

**THE USE OF INFORMATION AND COMMUNICATION
TECHNOLOGY IN IMPROVING TEACHING AND LEARNING IN
PUBLIC PRIMARY SCHOOLS IN GATANGA DISTRICT, MURANG'A
COUNTY, KENYA**

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the Degree of Master of Education in Curriculum Studies**

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DECLARATION

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

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DEDICATION

I dedicate this work to my doting parents James Kairo and Catherine Kairo. My siblings Liz and family, Julie and family, Ben, Purity and Ann. I also dedicate it to my friends.

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ABBREVIATION AND ACRONYMS

EFA	Education for All
FPE	Free Primary Education
GOK	Government of Kenya
ICT	Information Communication and Technology
IRI	Interactive Radio Instruction
KESSP	Kenya Education Sector Support Programme
MDGs	Millennium Development Goals
MOEST	Ministry of Education Science and Technology
PTRs	Pupil Teacher Ratios
UNESCO	United Nations Educational Scientific and Cultural Organization

ABSTRACT

The purpose of the study was to investigate the use of ICT in improving teaching and learning in public primary schools in Gatanga district. Five research objectives guided the study. The study used the descriptive survey research design. The sample comprised of 16 headteachers, 35 teachers and 377 class 8 learners. Data were gathered by use of questionnaires and were analysed by use of qualitative and quantitative techniques. The findings were that schools did not have IT facilities which affected the use of ICT in improving teaching and learning in public primary schools. For example, all the schools sampled did not have internet facilities, overhead projectors and video cassettes among other facilities. Findings also revealed that teacher preparedness affected the use of ICT in teaching and learning. For example, teachers had not attended in-service course in ICT in the last one year. Teachers said that they were trained in common packages level and were good in basic computer parts and functions such as opening, closing and saving files, opening and renaming files. Findings also revealed that administrative support affected the use of ICT in teaching and learning. Findings also revealed that there were challenges that faced the use of ICT in improving teaching and learning. Based on the findings of the study, it was concluded that lack or inadequate ICT facilities affected the use of ICT in improving teaching and learning in public primary schools. The study also concluded that teachers were adequately prepared in ICT but they could not use the skills since the schools did not have the required ICT facilities. Teachers were trained in common packages level. They also had basic computer skills such as opening, closing and saving files, opening and renaming files. The study also concluded that administrative support affected the use of ICT in teaching and learning. For example, headteachers indicated that they sometimes had an ICT coordinator who had no other responsibility and a computer specialist who is consulted. There were teachers who assisted pupils in using ICT in teaching and learning. It was therefore concluded that administrative support affected the use of ICT in teaching and learning. The study also concluded that there were challenges that faced the use of ICT in improving teaching and learning. Schools faced major challenges such as insufficient number of computers, difficulties in integrating ICT in teaching and learning, scheduling computer time, insufficient peripherals such as printers and scanners, lack of internet connection in the school, lack of technical assistance, weak infrastructure, insufficient technical support and prohibitive running costs. The study recommended that positive ICT for education policy statements from the government should be put in place that will go some way towards encouraging non-governmental donors to assist in the development of ICT in primary schools. Regardless of the extent of the government's direct financial involvement in teacher training in ICT, the Ministry of Education should none the less be working in consultation with primary schools to enhance

integration of ICT in teaching and learning. The government should formulate a policy with specific relevance to teacher capacity building in ICT. The study suggested that a study on perceptions of teachers on the potential of ICT in supporting teaching and learning in primary schools should be carried out. There is a need for a study on what are the most successful and relevant strategies for using ICT to change teaching and learning practices in primary schools. Since the study was carried out in a rural set up, there is need for a similar study in urban areas to compare the findings.

CHAPTER ONE

INTRODUCTION

1.1 Background to the study

Information and Communication technology (ICT) is an umbrella term that includes any communication device or application, encompassing: radio, television, cellular phones, computer and network hardware and software. They are often spoken of in particular context like ICT in education (Rouse, 2005). Information and Communication Technology in education refers to teaching and learning the subject matter that enables understanding the functions and effective use of ICT (Sweeney, 2012).

Use of ICT in teaching and learning is important. It helps learners to participate in gaining knowledge. Hayes and Whitebread (2006), explain that this can be supported by teachers teaching young learners using ICT. Geer and Sweeney (2012) state that current and emerging technology is forcing teachers to rethink how best to prepare learners for the demands and challenges of the 21st century.

According to the Ministry of Education Science and Technology Option Paper (2005) in response to Sessional Paper No. 1 of 2005 and KESSP document the quality of teaching and learning can be improved through e-content development, provision of computers in primary schools cluster centres, ICT infrastructure and

connectivity growth. This study therefore, will find out how schools are prepared to offer improved teaching and learning using ICT.

Teachers need to find ways of helping learners to do more learning on their own. Booker (2003) believes that the focus in early childhood education on cooperative play and discovery learning lends itself naturally to innovative and appropriate ways to use technology. Hawkins (2004) explains that ICT breaks down the barriers between teachers and learners in the classroom. However, ICT implementation in education often shows a disjuncture between the ICT itself and its use in education.

Teachers seem motivated to learn about ICT application skills, but less so to explore curriculum applications of ICT. Thus, need to find out on curriculum applications of ICT among teachers. According to Melita (2012) technologies have potential to support education across the curriculum providing opportunities for communication between teachers and students in ways that have not been possible before. School administration need to understand the demands of the high technology society (Rajpal, 2013). They should therefore provide the resources needed in use of ICT in schools and ensure their proper maintenance.

Delivery of education to all Kenyans using ICT is supported by the 2005 ICT in Education Option Paper, Sessional Paper No. 1 of 2005 and the Kenya Education Sector Support Programme document. (Republic of Kenya, 2005). The National

Economic Social Council (2007) asserts that the Kenya Vision 2030 is based on three pillars, that is; social, political and economic pillars. Education falls in the social pillar. Information and Communication Technology will help Kenya to realize the social pillar of Vision 2030 and the Millennium Development Goals (MDGs).

According to Farrell (2007), Uganda had Universal Primary Education introduced in 1997 and the number of the learners in primary schools doubled. Therefore, ICT was a great way of solving the problem of overcrowded classes, need for more learning materials and curriculum reforms. Similarly, with the introduction of Free Primary Education (FPE) in 2003 and reduced employment of more primary school teachers in Kenya, the use of ICT would be of great use to help manage the challenge of high Pupil Teacher Ratios (PTRs).

The barriers hindering use of ICT in schools include inadequate resources, limited time to search for information from the internet, frequent power blackouts, computer viruses, obsolete computer and moral degradation (Karsenti, Collins, Harper & Merrett, 2011). Karsenti et.al (2011) explains that an indicator is a category of information that is collected and stored in an observatory from where it may be retrieved. The study will use several indicators such as, the national education and the ICT policies, ICT infrastructure, teachers training on ICT use, challenges of ICT on teaching and learning and school ICT integration strategies.

1.2 Statement of the problem

There is a government policy that all schools in Kenya integrate ICT in the delivery of the curriculum at all levels of education in line with Vision 2030 (Ministry of Education Strategic Plan, 2006). This is a crucial policy since the world is moving towards the knowledge based economy and hence the need to train and equip the youth with the necessary knowledge and skills to work using 21st century tools that are hinged on technology (Hare, 2007). Hence, the need to establish the extent to which ICT is being used in teaching and learning in public primary schools in Gatanga district.

Although there has been considerable growth in acquisition of computer equipment in schools in Kenya in the recent past, there has been little study carried out to determine exactly how the technology is being used to facilitate both the teaching and learning in academic institutions. Most people have researched on secondary schools, for instance, Gathano (2009), Waiti (2010) and Njaari (2011). They mainly concerned themselves with determinants of ICT integration, factors influencing use of ICT and impact of ICT use in secondary schools. Little has been investigated on in the use of ICT in primary school in Gatanga district.

Hennessy, Angondi, Onguko, Namatefe, Harrison, Naseem and Wamakote (2010) observed that despite the efforts by the government to implement ICT in teaching

and learning in public schools in Kenya, use of ICT by teachers in course of their teaching is limited. There was, therefore, a need to conduct a study on the use of ICT improving teaching and learning in primary schools in Gatanga district.

1.3 Purpose of the study

The purpose of the study was to investigate the use of ICT in improving teaching and learning in public primary schools in Gatanga district.

1.4 Objectives of the study

The study was set to investigate the following objectives:

- i. To establish the extent to which public primary schools in Gatanga District have established ICT resources for use in improving teaching and learning.
- ii. To establish the extent to which teachers in Gatanga District are equipped with skills in ICT use in improving teaching and learning.
- iii. To establish how the administration support influence the use of ICT in teaching and learning in public primary schools in Gatanga District.
- iv. To identify the challenges facing the use of ICT in teaching and learning in public primary schools in Gatanga District.

- v. To identify strategies towards increasing the use of ICT in public primary schools in Gatanga District.

