

**EFFECTS OF TEACHERS DEMOGRAPHIC VARIABLES  
ON IMPLEMENTATION OF INFORMATION  
COMMUNICATION TECHNOLOGY IN PUBLIC  
SECONDARY SCHOOLS IN NYERI  
CENTRAL DISTRICT, KENYA**

**By**

**Wachiuri Reuben Nguyo**

**A Research Project Submitted in Partial Fulfillment of the Requirement  
for the Award of the Degree of Master of Education in Curriculum  
Studies**

**University of Nairobi**

University of NAIROBI Library



0532322 5

## **DECLARATION**

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



**Wachiuri Reuben Nguyo**

**This Research Project has been submitted for examination with our approval as university Supervisors.**



**Dr. Grace Nyagah**

**Senior Lecturer and Chairperson**

**Department of Educational Administration and Planning**

**University of Nairobi**



**Mrs. Lucy Njagi**

**Lecturer**

**Department of Educational Administration and Planning**

**University of Nairobi**

## **DEDICATION**

**I dedicate this research project to my friends Erastus, Jedidah, Paul and Call  
Anointed Ministries fraternity and my dear Weston Karitu's family.**

## **ACKNOWLEDGMENTS**

I acknowledge my supervisors Dr. Grace Nyagah and Mrs. Lucy Njagi for their guidance in carrying out this research. I appreciate your input and efforts in making sure I come up with quality work. I acknowledge Higher Ground Ministries International fraternity, Call Anointed Ministries, District education office, Nyeri Central district, principals and teachers for their support in this noble work. Also Joyce for typing, Kigo for the printing work, Mr. Sang of the Ministry of Education ICT department, Hannah Njenga of Kenya Institute of Education and Kenya Institute of Education ICT Department cannot go without mention. To Mrs. Imonje who inspired me to develop my ICT term paper to full project. Thanks to my great friend Paul Muturi for spending sleepless nights proof reading this project. And last but certainly not least, Jedida Kimathi for editing the project. Above all I thank God for enabling me to accomplish this task.

## TABLE OF CONTENTS

<b>Content</b>	<b>Page</b>
Title Page .....	i
Declaration.....	ii
Dedication.....	iii
Acknowledgments .....	iv
Table of Contents.....	v
List of Tables.....	x
List of Figures.....	xii
List of Abbreviations and Acronyms.....	xiii
Abstract.....	xiv

## CHAPTER ONE

### INTRODUCTION

1.1 Background to the study .....	1
1.2 Statement of the problem.....	5
1.3 Purpose of the study.....	7
1.4 Objectives of the study .....	7
1.5 Research questions.....	8
1.6 Significance of the study .....	8
1.7 Limitations of the study .....	9
1.8 Delimitations of the study.....	9
1.9 Basic assumptions of the study.....	10
1.10 Definitions of significant terms .....	10

1.11 Organization of the study.....	11
-------------------------------------	----

## **CHAPTER TWO**

### **LITERATURE REVIEW**

2.1 Introduction.....	13
2.2 The concept of ICT.....	13
2.3 Influence of gender on ICT implementation .....	15
2.4 Influence of age on ICT implementation.....	17
2.5 Influence of teaching experience on ICT implementation .....	18
2.6 Influence of training in computer usage on ICT Implementation .....	19
2.7 Influence of teachers level of education on ICT implementation.....	21
2.8 Influence of locality of the teacher on ICT implementation.....	21
2.9 Summary of literature review .....	21
2.10 Theoretical framework.....	22
2.11 Conceptual framework.....	23

## **CHAPTER THREE**

### **RESEARCH METHODOLOGY**

3.1 Introduction.....	25
3.2 Research design .....	25
3.3 Target population.....	25
3.4 Sample size and sampling techniques.....	26
3.5. Research Instruments.....	26
3.6 Validity of the instruments .....	27
3.7 Reliability of the instruments.....	27

