ICT use in primary schools pupils in teaching and learning.

ICT infrastructure is one of the biggest problems facing primary schools as far as using ICT in teaching and learning is concerned.
This view is shared by Isaacs (2000) that the main obstacles that face the African schools are lack of infrastructure, high telephone and internet costs and lack of enabling policy environment. It corroborates with Hafkin & Taggard (2001) that there is lack of adequate infrastructure such as telephone facilities, satellite facilities, electricity and communication centres in rural areas.

Hennessy et al. (1997) agreed that Limited Technology Infrastructure especially hardware/computers and software provision, access to internet, lack of reliable access to electricity and bandwidth have hindered teachers and pupils in using ICT in teaching and learning.

5.3.2 Access to ICT and use of ICT in teaching and learning.

The second objective of the study was to assess the ICT accessibility to ICT use on primary school pupils in teaching and learning.

Knowledge in the use of ICT in teaching and learning appears to be the most critical variable. Therefore, issue of ICT facilities, training in the use of ICT and reliability of connectivity should be the major focus for the primary schools. As the former president Thambo Mbeki of South Africa at the opening of Biennial meeting of the association for development of education in Africa said “we must encourage the use of information technology in education, so as to link for flung places and institutions of learning to bridge the gap between urban and rural areas, to enable African Children to advance scientifically so as to compete on an equal footing with the rest of world” (Mbeki cited in ADEA, 2000).

Most of respondents agreed to have telecommunication facilities to access broadcast lessons. This corroborates findings by Hiltz (1995) that students in collaborative learning conditions had more constructive learning processes and attained higher grades than students in other conditions.

On accessibility of ICT devices in teaching and learning, the physical location of computers was an important factor for teachers and pupils to access computers. It was observed that generally all the computers were located in offices and were not found in places more accessible to the teachers and pupils such as staffrooms and computer labs. The implication of the study findings is that if the computers are located in staffroom and computer labs, teaching and pupils would enhance accessibility, computers in primary schools are generally located in offices to which teachers and pupils had limited access. This implies that computers were largely for administrative purposes. This could negatively affect the use of ICT in teaching and learning in primary schools.
This agrees with Tin, (2002) that the use of technology depends on the availability of hardware and software and the equity of access to resources by teachers and pupils. Ayere et. al (2010) agreed that the use of ICT in teaching and learning is attributed to availability of internet and other ICT equipment and materials which made ICT use easier as teachers easily access the materials or direct learners to relevant sources.

Most of teacher respondents used internet to search for teaching and learning materials. This agrees with Adeya and Oyejinka (2002) that people use internet to access the needed information. It also corroborates with Ololube, (2006) that the information through ICT increases the information accessible to individuals and supports them in trying new strategies, thinking and creativity that are reflective in practice aimed at engaging them to new innovations through use of ICT.

The cost of internet was expensive according to teacher respondents. This view is shared by Isaacs, (2000) that the main obstacles that face African schools with respect to internet access are high telephone and internet costs and lack of enabling policy environment. Adeya and Oyejinka, (2002) agreed that internet access and cost of accessing are significantly related. Societies with predominantly low income groups are less likely to have access to internet. Knowledge acquisition is constrained by low income due to unequal access and more so because of unequal utilization of technology.

5.3.3 Skills in ICT and use of ICT in teaching and learning.

The third objective of the study was to access the influence of ICT skills to ICT use on primary school pupils in teaching and learning.

Most of the respondents had no ICT skills in teaching and learning. The school needs to offer training to its teachers and pupils if she wants to enhance use of ICT in teaching and learning. This concurs with the results from Obuh (2009) which found that in order to utilize the growing range of electronic resources, students must acquire and practice the skills necessary to exploit them. Ololube, (2006) agreed that teachers need training not only in computer literacy but in application of various education software in teaching and learning. This view is shared by Sarason (2003) that teachers and pupils training is a vital component in the introduction of innovations and improvement in schools.