1.5 Research questions

The study used the following research questions:

- i. To what extent have public primary schools in Gatanga District established their ICT resources for use in improving teaching and learning?
- ii. To what extent have public primary school teachers in Gatanga District integrated ICT in improving teaching and learning?
- iii. How does the administration support influence the use of ICT in improving teaching and learning process in public primary schools in Gatanga District?
- iv. What are the challenges affecting the use of ICT in improving teaching and learning in public primary schools in Gatanga District?
- v. What strategies can be adopted for successful implementation of ICT in public primary schools in Gatanga District?

1.6 Significance of the study

The data and information obtained in this study may hopefully provide curriculum policy makers with relevant information to improve use of ICT in primary schools. The findings of this study may assist the department of quality and standard assurance in supervising curriculum implementation. The results of this study are significant in that they reveal the available ICT resources, teachers' skills in ICT, school administration support to the teachers and the challenges affecting the use of ICT in teaching and learning. The results may be of concern to the community groups and leaders because technological revolution is central to learning and changes how education services are delivered (Hare, 2005). In addition the school output will directly influence the community.

1.7 Limitations of the study

The major limitations of this study are related to the fact that the available literature in the field of ICT in Kenya is limited. The study had to rely on studies done in other countries. The study was carried out in the rural setting and there were limitations of use of ICT in many schools. Teachers in primary schools have a lot of workload but they were able to fill in the questionnaires within the given timeframe and also gave reliable information. The researcher observed the ICT tools used and avoided interfering with teaching time to mitigate the effects of the expected challenges.

1.8 Delimitations of the study

Although ICT enhances learning at all levels of education, the study was confined to public primary schools in Gatanga District. This is because private schools in the area may not release information easily. The uses of ICT in schools are many but this study concentrated on ICT use in teaching and learning. This helped to find out how ICT which is an emerging issue in curriculum is helping to improve curriculum delivery process.

The study used questionnaires administered to head teachers, teachers and learners. Teachers implement the curriculum while learners are the recipients. The head teacher is in charge of curriculum implementation in the school. Questionnaires save on time, reduce biasness and are cost effective. Descriptive survey method was used because it covered a large population and helped to get original data.

1.9 Assumptions of the study

This study found out the use of ICT in teaching and learning. It was conducted in selected schools of Gatanga district on the following assumptions.

- i. The respondents provided objective and reliable information.
- ii. The respondents were able to fill in the questionnaire within
- iii. The respondents are familiar with ICT related terms.

1.10 Definition of significant terms

The following are some significant terms to the study:

Curriculum refers to the different courses of study that are taught in schools.

Government policies are the guiding principles used to influence decisions, for example, Information and Communication Technology in education and training.

Improving is making something better.

Information and Communication Technology refers to the ways and means information is retrieved using automatic systems.

Learning is the process of gaining knowledge through studying.

Primary schools, in Kenya, this refers to institutions that offer education to young learners of between seven to about fourteen years.

Teaching is work that a teacher does in helping students to learn.

1.11 Organization of the study

The study is organized into five chapters. Chapter one comprises of the background to the study, statement of the problem, purpose of the study, objectives of the study, limitations of the study, delimitation of the study, basic assumptions of the study, definition of significant terms and organization of the study. Chapter two contains the introduction, concept of ICT, ICT resources, teachers' ICT skill, school administration support, strategies to increase the use of ICT schools, the challenges facing the use of ICT in schools, theoretical

framework and conceptual framework. Chapter three comprises of research design target population, sample size, research instruments, validity and reliability of the instruments, data collection procedures and data analysis techniques. Chapter four has data analysis, interpretation and discussion of findings. Finally, chapter five contains summary of the research, research findings, discussion and recommendations.

CHAPTER TWO

LITERATURE REVIEW

2.1 Introduction

This chapter consists of a review of the relevant literature on the importance of Information Communication Technology (ICT) in primary schools. The chapter examines at the concept of ICT in education, learning resources in schools how teachers have been equipped with ICT skills to improve teaching and learning in schools, school administration support towards use of ICT to improve teaching and learning, strategies to increase the use of ICT in teaching and learning in public primary schools. It also examines the challenges facing the use of ICT in schools and a summary of the literature review.

2.2 Concept of ICT in education

A useful concept of ICT depends on the local culture and particular ICT available and how it is configured and managed. Information and Communication Technology in education is the use of a collection of electronic tools for teaching and learning. These electronic tools allow learning, problem solving and higher order collaborative thinking to take place. According to Kenya ICT Trust Fund (2006) a range of ICT has been used in delivery of education to improve access, teaching, learning and administration. Electric boards, audio cassettes, IRI, video, television, computers, among others are used.

2.3 Teaching and learning ICT resources available in schools

Computers for Schools Kenya (CFSK) supply localized curriculum to schools. It has supplied personal computers to over 4,000 public institutions in Kenya including primary schools. It also operates a comprehensive preventive and curative maintenance programme for these computers. They also help to place other infrastructure like electricity generators, internet access and world space direct media service (Rajpal, 2013).

Kenya ICT Trust Fund (2006) explains that resources are needed to implement ICT in schools. Digital content, electronic books by Kenya Literature Bureau, Microsoft software and Eureka 3D electronic content have been provided for in Kenya. Rajpal (2013) explains that “Accelerating 21st century education” is a project by the Government of Kenya to help teachers have better teaching methods like power point presentations, in depth research from the internet, easier lesson planning among other benefits. However, many schools have experienced use of second hand and refurbished personal computers obtained. This has led to the establishment of local personal computer refurbishment and technical service centres (Farrell & Isaacs, 2007).

Software can be described as a set of programs. According to Hare 2007 the software for most schools is Microsoft office suite of programs but the cost is prohibitive for most schools. Computers for Primary Schools Kenya have

installed a range of software linked to Kenyan syllabus for Kenyan schools. It has also enabled localization of software to local languages and contextualization (Ashby, 2009).

2.4 Equipping of teachers with ICT skills to improve their teaching

The issue of training is certainly complex because it is important to consider several components to ensure the effectiveness of the training. These include time for training, pedagogical training, skills training, and an ICT use in initial teacher training. Correspondingly, research by Gomes (2005) concluded that lack of training in digital literacy, lack of pedagogical and didactic training in how to use ICT in the classroom, and lack of training concerning the use of technologies were obstacles to using new technologies in classroom practice. Providing pedagogical training for teachers rather than simply training them to use ICT tools is an important issue (Becta, 2004).

Cox et al (1999) as cited in Bingimlas (2009) argue that if teachers are to be convinced of the value of using ICT in their teaching, their training should focus on the pedagogical issues. Pre-service teacher education can help teachers to experiment with ICT before using it in classroom teaching (Albirini, 2006). This would make them have confidence when using ICT. However, beside the need for pedagogical training, it is still necessary to train teachers in specific ICT skill.

Schoepp (2005), claims that when new technologies need to be integrated in the classroom, teachers need to be trained in the use of these particular ICTs.

In Kenya, like most developing countries, ICT usage is still limited to computer literacy training (Mutuma, 2005). As Karsenti (2011) contends that the present ICT curriculum merely deals with teaching about computers and not how computers can be used to transform the teaching and learning in our schools. The government of Kenya is committed to help teachers learn how to use ICT to improve their pedagogy of teaching. Teachers are taught how to use ICT in the new teacher education curriculum and teacher training curriculum.

Rajpal (2013) explains that the Kenyan government is committed to providing basic education to all including learners with special needs. Kenya Institute of Special Education is the institution that trains teachers to handle learners with special needs. Teachers need to use ICT in classroom activities such as matching, sorting and speech translation.

The Kenya Institute of Curriculum Development has partnered with the private sector to promote use of ICT. About 200 primary school teachers have undergone an online orientation course at KIE through Elimika online primary curriculum teacher orientation course (Rajpal 2013). The course is designed to enhance pedagogical skills in curriculum delivery and mode of instructions in schools. The project can be used to promote equitable provision of education opportunities

and provide cost-effective means of improving quality of education offered to Kenyan learners.

2.5 School administration support in use of ICT in teaching and learning

School administration is concerned with the leadership, planning, budgeting, organization, communication and coordination in the school. Becta (2004) cites school leadership as one of the factors that influence the likelihood that good ICT learning opportunities will develop in schools. The administration needs to provide technical support (Bingimlas, 2009). Additionally, schools must provide teachers with the necessary ICT resources including hardware and software. School administrators should also provide sufficient time to implement new technologies in the classroom (Bingimlas, 2009). The school should also adapt a school ICT policy that is economically sustainable. The policy should ensure equal access to ICT by all learners and teachers (Rajpal, 2013). Storage and safe keeping of ICT resources should be addressed. In addition, children should be familiarized with basic care of the school ICT resources.

2.6 Strategies to increase the use of ICT in primary schools

The Kenya Institute of Education (KIE) is responsible for education research and development of curriculum (Kinuthia, 2011). However, the institute has changed its name to the Kenya Institute of Curriculum Development (KICD). It has the

role of ensuring the curriculum for both pupils and teacher trainees are in response to the changing socio-economic and technological environment.