3.8 Data collection procedure .....	29
3.9 Data analysis .....	29

## **CHAPTER FOUR**

### **DATA ANALYSIS AND INTERPRETATION**

4.1 Introduction.....	30
4.2 Instruments return rate .....	30
4.3 Demographic Information of the respondents .....	30
4.3.1 The school category as indicated by the principals .....	31
4.3.2 Gender of the respondents .....	32
4.3.3 Age of the respondents .....	32
4.3.4 Teaching experience of the respondents.....	33
4.3.5 Respondents highest level of ICT training .....	34
4.3.6 Teachers' residential area .....	35
4.3.7 Teachers' highest level of education .....	36
4.4 Forms of ICT used in teaching .....	36
4.4.1 Other forms of ICT used in teaching .....	37
4.4.2 Types of ICT in schools as indicated by the principals .....	38
4.4.3 Other types of ICT in schools.....	39
4.4.4 Use of ICT in setting examinations and recording of marks .....	40
4.4.5 Use of ICT to monitor students' progress.....	41
4.4.6 Use of ICT to monitor students' progress.....	42
4.4.7 ICT in-service course undertaken.....	43
4.4.8 Findings on how often ICT in service course is undertaken .....	44

4.4.9 Use of ICT in lesson preparation .....	45
4.5 Strategies put in place for expansion of ICT in schools. ....	59
4.6 Extent to which the schools have organized training on use of ICT. ....	60
4.7 Challenges faced in ICT implementation in schools. ....	61
4.7.1 Measures put in place to overcome the challenges faced in ICT .....	62
4.8 Summary .....	63

## **CHAPTER FIVE**

### **SUMMARY, CONCLUSION AND RECOMMENDATIONS.**

5.1 Introduction.....	64
5.2 Summary of the study. ....	64
5.3 Summary of key findings.....	64
5.3.1 Teachers demographic factors that influence ICT implementation in public secondary schools. ....	64
5.3.2 Forms of ICT in schools .....	66
5.3.3 ICT implementation in public secondary schools. ....	66
5.4 Conclusions.....	68
5.5 Recommendations.....	69
5.6 Suggestions for further research. ....	69

REFERENCES .....	70
------------------	----

## **APPENDICES**

Appendix I :Introduction Letter.....	78
Appendix II Questionnaire for Principals.....	79
Appendix III: Questionnaire for Teachers. ....	80



<b>Appendix IV: Interview Schedule for Computer Teachers .....</b>	<b>82</b>
<b>Appendix V: Observation Schedule .....</b>	<b>83</b>
<b>Appendix VI : Research Authorization .....</b>	<b>84</b>
<b>Appendix VII: Research Clearance Permit.....</b>	<b>85</b>

## **LIST OF TABLES**

<b>Table</b>	<b>Page</b>
Table 4.1 Category of the school as indicated by the principals .....	31
Table 4.2 Age of teachers .....	32
Table 4.3 Teachers' residential area .....	35
Table 4.4 How ICT is used in setting examinations and recording of marks....	41
Table 4.5 Use of ICT in monitoring students' progress .....	43
Table 4.6 Use of ICT in lesson preparation.....	46
Table 4.7 Gender and use of ICT in examination setting and marks recording.	47
Table 4.8 Gender and use of ICT in monitoring student progress.....	48
Table 4.9 Gender and use of ICT in lesson preparation. ....	48
Table 4.10 Age of the respondents and use of ICT in monitoring students' progress.....	49
Table 4.11 Age of the respondents and use of ICT in lesson preparation. ....	50
Table 4.12 Teaching experience and use of ICT in examination setting and marks recording. ....	51
Table 4.13 Teaching experience and use of ICT to monitor students progress.	52
Table 4.14 Teaching experience and use if ICT in preparing lessons .....	53
Table 4.15 Teaching experience and forms of ICT used in teaching .....	54
Table 4.16 Highest level of ICT training and ICT in-service courses undertaken.....	55
Table 4.17 Highest level of ICT training and the frequency of ICT in service training.....	56
Table 4.18 Teachers residential area and forms of ICT used in teaching.....	56

<b>Table 4.19 Teacher’s residential area and other forms of ICT used in teaching.....</b>	<b>57</b>
<b>Table 4.20 Teacher highest education level and use of ICT in preparing lessons.....</b>	<b>58</b>
<b>Table 4.21 Strategies put in place for expansion of ICT in schools.....</b>	<b>59</b>
<b>Table 4.22 Challenges faced in ICT implementation in schools.....</b>	<b>61</b>
<b>Table 4.23 Measures put in place to overcome the challenges faced in ICT implementation .....</b>	<b>62</b>