Most of respondents agreed that the use of ICT in teaching and learning was inclusive and highly efficient. This view is shared by Dringus et. at (1995) that in the process of education, ICT is used as an information tool that provides vast amount of information in various formats such as audio and video.
It corroborates with Yusuf, (2005) that the use of ICT tools has helped students, academic and non academic staff to communicate with other more effectively during formal and informal teaching and learning.

Most of respondents agreed that there was inadequate technical support and this was one of the barriers resulted in computers being under utilized. Along with ICT training, one needs an ICT related support mechanism to gradually induce the integration (Lai & Pratt, 2006). Teachers need support in the use and integration of ICT into the curriculum and teaching methods. This concurs with 1997 report by National Council for the Accreditation of teacher education (NCATE) that lack of technical support was one of the barriers resulted in computers being under utilized in classes. This was because teachers were afraid of using computers when they were not sure where to turn for help when something went wrong.

5.3.4 ICT equipment and availability and use of ICT in teaching and learning.

The forth objective of the study was to examine the influence of ICT equipment and availability to ICT use on primary school pupils in teaching and learning.

Most of pupil respondents used mobile phones at home. This view is shared by Zephoria, (2008) that the fastest growing and most popular ICT in Kenya is mobile phones. Annan (United Nations, 2003) agreed that while education unlocks the door to development, it is information technologies that unlock the door to education.

Most of respondents confirmed that they had no computers in their schools. This concurs with previous studies that almost 40% of secondary schools had less than 10 computers therefore inadequate numbers for teaching and learning. More than 205 secondary schools had less than 5 computers indicating that computers were largely for administrative purposes. (Kenya School Net, 2003).

ICT devices were expensive according to most respondents. This view is shared by Yieke (2005) that the high costs of both hardware and software are prohibitive and most people can neither afford them. This concurs with the National centre for educational statistics, (1998) that the fact that African Americans between the ages of 19 and 54 who formed the largest learning group in America did not use computers because their average salary was low.

5.4 Conclusion of the study.

It is true that the use of ICT in teaching and learning is playing a vital role in distance education but at the same time there are issues and challenges that are to be addressed for smooth functioning of ICT use in teaching and learning primary schools.
ICT infrastructure in primary school was inadequate in most of the schools and this have hindered teachers and pupils in using ICT in teaching and learning. On the issue of accessibility to ICT tools, most respondents had no access to computers and therefore this contributed to their inability to use them. The cost of internet was high and teachers could not afford. Majority of the teachers used internet to search for teaching and learning materials. Most of the respondents had no skills on how to use ICT devices but they were ready to be trained on how to use ICT devices in teaching and learning. Schools were not equipped with adequate computers resources and the cost of ICT devices were high and therefore teachers and pupils can’t afford ICT devices and hence they can’t use them in teaching and learning.

5.5 Recommendations.

Based on the objectives this study recommends;

1. The government through Ministry of Education and finance should provide funds for acquisition of ICT infrastructure to consequently, breathe life to ICT for teaching and learning in primary schools. Schools administrators should on the other hand, prudently make use of ICT infrastructure already at their disposal.

2. The government and educational stakeholders to combine efforts in order to equip schools with wireless internet services to enhance internet access.

3. Training gaps are identified and intensive training for both teachers and pupils on ICT is carried out in order to improve teaching and learning practices.

4. The government, administrators and educational stakeholders to combine efforts in order to equip schools with computing resources.

5.6 Suggestions for further research.

1. Studies similar to this one to be carried out in other Sub-Counties within and without the County.

2. Attitude of teachers and pupils in the use of ICT in teaching and learning in the County.
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Dear Respondent,

**RE: REQUEST FOR RESEARCH DATA**

I am a Master of Distance Education (M.D.E) student in the University of Nairobi. I am required to submit as part of my course work assessment a research project report on "usage of information and communication Technology in teaching and learning among Primary School students in Kandara Sub-county."

I therefore kindly request you to assist me in filling the attached questionnaire to the best of your ability as it applies to you.