One of the latest technological changes is the use of ICT in teaching and learning. The Kenya Institute of Curriculum Development (KICD) has partnered with the private sector to promote ICT use in education by developing ICT curricula. According to Rajpal (2013), KICD through the Tafakari Mindset Project, the curriculum for mathematics and science have been digitized (Rajpal, 2013).

The Ministry of Education Kenya Sector Support Programme document (2005) gave a lot of recommendations. The government has responded to the recommendations through several initiatives to improve the quality of teaching and learning, enhance content development, offer ICT in teacher training colleges, to ensure use of computers in primary schools and use of ICT in teacher development programmes. Electronic learning delivery systems are intended to achieve increased access to learning materials, enhanced delivery methods, increased sharing of learning materials and more affordable education. These initiatives can be looked at in depth to help understand the ICT activities in primary schools especially in Kenya (Gathano, 2009).

2.7 Challenges facing the use of ICT in schools

Most institutions still use nearly obsolete systems and are consequently unable to exploit the potential of the emerging technologies (Karsenti, 2011). Mungai (2011) in addition states that obsolete computers lower the morale of both the teacher and learners. He further identifies cyber bullying and other anti-social behaviors as a worrying emerging problems facing use of internet by learners. The cyber bullies can be very manipulative and hard to identify. Teachers should therefore give computer use guidance to learners.

Technophobia, fear of advanced technology, is a challenge that affects the use of ICT in teaching and learning. Mungai (2011) explains that teachers may fear being rendered irrelevant by the introduction of computers in their classes. The feeling of being source of knowledge is something teachers cherish and anything that makes them lose this entity is deemed inappropriate. Butcher (2003) as cited in Bingimlas (2009) argues that limited expertise and inadequate ICT skills levels and lack of an enabling policy environment are constraints on use of ICT.

Schools are faced with the problem of burglary and vandalism. Mungai (2011) observes that due to the fact that computers are still very expensive in Kenya, makes them a target for thieves who usually have ready markets. The government agencies, donors and private partnerships donate computers to needy learners but

the schools have to incur extra expenses trying to burglar proof the computer rooms. Schools can avoid vandalism by using wireless routers.

Rajpal (2013) observes that access to ICT facilities is a major challenge in Africa. A recent report by National Council for Science and Technology (2010) indicates that computer use in Kenyan classroom is in its early phases. Schools that have enough resources continue to flourish in ICT as those that are struggling to access resources lag behind. This is called digital divide.

Primary schools are faced with challenges of developing and maintaining infrastructure that keep pace with the demands of today's high technology society. School administrators may not understand what it takes to keep up with new technology and may not be supportive. However, technology has helped to improve the teaching and learning process.

2.8 Importance of ICT policies

The challenges discussed can be mitigated by having effective policies in place. Effective policies should ensure that investment in ICT leads to educational outcomes. They should take into account the retraining of teachers to incorporate use of ICT in education. The focus of developing countries should be on how they can use ICT to compensate for the factors that are lacking in education, namely, well-trained teachers and the resources to pay for expensive equipment (Bingimilas, 2009).

2.9 Summary of the literature review

In summary, there are several benefits of using ICT in teaching and learning. The teachers and learners are able to research widely and get current information. In addition, the learners are able to share knowledge, have better mastery of the content and can learn at their own pace. The combination of ICT and learning makes teaching and learning more fun and enjoyable so as to motivate the learner to want to acquire more information on his or her own. Use of ICT enhanced learning allows globalization and raises the education system to the level of international competition.

The implication to classroom teachers is that they should use ICT to enhance teaching. The policies should be implemented to help exploit the potentials in electronic learning. Schools should have their own ICT policies drawn from the national ICT policies to guide them.

2.10 Theoretical framework for this study

The constructivism learning theory is by Jean Piaget (1896-1980). Piaget was a Swiss scientist and philosopher. He was a pioneer in studying cognitive development (Kwait, 2013). Piaget was a philosopher who perceived learning as a process of adjusting mental models to accommodate new experiences (Atherton, 2010). According to Kwait 2013, the theory of constructivism states that learning

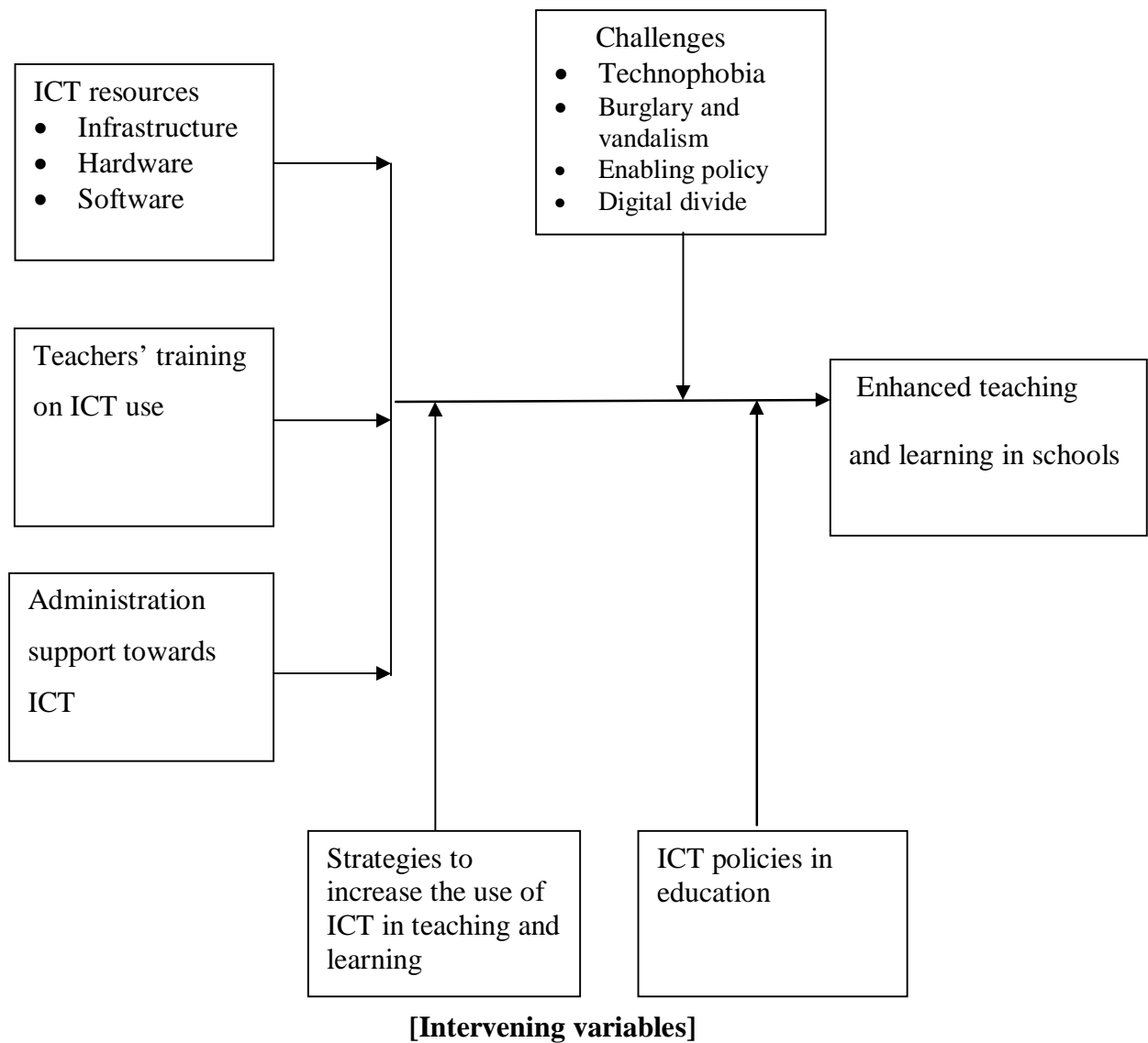
is in the hands of learners. He further argues that learners' knowledge is constructed from personal experiences.

According to Kwait 2013, teachers can apply this theory in class by being facilitators whereby they ask questions to challenge learners to be critical thinkers. They can be consultants and mentors and expose learners to sources of knowledge through technology. Atherton (2010) suggests that teachers can also allow learners to use ICT to interact with the other learners and share learning experiences. Therefore, learning would become adoptable and flexible.

2.11 Conceptual framework

This conceptual framework shows the relationship between the study variables.

Figure 1.1 Conceptual Framework on the relationship between study variables



The conceptual framework in this study will provide the researcher's views on the use of ICT in improving the teaching and learning process. Improving of the teaching and learning is the dependent variable. This dependent variable depends on the independent variables that are, ICT resources which include infrastructure, hardware and software, teacher professional training on use of ICT administration support and strategies on ICT. The outcome of effective use of ICT in schools is likely to improve teaching and learning. However, the challenges facing the use of ICT in school may hinder its effectiveness in improving teaching and learning. Formulating of better ICT policies and implementing them may help in mitigating the challenges.

CHAPTER THREE

RESEARCH METHODOLOGY

3.1 Introduction

The purpose of this chapter is to outline the methods to be used to achieve the research objectives. The chapter describes the research design and methodology to be used. The aspects covered include the research design, target population, sampling procedure, research instruments, data collection and proposed analysis procedures.