## LIST OF FIGURES

<b>Figure</b>	<b>Page</b>
Figure 2.1 Conceptual framework .....	23
Figure 4.1 Teachers' gender. ....	32
Figure 4.2 Teaching experience of the respondents. ....	33
Figure 4.3 Teachers' highest level of ICT training.....	34
Figure 4.4 Teachers' highest level of education.....	36
Figure 4.5 Forms of ICT used in teaching.....	37
Figure 4.6 Other forms of ICT used in teaching.....	38
Figure 4.7 Types of ICT in schools as indicated by the principals.....	38
Figure 4.8 Other types of ICT in schools. ....	39
Figure 4.9 Use of ICT in setting examinations and recording of marks.....	40
Figure 4.10 Use of ICT to monitor students' progress .....	42
Figure 4.11 ICT in-service course undertaken .....	44
Figure 4.12 Findings on how often ICT in service course is undertaken. ....	45
Figure 4.13 Extent to which the schools have organized training on use of ICT.....	60

## **LIST OF ABBREVIATIONS AND ACRONYMS**

<b>ACE</b>	<b>Accelerating 21<sup>st</sup> Century Education</b>
<b>ASALS</b>	<b>Arid and Semi Arid Lands</b>
<b>AUC</b>	<b>Actual Usage of Computer</b>
<b>CLPP</b>	<b>Computer Literacy Pilot Project</b>
<b>GoK</b>	<b>Government of Kenya</b>
<b>ICT</b>	<b>Information Communication Technology</b>
<b>IT</b>	<b>Information Technology</b>
<b>KESSP</b>	<b>Kenya Education Sector Support Programme</b>
<b>KIE</b>	<b>Kenya Institute of Education</b>
<b>MOE</b>	<b>Ministry of Education</b>
<b>MoEST</b>	<b>Ministry of Education Sciences and Technology</b>
<b>SMASSE</b>	<b>Strengthening Mathematics and Sciences in Secondary Education</b>
<b>TSC</b>	<b>Teachers Service Commission</b>
<b>UNESCO</b>	<b>United Nations Educational, Scientific and Cultural Organization</b>

## **ABSTRACT**

The purpose of the study was to investigate the effects of teachers' demographic variables on implementation of Information Communication Technology in public secondary schools in Nyeri Central district, Kenya. The dependent variable was implementation of ICT and the independent variables were teachers' age, level of education, teachers' locality, teaching experience, training and gender. The research design used was descriptive survey design. The target population was 275 teachers working in 15 public secondary schools in Nyeri Central district. The sampling design was stratified random sampling and sample size was 82 teachers. The study targeted 15 principals of the schools in Nyeri Central district. The data collection tools were questionnaires, interview schedule and observation schedule. Data were analyzed quantitatively and qualitatively.

The research study revealed that teachers' demographic variables affected ICT implementation in public secondary schools. Male respondents were found to use ICT more than female respondents and thus gender influence ICT implementation. Teachers' training in ICT, age, education level, teaching experience and locality are not consistent in affecting ICT implementation. Many schools especially in rural areas had not embraced ICT mainly because teachers lacked adequate training, had lower levels of education, and had negative attitude towards ICT implementation. This has led to schools facing major challenges in ICT implementation.

**The researcher recommends that Public secondary schools should find a way to purchase more ICT facilities and support teachers' training on the use of ICT. The government needs to give more financial support through free education programme and donations to enhance ICT implementation in public secondary schools. The teachers should change their attitude towards the use and implementation of ICT in the schools so as to create information technology culture in all aspects of teaching and learning.**

# **CHAPTER ONE**

## **INTRODUCTION**

### **1.1 Background to the study**

Information Communication Technologies (ICT) are defined as a diverse set of technological tools and resources used to communicate, and to create, disseminate, store, and manage information. Thus, ICT is an umbrella term that includes any communication device or application, encompassing; projector, radio, television, cellular phones, computer, internet network hardware and software, satellite systems and various services associated with them for example video conferencing and distance learning (Tinio, 2003).

Information Communication Technology dates back in 1936. Countries like United States of America (USA), Britain, Russia and Germany started to include ICT in the education sector mostly for administrative purposes (Mioduser, Turksapa & Leitner, 2000). However, in mid 1970s America, Canada and Britain started piloting ICT in their schools as part of teaching learning resource (Mioduser, et al 2000).