Please be assured that the information you provide will be solely for academic purposes and all responses will remain confidential.

Thanking you in advance.

Yours faithfully,

GAITHO ANTHONY MWAUROA
L45/62141/13
APPENDIX II

STUDENTS QUESTIONNAIRE

NOTE: Please do not write your name anywhere on this questionnaire. The responses you put on this paper shall be treated with utmost confidentiality.

SECTION A: BACKGROUND INFORMATION

1. Type of school (tick one appropriately)
   a) Mixed day
   b) Mixed boarding
   c) Mixed day/boarding
   d) Others (specify)

2. Location of the school (tick one)
   a) Rural
   b) Urban

3. Gender (tick one)
   a) Male
   b) Female

4. Your age

SECTION B: QUESTION 1: ICT INFRASTRUCTURE

5. Do you have problems in ICT tools utilization?
   a. Yes  
   b. No. 

6. If yes, in Q5, list the problems

7. Is your school connected to electricity?
   a. Yes  
   b. No. 

8. Do you have computers in your school?
   a. Yes  
   b. No. 

9. If yes in Q8, how many?
   Specify

10. What ICT tools are lacking in your school that would be important for
    quality teaching/learning?
    a
    b
    c
    d

11. Apart from computers, what are other telecommunication facilities are in your school?

<table>
<thead>
<tr>
<th>Facility</th>
<th>Radio</th>
<th>T.V</th>
<th>DVD</th>
<th>VCR</th>
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12. How are the above facilities used?
   a. Entertainment
   b. Access broadcast lessons
   c. Access CD-Rom learning materials

SECTION C: QUESTION 2: ICT ACCESSIBILITY

13. Where are the computers placed in school?
   a. Office
   b. Staffroom
   c. Computer Lab

14. Do you have internet connection in your school?
   a. Yes
   b. No

15. If yes, in Q14, how are you connected?
   a. Pre-paid modem
   b. Internet server
16. How do you use the internet?
   a) Communicate with friends and family
   b) Communicate with other teachers or pupils on school related matters
   c) Search for teaching and learning materials.

17. How does the availability of ICT devices in the school influence the students’ ICT use?

18. How often do you access the computer?
   a. Daily
   b. Weekly
   c. Monthly
   d. Once a term
   e. Never

SECTION D: QUESTION 3: INFLUENCE OF ICT SKILLS ON THE USE OF ICT

19. Have you ever participated in any ICT training?
   a. Yes
   b. No

20. Would you like to be trained, on how to use ICT devices?
   a. Yes
   b. No

21. The use of ICT in Primary schools enhances teaching and learning programmes?
   a. Agree
   b. Disagree
   c. Strongly Disagree
   d. Uncertain
   e. Not applicable

22. All pupils should be trained in the use of ICT?
   a. Yes
   b. No

23. The teaching and learning methodology when using ICT is inclusive and highly efficient in teaching and learning.
   a. Strongly agree
   b. Agree
   c. Uncertain
   d. Disagree
   e. Strongly disagree
24. Is there adequate technical support to handle ICT equipment in your school?
   a. Yes    b. No  

25. Is there any advantage of using ICT devices (specify)
   a. Yes    b. No  

26. If yes in Q25, list them down
   aū ū ū ū ū ū ū ū ū  
   bū ū ū ū ū ū ū ū ū  
   cū ū ū ū ū ū ū ū ū .  

SECTION E: QUESTION 4: ICT EQUIPMENT

27. Have you used ICT tools before at home?
   a. Yes    b. No  

28. If yes, in Q27, name them
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   bū ū ū ū ū ū ū ū ū  
   cū ū ū ū ū ū ū ū ū .  