3.2 Research design

The study used the descriptive survey research design. Descriptive survey research design gives accurate information. It is a method that can also be used by educators to collect original data for describing a population that is too large to be observed directly. Therefore, this design was used to investigate the use of ICT in improving teaching and learning in public primary schools in Gatanga district.

3.3 Target population

Ngechu (2006) defines a target population as a set of people who are being investigated. Usually this definition consists of description to suit a certain specialization which a researcher is studying. Gatanga district has 56 public

primary schools. The target population was 56 head teachers, 114 teachers and 3770 class eight pupils.

3.4 Sample size and sampling technique

Sampling is the process of selection of appropriate number of subjects from a defined population (Kothari, 2008). According to Mugenda and Mugenda (2003) 30% sample can be used to give generalization about the target population. The sample size for this study will be 16 schools. The researcher used the stratified sampling to select the schools. Stratified sampling is used when there are sub groups which need to be represented. The study had the sub group of the headteachers, teachers and class eight learners.

The sample size for this study was 16 head teachers out of the 58 in the district. It also used thirty per cent of the target population of the teachers which was 35 teachers out of the 116 teachers in the target population (Mugenda & Mugenda, 2003). The sample size of the class eight learners was 377 out of the 3770 target population of class eight learners using Kothari (2008), ten per cent method.

3.5 Research instruments

The instruments of this research were questionnaires developed by the researcher. They will be administered to class eight pupils, teachers and the head teachers. The questionnaires for the head teachers and the teachers will both contain twelve

items while those of learners will contain ten items. The questionnaires had both close-ended and open ended questions. The questionnaires were divided into two parts that is section A and B. Section A was be on ICT background information of the respondent while section B will contain information on use of ICT to enhance teaching and learning.

3.6 Instrument validity

Validity can be defined as the degree to which a test measures what it is supposed to measure. According to Kothari (2008), to ensure content validity, expert judgment method was used whereby the questionnaire was given to the supervisors who will examine the items critically and give comments to the researcher. Content validity is the estimate of how much a measure represents every single element of a construct (Schoepp, 2005).

3.7 Instrument reliability

Mugenda and Mugenda (2003) define reliability as a measure of degree to which a research instrument yields consistent results or data after repeated trials. The reliability of the questionnaires was done using the test- retest method. A pilot study was conducted and after a period of two weeks questionnaires was administered to the same pupils. The test retest method will find out if the responses given first will match with those given the second time. If the

instrument produces reliability coefficient of 0.7 and above, the tool was considered reliable. If the coefficient is less than 0.7 then the tools were revised.

3.8 Data collection procedures

The researcher sought authority to conduct research from the National Council for Science and Technology. Thereafter the researcher sought permission from the District Education Officer to visit the sampled schools to administer questionnaires to the respondents. The researcher organized the data collection schedules with the school administration. The researcher assured that the respondents of confidentiality of their identity. The questionnaires were distributed to the respondents and later the researcher will analyze the data.

3.9 Data analysis techniques

The researcher verified that the questionnaires were filled in correctly. Descriptive statistics were used to describe the basic features of the study data. They provide simple but powerful summaries about the sample and the measures. The quantitative data was described using frequencies, percentages and averages. The Statistical Package for Social Sciences (SPSS) was used. Qualitative data was analyzed through content analysis. Content analysis of the themes was done to help draw inferences.

CHAPTER FOUR

DATA ANALYSIS AND INTERPRETATION

4.1 Introduction

Presented in this chapter is data analysis, presentation and interpretation of finding. The data presented in this chapter were processed using Statistical Package for Social Sciences (SPSS). All themes discussing the same research questions were presented and analyzed together. The analysis of data was presented in both narrative and tabular forms.

4.2 Response rate

Questionnaire return is the proportion of the questionnaires returned after they have been issued to the respondents. Table 4.1 presents the questionnaire return rate

Table 4.1 Questionnaire return rate

Category	Sample	Return	Percentage (%)
Headteachers	16	16	100.0
Teachers	35	32	91.5
Pupils	377	365	88.5
Total	428	413	96.5

Table 4.1 shows that all the return rates for respondent were above 80% and hence were deemed adequate for data analysis.

4.3 Demographic data of the respondents

This section presented the demographic information of headteachers, teachers and that of learners.

4.3.1 Demographic data of the headteachers

The demographic information of the headteachers was based on gender, age, highest level of education and duration they had served as headteachers. Table 4.1 shows their gender

Table 4.2 Distribution of headteachers according to gender

Gender	Frequency (F)	Percentage (%)
Male	10	62.5
Female	6	37.5
Total	12	100.0

Majority (62.5%) of headteachers were male while 37.5% of headteachers were female. The data shows that there is gender disparity in the headship of schools in favour of the male.

Table 4.3 Age distribution of the headteachers

Age	Frequency (F)	Percentage (%)
21 – 25 years	2	12.5
26 – 30 years	2	12.5
31 – 40 years	6	37.5
Over 40 years	6	37.5
Total	16	100.0

Data shows that 75% of headteachers were aged above 31 years. This data could mean that most of the headteachers have inadequate ICT skills because at the time of training the colleges had not integrated ICT in their curriculum hence the need for training on ICT. The headteachers were asked to indicate their number of years as heads. The data is presented in Table 4.3.

Table 4.4 Headteachers number of years as a headteacher

Duration (years)	Frequency (F)	Percentage (%)
Between 1 – 5	6	37.4
6 – 10	3	18.8
11 – 15	3	18.8
Over 15	4	25.0
Total	16	100.0

Table 4.3 shows that 37.5% of headteachers had been heads for between 1 and 5 years. Those who had served as heads for more than 6 years were 62.5%. The data shows that they had been headteachers for a relatively long time hence can provide information on the use of ICT in improving teaching and learning. Asked to indicate the number of years they had served in the current school as a headteacher, they responded as Table 4.4

Table 4.5 Number of years the headteachers had served in the current school

Duration (years)	Frequency (F)	Percentage (%)
Between 1 – 5	6	37.5
6 – 10	3	18.8
11 – 15	3	18.8
Over 15	4	25.0
Total	16	100.0

Findings showed that 62.5% had served in the current station for more than 6 years. Table 4.5 shows headteachers highest professional qualification

Table 4.6 Headteachers highest professional qualification

Highest professional qualification	Frequency (F)	Percentage (%)
P1 Certificate	6	37.5
Diploma	3	18.8
Bachelors degree	3	18.8
Master of Education	4	25.0
Total	16	100.0

Data shows that 37.5% of headteacher had a P1 certificate, 18.8% of headteachers had Diploma in Education, and the same number of headteachers had Bachelors Degree while 25.0% of headteachers had Masters in Education.

At least 43.8% of the head teachers are graduates; therefore, they are able to implement use of ICT in schools. The minimum qualifications for teachers in most of the developed nations like the USA and Germany is a Bachelor degree in education as discussed in the literature review. In these countries, ICT has been used to improve teaching and learning.

4.3.2 Demographic data of the teachers

The demographic information of the teachers was based on gender, age, highest level of education and duration they had served as teachers. Table 4.6 shows their gender

Table 4.7 Distribution of teachers according to gender

Gender	Frequency (F)	Percentage (%)
Male	13	40.6
Female	19	59.4
Total	32	100.0

A greater number (59.4%) of teachers were female while 40.6% of teachers were males. In the literature review it has been noted that men are interested in technology than women Table 4.7 shows teachers' age.

Table 4.8 Teachers' distribution by age

Age	Frequency (F)	Percentage (%)
Below 20 years	1	3.1
21 – 25 years	8	25.0
31 – 35 years	6	18.8
26 – 40 years	7	21.9
Over 40 years	10	31.3
Total	32	100.0

Table 4.7 shows that 72% of teachers were aged above 30 years. This shows that these teachers were mature and hence able to understand how ICT influence teaching and learning. The teachers were asked to specify their teaching duration. The data is presented in Table 4.8.

Table 4.9 Teachers teaching duration

Duration (years)	Frequency (F)	Percentage (%)
Less than one year	10	31.3
Between 1 – 5	4	12.5
6 – 10	5	15.6
11 – 15	10	31.3
Over 15	3	9.4
Total	32	100.0

Table 4.8 shows that 31.3% of teachers had taught for less than one year. The same number of teachers had taught for between 11 and 15 years, while 12.5% of teachers had taught for between 1 and 5 years. In addition, 15.6% of teachers had taught for between 6 and 10 years. At least 43.8% of the teachers who had taught for less than five years are likely to have experienced the use of computers in teaching and learning in college. They can assist their colleagues who have difficulties in using computers.

Table 4.10 Distribution of teachers according to highest professional qualification

Highest professional qualification	Frequency (F)	Percentage (%)
P1	15	46.9
Diploma in Education	11	34.3
Bachelors degree	3	9.4
Master of Education	3	9.4
Total	32	100.0

Findings show that all the teachers were qualified to teach in primary schools and hence are able to evaluate the integration of ICT in teaching and learning.