Information Communication Technology was first integrated in education in 1980 and made compulsory in the developed nations (Tinio, 2003). It was assumed that the integration of ICT into education would revolutionize outdated or old ICTs in education systems (Waema, 2002). Phipps and Merisotis (1999) state that when ICT integration in education was pointed out, educators embraced it in spite of their demographic differences and declared it



a new educational technology. They state that such hype is typical for new technologies, and in no areas is this seen more keenly than in education.

Compared with developed countries such as United States of America (USA), Britain, Russia and Germany, the use of ICT in education programs in developing nations is more recent, small scale and experimental (Oliveira, 1989). Oliveira further states that ICT in developing nations is still evolving from the traditional ICTs, for example, the printed books, postal services, the printed press, film, radio broadcast and television. According to Waema (2002) several African countries like Egypt, Mauritius, Rwanda, and South Africa have developed comprehensive national policies and strategies to fully implement Information Technologies in education. Oliveira (1989) states that Egypt and South Africa are at par with developed countries like the UK.

Kenya is one of the few developing countries where ICT implementation in education is considerably more recent in that, the integration of ICT to education was done in 2005 in line with Sessional Paper No.1 of 2005 (Republic of Kenya, 2005). This was shortly after the Ministry of Education Science and Technology (MoEST) came up with education ICT policy drawn from the larger national ICT policy. To implement the policies embodied in the education ICT policy, the Kenya government employed the following strategies; facilitating universal access to ICT infrastructure, that is, electrical power, computers and improved internet connectivity in all institutions of learning in both the formal and non-formal education sectors including

affirmation action of gender, ASAL areas, rural-urban poor schools and those with special needs. Building capacity to enable the use of ICT in teaching and learning has been a key task that the government of Kenya through Ministry of Education Science and Technology has laid emphasis on (Okanda, 2005).

Kenya recognizes the many ways in which Information and Communication Technologies (ICTs) can be leveraged to support and improve the delivery of quality education for all Kenyans. These options are as per the educational priorities outlined in Sessional paper No.1 of 2005 (Republic of Kenya, 2005) and the Kenya Education Sector Support Programme (KESSP) document (Republic of Kenya, 2005). These options include: quality teaching and learning through ICT. Kenya Institute of Education (KIE), an arm of the Ministry of Education which is tasked with formulation and implementation of education curriculum has gone ahead to develop an online course for orientation of both primary and secondary school teachers. It has also developed an ICT syllabus for primary school teachers (Kenya Institute of Education, 2004).

According to Ornstein and Hunkins (1998) the hardest part of any curriculum change and innovation is the implementation. This is dependent on how change agents perceive the innovation. The change agents' statistical and socio-economic characteristics may mean its success or failure. Gichoya (2005) reported that the greatest barrier that impedes the implementation of ICT in any government institution in Kenya lies heavily with the key

implementers and that their demographic factors might positively or negatively influence ICT implementation on the ground. According to a survey by Makau (1998) majority of teachers tended to be passive in any modern ICT oriented lesson and opted for a lecture based teaching method rather than use of any modern ICT.

Mioduser, Turksapa and Leitner (2000) reported that demographic factors such as age, gender, teachers' experience and teachers' level of education greatly affected the speed at which ICT was conceived and implemented at Greece. However they state that teachers had already received training on ICT before the actual implementation began citing it as the only teacher demographic factor considered by Greece Ministry of Education.

William, Cole and Wilson (2000) found that teachers failed to exploit the new powerful technologies due to lack of skills and meaningful application of ICT in classroom and a good percentage of teachers literally discouraged students to use computers during their free time. If ICT in teaching and learning process is fully introduced in schools it will act as an integral tool to engage students in understanding concepts and processes in more depth and enable them to demonstrate their understanding, fit classroom learning to particular student needs and interests, and to extend the reach of the classroom across space and time.

According to Murphy and Greenwood (1998), ICT is significantly under utilized by teachers. The problem is worldwide and many explanations were offered for it, among them being factors like the experience of the teacher on ICT, gender in terms of marginalization and allotment of ICT leadership, age that could influence the perception of ICT as a whole, teachers' location and the qualifications of the teachers on use of the modern ICTs (Dearing, 1997). Lack of experience and training at the pre-service and also exposure in the field is a key factor that inhibits the implementation of ICT in schools (Kigwilu, 2005).