29. Does your school have computers?
   a. Yes    b. No  

30. If yes, in Q29, how many?
    Specifyū ū ū ū ū ū ū ū ū ū ū ū ū ū ū ū ū ū ū ū ū ū ū ū ū ū ū ū ū ū ū ū ū ū ū ū ū .  

31. Are the ICT devices affordable?
   a. Cheap b. Expensive  


APPENDIX III

TEACHERS’ QUESTIONNAIRE

NOTE: Please do not write your name or employment number anywhere on this questionnaire. The answer you give on this questionnaire will be treated with utmost confidentiality.

SECTION A: BACKGROUND INFORMATION

1. Type of your school (Tick the appropriate option)
   - Mixed day
   - Mixed boarding
   - Mixed day/boarding
   - Others (specify)

2. Gender
   - Male
   - Female

3. Your age

4. For how long have you been teaching in primary school?
   - 0-2 years
   - 3-5 years
   - 6-10 years
   - 11-15 years
   - 16 and above

SECTION B: QUESTION 1: ICT INFRASTRUCTURE

5. Do you have problems in ICT tools utilization?
   a. Yes
   b. No.

6. If yes, in Q5, list the problems
7. Do you have computers in your school?
   a. Yes    b. No

8. If yes in Q7, how many?
   Specify

9. Apart from computers, what are other telecommunication facilities are in your school?

<table>
<thead>
<tr>
<th>Facility</th>
<th>Radio</th>
<th>T.V</th>
<th>DVD</th>
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10. How are the facilities used?
   a. Entertainment
   b. Access broadcast lessons
   c. Access CD-Rom learning materials

SECTION C: QUESTION 2: ICT ACCESSIBILITY

11. Do you have a computer at home?
   a. Yes    b. No

12. Where are the computers placed in school?
   a. Office    b. Staffroom    c. Computer Lab

13. Do you have internet access in your school?
   a. Yes    b. No

14. If yes, in Q13, how are you connected?
   a. Pre-paid modem    b. Internet server

15. Is the internet affordable?
   a. Yes    b. No
16. How do you use the internet?
   a) Communicate with friends and family
   b) Communicate with other teachers or pupils on school related matters
   c) Search for teaching and learning materials.

17. How often do you access the computer?
   a. Daily
   b. weekly
   c. monthly
   d. Once a term
   e. Never

SECTION D: QUESTION 3: INFLUENCE OF ICT SKILLS

18. Have you ever participated in any ICT education training?
   a. Yes
   b. No

19. If yes, in Q.18, which level?
   a. Diploma
   b. Certificate
   c. Others (Specify)

20. Would you like to be trained, on how to offer the subject(s) you teach by ICT?
   a. Yes
   b. No

21. Would you consider yourself computer literate?
   a. Yes
   b. No

22. All teachers should be trained in ICT?
   a. Yes
   b. No

23. Are there adequate technical support to handle ICT and equipment in your school?
   a. Yes
   b. No
SECTION E: QUESTION 4: ICT EQUIPMENT

24. Are the ICT devices affordable?
   a. Cheap          b. Expensive

25. Are there enough computers in your school?
   a. Yes    b. No

26. Indicate the extent to which the following factors affect the use of ICT in learning. SA- strongly agreed, A-agree, U-uncertain, D-Disagree, SD-Strongly disagree.

<table>
<thead>
<tr>
<th>Factor</th>
<th>SA</th>
<th>A</th>
<th>U</th>
<th>D</th>
<th>SD</th>
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<tbody>
<tr>
<td>Inadequate number of computers</td>
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<td>Lack of internet connectivity</td>
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<td>Lack of access to computers</td>
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<td>Insufficient or irregular power supply</td>
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<td>High cost of hardware and software</td>
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<td>Lack of skills</td>
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<td>Unavailability of appropriate software</td>
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APPENDIX IV: DETERMINATION OF SAMPLE SIZE

The size of the population and amount of error determines the size of a randomly selected sample. This table helps the researcher determine (with 95 percent certainty) what the results would have been if the entire population had been surveyed.

Table for determining the Random Sample size from a determined population.

<table>
<thead>
<tr>
<th>Population Size</th>
<th>Sample Size</th>
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