4.3.3 Demographic data of the learners

The demographic information of the learners was based on gender and where the school was located. Table 4.10 shows learners' gender.

Table 4.11 Distribution of learners according to gender

Gender	Frequency (F)	Percentage (%)
Male	159	43.6
Female	206	56.4
Total	365	100.0

Majority (56.4%) of learners were female. Data shows that there were relatively more boys than girls in the primary schools. In the literatures review boys were noted to be more interested in technology than girls.

The learners were also asked to indicate their school location. The data is presented in Table 4.11.

Table 4.12 Distribution of learners according to school location

Response	Frequency (F)	Percentage (%)
Urban	42	11.5
Semi urban	89	24.4
Rural	234	64.1
Total	365	100.0

Data shows that majority (64.1%) of learners were from rural schools. This confirms the reality that the area that the study was conducted is predominantly rural. This could lead to digital divide based on location for example learners in the rural areas have the challenge of lack of electricity.

4.4 ICT establishment in schools

To establish the extent to which public primary schools had established ICT resources for use in improving teaching and learning head teachers were asked to respond to items that sought the same. Data is presented in the following section:

Table 4.13 Headteachers responses on the availability of ICT facilities

Facilities	Available and Adequate		Available and inadequate		Not available	
	F	%	F	%	F	%
	Internet services	0	0.0	0	0.0	16
Radio			11	68.8	5	31.3
Computer	2	12.5	3	18.8	11	68.8
Mobile phone			11	68.8	5	31.3
Tape recorder	2	12.5	6	37.5	8	50.0
Overhead projector	0	0.0	0	0.0	16	100.0
Film projector	0	0.0	0	0.0	16	100.0
Video cassette recorder	0	0.0	0	0.0	16	100.0
Printer	3	18.8	11	68.8	2	12.5
T.V set	0	0.0	0	0.0	16	100.0
Microphone for audio-recording	0	0.0	0	0.0	16	100.0

Table 4.12 shows that all the schools sampled to did not have internet services, overhead projectors and video cassettes among other facilities. These findings indicated that schools lacked ICT facilities. When learners were asked whether

they had computers in their school, majority (68.8%) of learners said that there were no computers hence need for some. Asked whether they used the computers, majority (58.6%) of learners indicated that they did not use them due to inadequacy.

Table 4.14 Learners responses on the use of ICT facilities

Statement	Yes		No	
	F	%	F	%
Is there a computer laboratory in your school?	59	16.2	306	83.8
Do you listen to radio lesson programs in your school	306	83.8	59	16.2
Do you use the internet to research on your school work?	135	37.0	230	63.0
Is there electricity in your school?	204	55.8	161	44.1

A greater percentage (83.8%) of learners indicated that there were no computer laboratories in their schools, but 83.8% of learners indicated that they listened to radio lesson programs in their schools. Majority (63.0%) of learners did not use the internet to research on their school work while several (55.8%) learners indicated that they had electricity in their school. Cox et al (1999) as cited in

Bingimlas (2009) argue that if teachers are to be convinced of the value of using ICT in their teaching, their training should focus on the pedagogical issues.

When headteachers were asked whether their learners had radio broadcast lessons, they responded as Table 4.14

Table 4.15 Headteachers responses on whether there was radio broadcast lessons

Radio broadcast lessons	Frequency (F)	Percentage (%)
No	6	37.5
Yes	10	62.5
Total	16	100.0

Data shows that majority (62.5%) of headteachers indicated that they had the radio lessons. The data implies that most teachers use radio as an ICT tool for enhancing teaching and learning. The study further sought to establish the frequency at which the teachers used ICT as a teaching tool. Data is tabulated in Table 4.15

Table 4.16 Teachers responses on the frequency at which they used ICT

Frequency of ICT use	Frequency (F)	Percentage (%)
Many times	7	21.9
Occasionally	15	46.9
Very Few	8	25.0
None	2	6.3
Total	32	100.0

Findings shows that 21.9% of teachers used ICT as a teaching tool many times, 46.9% of teachers used occasionally, 25.0% of teachers used very few times while 6.3%)of teachers had never used ICT as a teaching tool.

Asked whether their school had digital curriculum content, they responded as Table 4.16

Table 4.17 Teachers responses on whether their school had digital curriculum content

Digital Curriculum content	Frequency (F)	Percentage (%)
Yes	11	34.4
No	21	65.6
Total	32	100.0

Data shows that majority (65.6%) of teachers indicated that their school lacked digital curriculum content. The data implies that lack of digital curriculum may hinder the integration of ICT in teaching and learning. Data shows that majority (54.2%) of learners said they lacked radio, 54.0% of learners lacked overhead projector, internet access and audio cassettes. The data shows the schools had not integrated ICT in the curriculum. Data further shows that majority (54.0%) of learners lacked compact disks while 63.3% of learners indicated that their school lacked televisions.

Table 4.18 Learners response on the use of computer in the school

Use of computers	Frequency	Percentage
	(F)	(%)
Typing	217	59.5
Drawing	106	29.0
Playing games	42	11.5
Total	365	100.0

Majority (59.5%) of learners indicated that they used the computers in typing, 29.0% of learners used them in drawing while 11.5% of learners used them it in playing games. To establish the most used type of ICT tool in the school, the headteachers were asked to indicate the same. Data is tabulated in Table 4.18

Table 4.19 Headteachers responses on the most used type of ICT tool in the school

Tool	Frequency (F)	Percentage (%)
Computer	5	31.3
Radio	11	68.8
Total	16	100.0

A greater number (68.8%) of headteachers said that radios were the most used type of ICT tool in their school with 31.3% of headteachers indicating the use of computers.

4.5 Teacher preparedness and integration of ICT in teaching and learning

To establish the extent to which teachers were equipped with skills in ICT use in improving teaching and learning, teachers, headteachers and learners were asked to respond to items that sought the same. Data is presented in the following section:

Table 4.20 Headteachers responses on the number of teachers had ICT skills in the school

Teachers with ICT skills	Frequency (F)	Percentage (%)
One	3	18.8
Two	11	68.7
More than two	2	12.5
Total	16	100.0

Majority (68.7%) of headteachers pointed out that they had two teachers who had ICT skills in the school. The data shows that teachers had ICT skills which could influence integration of ICT. Asked to indicate how their school implemented the National ICT Strategy for Education and Training, they responded as Table 4.20.

Table 4.21. Headteachers responses on how they implemented the National ICT Strategy for Education and Training

Implementing of the National ICT Strategy for Education and Training in Schools	Frequency (F)	Percentage (%)
Encouraging teachers to train in ICT	7	43.8
Using ICT in curriculum delivery	6	37.5
Using digital learning content	3	18.8
Total	16	100.0

Table shows that 43.8% of headteachers encouraged teachers to train in ICT, 37.5% of headteachers used ICT in curriculum delivery while 18.8% of headteachers used digital learning content to implement the National ICT Strategy for Education and Training. The study further sought to establish whether teachers had attended in-service course in ICT in the last one year. Teachers responses is tabulated in Table 4.22

Table 4.22 Teachers responses on whether they had attended in-service course in ICT in the last one year

Attendance of in service training	Frequency (F)	Percentage (%)
Yes	7	21.9
No	25	78.1
Total	32	100.0

Majority (78.1%) of teachers had not attended in-service course in ICT in the last one year while 21.9% of teachers had attended. Asked to specify the level that they had been trained, a greater number of teachers said that they were trained in common packages level. When teachers were asked to rate their expertise in ICT, they responded as Table 4.23.

Table 4.23 Teachers rate competence in ICT

Statement	Very Good		Good		Average		Weak		Poor	
	F	%	F	%	F	%	F	%	F	%
Basic computer parts and functions	7	21.9	18	56.3	5	15.6	2	6.3		
Operating systems	3	9.4	9	28.1	11	34.4	7	21.9	2	6.3
Software applications	10	31.3	10	31.3	5	15.6	5	15.6	2	6.3
Creating student reports using software applications	2	6.3	15	46.9	10	31.3	3	9.4	2	6.3
Using PowerPoint for presentations in the classroom	11	34.4	9	28.1	5	15.6	5	15.6	2	6.3
Using and producing video for classroom presentation	10	31.3	11	34.4	7	21.9	2	6.3	2	6.3
File management	9	28.1	7	21.9	9	28.1	5	15.6	2	6.3
Using Publisher software	11	34.4	9	28.1	7	21.9	3	9.4	2	6.3
Use of Internet for teaching and learning	6	18.8	11	34.4	9	28.1	4	12.5	2	6.3
Use of E-Mail	9	28.1	8	25.0	6	18.8	7	21.9	2	6.3
Developing productivity tools such as tests and mark sheets	8	25.0	11	34.4	5	15.6	6	18.8	2	6.3
Using and producing video for classroom teaching	9	28.1	10	31.3	5	15.6	6	18.8	2	6.3
Searching the Internet	9	28.1	11	34.4	5	15.6	5	15.6	2	6.3
Technology management such as trouble shooting	11	34.4	7	21.9	7	21.9	5	15.6	2	6.3

Table 4.23 shows that majority (56.3%) of teachers were good in basic computer skills (opening, closing and saving files, opening and renaming files), 34.4% of teachers were average in operating systems (Windows Operating System and others), the same number of teachers were very good at using PowerPoint for presentations in the classroom for a variety of curriculum areas and were good in using and producing video for classroom presentation. Data further shows that 28.1% of teachers were average in file management for teachers for creating folders, moving files, renaming files for classroom assignments and documents. The same numbers of teachers, (28.1%) were very good at file management for teachers for creating folders, moving files, renaming files for classroom assignments and documents. In addition, they were good at using and producing video for classroom teaching and searching the Internet for good multimedia lessons, activities and resources as well as pedagogical issues.

The researcher further sought to examine the extent to which teachers were equipped with skills in ICT use in improving teaching and learning from the learners. Data is tabulated in Table 4.23.

Table 4.24 Learners responses on how their teacher use ICT to improve teaching and learning

Statement	Yes		No		N/A	
	F	%	F	%	F	%
Do your teachers teach you using ICT?	148	40.5	137	37.5	80	21.9
Do teachers assist you in using a radio?	159	43.6	121	33.2	85	23.3
Do you use digital content in your school?	56	15.3	237	64.9	72	19.7

Tables 4.24 shows that 40.5% of learners indicated that their teachers taught them using ICT while 43.6% of learners pointed out that teachers assisted them in using Radios. A greater number (64.9%) of learners revealed that they did not use digital content in their school. There is need for use of digital content in teaching and learning process.

4.6 Administrative support and integration of ICT in teaching and learning

To establish how the administration support influenced the use of ICT in teaching and learning in public primary schools, headteachers were asked to indicate the availability of the personnel in the ICT department. Data is tabulated in Table 4.24.

Table 4.25 Headteachers responses on indicate the availability of the personnel in the ICT department

Statement	Available		Available sometimes		Not available	
	F	%	F	%	F	%
ICT coordinator who has no any other responsibility	3	18.8	10	62.5	3	18.8
A teacher who serves as an ICT coordinator	7	43.8	6	37.5	3	18.8
A computer specialist who is consulted	3	18.8	10	62.5	3	18.8
A teacher who assists students in using ICT in teaching and learning	7	43.8	6	37.5	3	18.8

Majority (62.5%) of headteachers indicated that they sometimes have an ICT coordinator who has no other responsibility and a computer specialist who is consulted, 43.8% of headteachers pointed out that there was a teacher who assisted students in using ICT in teaching and learning while 37.5% of headteachers indicated that they sometimes had a teacher who served as an ICT coordinator.

Table 4.26 Teachers responses on whether the school administration provide ICT equipment in time

Timely provision of ICT equipment	Frequency (F)	Percentage (%)
Yes	11	34.4
No	21	65.6
Total	32	100.0

Majority (65.6%) of teachers indicated that the school administration did not provide ICT equipment in time. This probably affected the use of ICT in teaching and learning. Asked whether the school administration encouraged use of ICT in teaching and learning, majority (65.6%) of teachers agreed with the statement.

Table 4.27 Teachers responses on who maintained the ICT equipment in the school

Maintenance of ICT equipments	Frequency (F)	Percentage %
The school administration	25	78.1
Parents	7	21.9
Total	32	100.0

Most (78.1%) of teachers pointed out that the school administration maintained the ICT equipment in the school while 21.9% of teachers indicated that it was maintained by the parents.

When the headteachers were asked whether they had an ICT purchases and maintenance budget in their school, a greater number (62.5%) of headteachers showed they lacked the budget. Data from the headteachers further denoted that majority (56.3%) of headteachers had ICT policy in their institution.

Table 4.28 Learners responses on whether school purchased any ICT equipment in the last one year

Practices of ICT equipment in the last one year	Frequency (F)	Percentage (%)
Yes	159	43.6
No	206	56.4
Total	365	100.0

Majority (56.4%) of learners attested that their school had not purchased any ICT equipment in the last one year while 43.6% of learners pointed out that they had purchased.

Asked to indicate whether they paid money for computer purchases and maintenance, majority (57.5%) of learners showed that they had not paid the money. Effective use of ICT equipment requires allocation of enough money in the school budget.

4.7 Challenges facing ICT in schools

To identify the challenges facing the use of ICT in teaching and learning, the headteachers were asked to specify the challenges that they faced. Data is presented in Table 4.28

Table 4.29 Headteachers responses on the challenges facing ICT in the schools

Statement	Not a challenge		A minor challenge		A major challenge	
	F	%	F	%	F	%
	Insufficient number of computers	0	00.0	0	00.0	16
Teachers lack knowledge	6	37.5	10	62.5		
Difficult to integrate ICT	0	00.0	0	00.0	16	100.0
Scheduling computer time	0	00.0	0	00.0	16	100.0
Insufficient printers and scanners	0	00.0	0	00.0	16	100.0
Lack of internet connection	0	00.0	0	00.0	16	100.0
Lack of technical assistance	0	00.0	0	00.0	16	100.0
Lack of interest by teachers	8	50.0	5	31.3	3	18.8
Lack of information about ICT			11	68.8	5	31.3
Insufficient technical support	0	00.0	0	00.0	16	100.0
Lack of support from school board	11	68.8	3	18.8	2	12.5
Running cost too prohibitive	0	00.0	0	00.0	16	100.0

Data shows that some of the major challenges were in the areas of insufficient number of computers, difficult to integrate in teaching and learning, scheduling computer time, insufficient peripherals such as printers and scanners, lack of internet connection in the school, lack of technical assistance, weak infrastructure, insufficient technical support and prohibitive running costs. Learners pointed out challenges faced in the use of ICT as indicated in table 4.29.

Table 4.30 Learners responses on the challenges they faced in the use of ICT

Response	Frequency (F)	Percentage (%)
Lack of information on ICT	172	47.1
Lack of teachers support	159	43.6
Lack of electricity in the school	34	9.3
Total	365	100.0

Data shows that 47.1% of learners indicated that they lacked information on ICT, 43.6% of learners revealed that they lacked teachers support while 9.3% of learners denoted that they lacked electricity in the school. These challenges may hinder effective use of ICT in schools.

4.8 Strategies towards increasing the use of ICT to improve teaching and learning

To identify strategies towards increasing the use of ICT to improve teaching and learning in public primary schools, the headteachers were asked to indicate the strategies they had in place to ensure effective use of ICT in teaching and learning. Data shows that headteachers had tried to seek for resources that would facilitate integration of ICT in the schools. The headteachers recommended that in the use of ICT in public primary schools, there should be greater use of ICT

resources in curriculum delivery, enhance teachers' capacity building and training teachers on ICT.

The headteachers recommended the training of teachers through in-service training, workshops and seminars regularly since technology are dynamic. Teachers need to keep abreast of the changes. They also pointed out that capacity building will help teachers to be more effective in implementing the ICT in education policies. The headteachers, in addition recommended the strengthening of the ICT infrastructure internet connection to schools and budget allocation for ICT maintenance costs.

Data shows that teachers recommended there should be sufficient time allocated per lesson to enable teachers to use ICT in teaching. Teachers should be enabled to access the ICT facilities during their free time for lesson preparation. They also recommended provision of sufficient peripherals such as printers and scanners. In addition, training teachers on ICT in education would help them to be more effective in their computer use in teaching. Moreover, the headteachers recommended formulation of better National policies on ICT in Education with specific relevance to teacher capacity building in ICT. They also suggested that schools should have clear ICT policies so that implementation is made easier.

CHAPTER FIVE

SUMMARY, CONCLUSIONS AND RECOMMENDATIONS

5.1 Introduction

This chapter presents the summary, conclusions and recommendations. The chapter also presents the suggestions for further research.

5.2 Summary

The purpose of the study was to investigate the use of ICT in improving teaching and learning in public primary schools in Gatanga district. Five research objectives guided the study. The research objectives sought to establish the extent to which public primary schools in Gatanga district have established ICT resources for use in improving teaching and learning; establish the extent to which teachers in Gatanga district are equipped with skills in ICT use in improving teaching and learning; establish how the administration support influence the use of ICT in teaching and learning in public primary schools in Gatanga district; identify the challenges facing the use of ICT in teaching and learning in public primary schools in Gatanga district and lastly identify strategies towards increasing the use of ICT in public primary schools in Gatanga district.

The study used the descriptive survey research design. The sample comprised of 16 headteachers, 35 teachers and 377 class eight learners. Data were gathered by use of questionnaires and were analysed by use of qualitative and quantitative techniques.

The findings were that schools did not have ICT facilities which affected the use of ICT in improving teaching and learning in public primary schools. For example all the schools sampled did not have internet facilities, overhead projectors and video cassettes among other facilities. Majority (64.4%) of learners reported that there were computers but they were not adequate. A greater number of learners had not used internet to research on their school work while majority (55.8%) of learners specified that they had electricity in their school. Findings also revealed that teacher preparedness affected the use of ICT in teaching and learning. For example, majority (68.7%) of headteachers indicated that they had only two teachers who had ICT skills in the school, 18.8% of headteachers had one teacher while 12.5% of headteachers had more than two teachers. Majority (78.1%) of teachers had not attended in-service course in ICT in the last one year. A greater number (68.8%) of teachers said that they were trained in common packages level. Majority (56.3%) of teachers were good in basic computer skills such as opening, closing and saving files, opening and renaming files.

Findings also revealed that administrative support affected the use of ICT in teaching and learning. For example, majority (62.5%) of headteachers indicated

that they sometimes had an ICT coordinator who has no other responsibility and a computer specialist who is consulted, 43.8% of headteachers said that there was a teacher who assists students in using ICT in teaching and learning while 37.5% of headteachers indicated that they sometimes had a teacher who serves as an ICT coordinator. Majority (78.1%) of teachers indicated that the school administration maintained the ICT equipment in the school while 21.9% of teachers indicated that it was maintained by the parents. Majority (56.34%) of learners indicated that their school had not purchased any ICT equipment in the last one year while 43.6% of learners said that they had purchased. These findings indicated that administrative support affected the use of ICT in teaching and learning.

Findings also revealed that there were challenges that faced the use of ICT in improving teaching and learning. Some of the major challenges were in the areas of insufficient number of computers, difficult to integrate in teaching and learning, scheduling computer time, insufficient peripherals such as printers and scanners, lack of internet connection in the school, lack of technical assistance, weak infrastructure, insufficient technical support and prohibitive running cost.

5.3 Conclusions

Based on the findings of the study, it was concluded that there was lack or inadequate ICT resources. For example there were inadequate computer laboratories, lack of electricity, inadequate digital content and lack of internet access in the schools. The existing computer had very few programs because of the high cost of installing them. The software that was in the schools I was neither localized nor contextualized as suggested by (Ashby 2009). In the literature review the study also concluded that most schools have traditional ICTs such as radios.

The study findings revealed that a good number of teachers had taught for less than five years. Therefore it was concluded that they are likely to have adequate ICT skills and can assist their colleagues who have difficulties in using computers. Although most teachers had qualified to teach in primary schools and they had basic computer skills, they did not teach using ICT. The study concluded that they were limited by lack of required ICT facilities.

According to the study findings, there is gender disparity in the headship of schools in favour of male. In the literature review male are seen to embrace technology more than female. In addition, the study showed that most headteachers trained when ICT had not been integrated in teachers' training colleges; therefore they may have inadequate ICT skills. This may result into lack

of administration support of ICT use in primary schools. The study also pointed out that a good number of the headteachers had served as heads for a long time hence can provide information on the use of ICT in improving teaching and learning.

Moreover, the study concluded that administration support affected the use of ICT in teaching and learning. For example, headteachers indicated that they sometimes had an ICT coordinator who had no any other responsibility and a computer specialist who was consulted. The study findings revealed that most of the learners were female. In the literature review boys were noted to be better at embracing technology. The study also revealed that most of the schools in Gatanga District are in rural areas.

In conclusion, those two findings could lead to digital divide based on gender and location. Based on the study, it was concluded that lack or inadequate ICT infrastructure, insufficient number of computers, difficulties in integrating ICT in teaching and learning, scheduling computer time and insufficient peripherals such as printers and scanners were major challenges facing primary schools. Furthermore, lack of technical assistance, insufficient technical support and prohibitive running costs were also challenges limiting use of ICT in improving teaching and learning in primary schools in the district. The study revealed that a number of schools were implementing the National ICT Strategy for Education and Training by encouraging teachers to train in ICT and encouraging teachers to

use ICT in curriculum delivery. However, very few schools had digital learning content and very few teachers had attended in service courses in ICT.

In conclusion teachers, capacity building and training may make them more effective in ICT use. The existing ICT education policies should be reviewed for greater efficiency in educational outcomes.

Teachers recommended that the school administration gave enough allocation for the purchases and maintenance of ICT facilities. They also suggested that the government empowers them with ICT skills. They felt refresher courses on ICT were vital because ICT is dynamic. From the research finding the teachers also felt that use of ICT in teaching would enhance the mastery of content by the learners and better their creativity.

The learners recommended that the government provides schools with ICT resources such as laptops. They felt that this would help them research on their academic work. Based on the findings of the study most learners felt that use of ICT would make learning more interesting. They also felt that ICTs would help them realize their talents such as drawing. Most of the learners like drawing.

5.4 Recommendations

The following were the recommendations:

- i. Based on the findings, it was recommended that the government should ensure that the ICT policies should be implemented in the schools. This will go some way towards encouraging non-governmental donors to assist in the development of ICT in primary schools.
- ii. The Ministry of Education should ensure that ICT is implemented in the schools so that teachers can use it to enhance teaching and learning.
- iii. In as much as the government has formulated policy with specific relevance to teacher capacity building in ICT, there is need to make sure that the policies are implemented.

5.5 Suggestions for further research

Based on the findings of the study, the researcher makes the following suggestions for further research:

- i. The perceptions of teachers on the potential of ICT in supporting teaching and learning in primary schools.

- ii. There is a need for a study on what are the most successful and relevant strategies for using ICT to change teaching and learning practices in primary schools.
- iii. Since the study was carried out in a rural set up, there is need for a similar study in urban areas to compare the findings.

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APPENDIX 1

LETTER OF INTRODUCTION

University of Nairobi
Faculty of Education
P.O Box 30197- 00100
Nairobi.

The Head teacher
_____Primary School
P.O Box _____
Thika

Dear Sir/Madam,

RE: REQUEST TO CARRY OUT RESEARCH

I am a post graduate student from the University of Nairobi undertaking a research on “The Use of Information Communication and Technology in improving Teaching and Learning in Public Primary Schools in Gatanga District.”

I, therefore, seek your permission to administer the questionnaire on the head teacher, selected teachers and learners. The information in the questionnaires will be confidential.

Your permission will be highly appreciated.

Yours faithfully,

Rosemary Wanjiru Kairo

APPENDIX II

QUESTIONNAIRE FOR THE CLASS EIGHT LEARNERS

This questionnaire is designed to help the researcher find out the role of ICT in enhancing teaching and learning in public primary schools in Gatanga District. Kindly respond to all items in the questionnaire by writing down your honest opinions in the blank spaces provided.

Section A: Personal information

1. What is your gender?

Male [] Female []

2. Where is your school located?

Urban [] Semi urban [] Rural []

Section B: ICT establishment in the schools

3. Are there computers in your school?

Yes [] No []

4. Is there a computer laboratory in your school?

Yes [] No []

5. If yes above do you use the computers?

Yes [] No [] Not applicable []

6. Do you listen to radio lesson programs in your school?

Yes [] No []

7. What among the following are found in your school? (tick as appropriate)

	Yes	No
Radio	[]	[]
Overhead projector	[]	[]
Lap top	[]	[]
Mobile phone	[]	[]
Internet facility	[]	[]
Television	[]	[]
Audio cassettes	[]	[]
Compact disks	[]	[]

8. Do you use the internet to research on your school work?

Yes [] No []

9. Is there electricity in your school?

Yes [] No []

10. If there is a computer in your school, what do you use it for?

Typing [] Drawing []

Playing games [] Others []

Section C: Teachers' preparedness in ICT

11. Do your teachers teach you using technology?

Yes [] No []

12. Do teachers assist you in using a computer?

Yes [] No [] Not applicable []

13. Do you use digital learning content in your school?

Yes [] No []

14. Are your teachers competent in the use of technology in your school?

Yes [] No [] Not sure []

Section D: Administration support of ICT use

15. Does your school provide you with the required ICT equipment?

Yes [] No [] Not sure []

16. Has the school purchased any ICT equipment in the last one year?

Yes [] No [] Not sure []

17. Do you pay money for computer purchases and maintenance?

Yes [] No []

Section E: Challenges facing the use of ICT in teaching and learning

18. What challenges do you face in the use of ICT?

Lack of information on ICT []

Lack of teachers support []

Lack of electricity in the school []

19. How often do you use your phone to get information on your school work?

Often [] Occasionally []

Very often [] None []

20. Do you use digital learning content in your school?

Yes [] No []

Section F: Strategies towards increasing the use of ICT

21. What has the school done in ensuring ICT is used in teaching and learning?

APPENDIX III

QUESTIONNAIRE FOR TEACHERS

This questionnaire is designed to help the researcher find out the role of ICT in enhancing teaching and learning in public primary schools in Gatanga District.

Please respond to all items in the questionnaire as honestly as possible.

Part A: Personal information

1. What is your gender

Male [] Female []

2. What is your age?

Below 20 years [] 21 – 25 years []

26 – 30 years [] 31 – 35 years []

26 – 40 years [] Over 40 years []

3. How long have you been a teacher?

Less than one year [] Between 1 – 5 years []

6 – 10 years [] 11 – 15 year []

Over 15 years []

4. For how long have you been in this school?

Less than one year [] Between 1 – 5 years []

6 – 10 years [] 11 – 15 year []

Over 15 years []

5. What is your highest professional qualification?

P1 [] Diploma in Education []

Bachelors degree [] PGDE []

Master of Education []

What are your teaching subjects? _____

Part B: ICT establishment in the schools

6. How frequent do you use ICT as a teaching tool?

Many Times [] Occasionally []

Very Few [] None []

7. Does your school have digital curriculum content?

Yes [] No []

Part C: Teachers' preparedness in ICT

8. Are you trained in ICT?

Yes [] No []

If yes, at what level?

Common packages []

Certificate []

Diploma []

Degree []

9. Have you attended in-service course in ICT in the last one year?

Yes [] No []

Please rate your expertise in the use of the following

ICT Competencies	Very Good	Good	Average	Weak	poor
Basic computer parts and functions (opening, closing and saving files, opening and renaming files, etc.)					
Operating systems (Windows Operating System and others)					
Software applications-MS Office, MS Word, Excel, PowerPoint, Internet and E-Mail, Graphics and drawing, Databases and data entry, Desktop publishing, Video production and editing					
Creating student reports using software					

applications such as MS Word					
Using PowerPoint for presentations in the classroom for a variety of curriculum areas					
Using and producing video for classroom presentation					
File management for teachers for creating folders, moving files, renaming files for classroom assignments and documents					
Using Publisher software to create a class newsletter or teachers newsletter and students publications					
Use of Internet for teaching and learning					
Use of E-Mail for working together with other teachers and pupils on issues related to teaching and learning					
Developing productivity tools such as tests and mark sheets					
Using and producing video for classroom teaching					
Searching the Internet for good multimedia lessons, activities and resources as well as					

pedagogical issues					
Technology management such as trouble shooting					

10. In the table below, respond by ticking (✓) the appropriate response

Application	Everyday	Once or twice a week	Once or twice a month	Never
How often do you have pupils use computer technology to find information?				
How often do you have pupils use instructional software to develop reading skills and strategies?				
How often do you have pupils watch movies, videos, or television to obtain information?				
How often do you have pupils compare materials presented in different media?				
How often do you have pupils record their class presentations for discussion with other students/ teachers?				
How often do you have pupils use the				

computer to write stories or other texts?				
How often do you have pupils use a computer to practice skills and procedures or observe the way things are done in the actual setting?				
How often do you have pupils use computers to process and analyze data?				
How often do you use different ICTs for individualized interaction with the pupils?				
How often do you use the different ICTs to deliver educational resources to students?				
How often do you use different ICTs for entertainment to engage and motivate pupils?				
How often do you use ICT to provide self guided materials to pupils to support learning when you are absent from classroom?				

Part D: Administration support of ICT use

11. Does the school administration provide ICT equipment in time?

Yes [] No []

12. Does the school administration encourage use of ICT in teaching and learning?

Yes [] No []

13. Who maintains the ICT equipment in your school?

The school administration []

Parents []

Part E: Challenges facing the use of ICT in teaching and learning

14/. The following is a list of potential challenges in use of ICTs in enhancing teaching and learning. Please indicate whether you consider each obstacle not a challenge, a minor challenge or a major challenge.

Potential challenge⁶	Not a challenge	A minor challenge	A major challenge
Insufficient number of computers			
Teachers lack knowledge			
Difficult to integrate in teaching and learning			
Scheduling computer time			
Insufficient peripherals such as			

printers and scanners			
Lack of internet connection in the school			
Lack of technical assistance			
Lack of interest by teachers			
Telecomm infrastructure weak			
Lack of information about ICT			
Insufficient technical support			
Lack of support from school board			
Running cost too prohibitive			

14. Please list any other challenges encountered apart from those listed above.

15. What factors would enhance the use of ICTs in teaching and learning in your school?

Part F: Strategies towards increasing the use of ICT

16. What possible recommendations would you make towards increasing the use of ICTs in enhancing teaching and learning in your school?

APPENDIX IV

QUESTIONNAIRE FOR HEAD TEACHERS

This questionnaire is designed to help the researcher find out the role of ICT in enhancing teaching and learning in public primary schools in Gatanga District. Please respond to all the items in the questionnaire as honestly and correctly as possible.

Part A: Background information

1. What is your gender

Male [] Female []

2. What is your age?

Below 20 years [] 21 – 25 years []

26 – 30 years [] 31 – 35 years []

36 – 40 years [] Over 40 years []

3. How long have you been a headteacher?

Less than one year [] Between 1 – 5 years []

6 – 10 years [] 11 – 15 year []

Over 15 years []

4. For how long have you been a head teacher in this school?

Less than one year [] Between 1 – 5 years []

6 – 10 years [] 11 – 15 year []

Over 15 years []

5. What is your highest professional qualification?

P1 [] Diploma in Education []

Bachelors degree [] PGDE []

Master of Education []

Part B: ICT establishment

6. Which of the following does your college have? (Please fill in appropriately).

Item	Available and Adequate	Available and inadequate	Not available
Internet facilities			
Radio			
Computer			
Telephone			
Tape recorder			
Overhead projector			
Film projector			
Video cassette recorder			
Printer			
T.V set			
Microphone for audio-recording			

7. Do you have computers in your schools?

Yes [] No []

8. Does your school have adequate computers?

Yes [] No []

9. Do learners have radio broadcast lessons?

Yes [] No []

10. Do learners use computers in your schools?

Yes [] No []

11. Which is the most used type of ICT tool in your school?

Computer [] Mobile phones []

Projector [] Radio []

Any other []

Part C: Teacher preparedness

12. How many teachers have ICT skills in your schools? _____

13. How does your school implement The National ICT Strategy for Education and Training?

Encouraging teachers to train in ICT []

Using ICT in curriculum delivery []

Using digital learning content []

Part D: Administrative support

Indicate the availability of the following personnel in the ICT department

Personnel	Available	Available sometimes	Not available
ICT coordinator who has no other responsibility			
A teacher who serves as an ICT coordinator			
A computer specialist who is consulted			
A teacher who assists students in using ICT in teaching and learning			

14. Do you have an ICT purchases and maintenance budget in your school?

Yes [] No []

15. Does your school have digital curriculum content?

Yes [] No []

16. Is there school ICT policy in your institution?

Yes [] No []

Part E: Challenges facing ICT in the schools

17. The following is a list of potential challenges in use of ICTs in enhancing teaching and learning. Please indicate whether you consider each obstacle not a challenge, a minor challenge or a major challenge.

Potential challenge‘	Not a challenge	A minor challenge	A major challenge
Insufficient number of computers			
Teachers lack knowledge			
Difficult to integrate in teaching and learning			
Scheduling computer time			
Insufficient peripherals such as printers and scanners			
Lack of internet connection in the school			
Lack of technical assistance			
Lack of interest by teachers			
Telecomm infrastructure weak			
Lack of information about ICT			
Insufficient technical support			
Lack of support from school board			
Running cost too prohibitive			

18. What other challenges do you face in the use of ICT in teaching and learning?

Part F: Strategies towards increasing the use of ICT

19. What strategies have you put in place to ensure effective use of ICT in teaching and learning?

20. What possible suggestions would you make towards increasing the use of ICTs in enhancing teaching and learning in your school?

21. What would you recommend in the use of ICT in public primary schools?

Thank you for your co-operation

APPENDIX V

OBSERVATION CHECKLIST

STATEMENT	Comment
Use of internet	
Use of mobile phone in teaching and learning	
ICT use in teaching and learning	
Teaching using ICT tools	
Pupils interaction with ICT	
Availability of ICT resources	
Adequacy of ICT equipment	

**APPENDIX VI
RESEARCH PERMIT**

PAGE 2

PAGE 3

**THIS IS TO CERTIFY THAT:
Prof./Dr./Mr./Mrs./Miss/Institution**

Research Permit No. NCST/RCD/13/013/68

Date of issue

17th June, 2013

Fee received

KSH. 1000

**Rosemary Wanjiru Kairo
of (Address) University of Nairobi
P. O Box 92-0902, Kikuyu**

has been permitted to conduct research in

**Location
District
Province**

**Gatanga
Central**

**on the topic: The use of information and
communication technology in improving
teaching and learning in public primary
schools in Gatanga District, Murang'a
County, Kenya**



**Applicant's
Signature**

**For Secretary
National Council for
Science & Technology**

for a period ending: 31st July, 2013.

CONDITIONS



**REPUBLIC OF KENYA
RESEARCH CLEARANCE
PERMIT**

- 1. You must report to the District Commissioner and the District Education Officer of the area before embarking on your research. Failure to do that may lead to the cancellation of your permit**
- 2. Government Officers will not be interviewed with-out prior appointment.**
- 3. No questionnaire will be used unless it has been approved.**
- 4. Excavation, filming and collection of biological specimens are subject to further permission from the relevant Government Ministries.**
- 5. You are required to submit at least two(2)/four(4) bound copies of your final report for Kenyans and non-Kenyans respectively.**
- 6. The Government of Kenya reserves the right to modify the conditions of this permit including its cancellation without notice**

GPK6055t3mt10/2011

(CONDITIONS—see back page)