Hennesy, David and Wamakote (2010) observed that despite the efforts by the government offering its full support to the implementation of ICT in teaching and learning in public schools in Kenya, low optimum use of the ICT by teachers is evident on the ground. According to Unwin (2004), there is a gap between those advocating for the use of ICT in teacher education and the classroom practice. The Republic of Kenya (2005) also notes that most schools use less than 40 per cent of the available ICT infrastructure.

## **1.2 Statement of the problem**

According to Gathano (2009) demographic factors such as teachers' level of education, teachers' training on ICT and age are important in the implementation of ICT in Thika district. Gichoya (2005) study in Nyeri Central district reported that the greatest barrier that impedes the implementation of ICT in any government institution in Kenya lies heavily

with the key implementers and that their demographic variables might positively or negatively influence ICT implementation on the ground. According to Kigwilu (2005) lack of experience and training at the pre-service and also exposure in the field is a key factor that inhibits the implementation of ICT in schools.

Records from the District Education Office in Nyeri Central District show that out of 275 teachers only nine are fully conversant with ICT. Although the Ministry of Education ICT section has been involved in the training of at least three teachers in use of ICT in every district the number of teachers who are knowledgeable in new ICT is minimal. This is the reason why many teachers avoid using computers for recording information and incase they do it they do it wrongly. Consequently this hinders the implementation of ICT. Through SMASSE teachers are supposed to be taught how to use ICT. However, it is only the science teachers who are taught but only on how to use the projector (MoEST, 2010). When teachers are being recruited it is done on the basis of when one finished college and whether the teacher comes from the locality not on ICT knowledge.

Gathano (2009) study on the impact of age, experience and training in ICT implementation was confined to Thika district. Therefore this study seeks to investigate effect of teachers' demographic variables on ICT implementation in a different context in Nyeri Central district. Kigwilu (2005) states that lack of experience and pre service training inhibits implementation of ICT in

schools. This study did not address public secondary schools in Nyeri Central district in particular and thus this study seeks to determine the influence of various demographic variables on ICT implementation. Implementation phase is very fundamental and thus the need to determine the influence of the teachers' demographic variables.

### **1.3 Purpose of the study**

The purpose of the study was to investigate the effects of teachers' demographic variables on implementation of ICT in public secondary schools in Nyeri Central district.

### **1.4 Objectives of the study**

The study sought to achieve the following objectives

- i. To establish the influence of teachers' age on the implementation of ICT in Public secondary schools.
- ii. To determine the influence of teachers' gender on the implementation of ICT in Public secondary schools.
- iii. To determine the influence of the locality of teachers on the implementation of the ICT in Public secondary schools.
- iv. To identify the effect of teachers' level of education on the implementation of ICT in Public secondary schools.
- v. To establish the extent to which teachers' in-service training in ICT affects its implementation in Public secondary schools.

- vi. To determine the influence of the teachers' experience on the implementation of ICT in Public secondary schools.

### **1.5 Research questions**

The study sought to answer the following research questions

- i. To what extent does the teachers' age affect ICT implementation in Public Secondary schools?
- ii. What is the influence of teachers' gender on the implementation of ICT in Public Secondary schools?
- iii. What are the effects of the locality of teachers on the implementation of ICT in Public Secondary schools?
- iv. What is the significance of teachers' education level on ICT implementation in Public Secondary schools?
- v. To what extent does teachers' in-service training in ICT affect the implementation of ICT in Public Secondary schools?
- vi. What is the influence of teachers' experience on the implementation of ICT in Public Secondary schools?

### **1.6 Significance of the study**

The study may help the Ministry of Education to take into consideration demographic variables while implementing ICT. The study may assist in Ministry of Education SMASSE programmes in teaching ICT and its applicability in teaching and learning. It may assist the department of quality assurance in supervising curriculum implementation. Findings from this study

may help in formulating methods of implementing the ICT curriculum. It may also help in developing materials for ICT. Findings of this study may help the principals while supervising curriculum implementation .It may also assist the principals in dealing with challenges while implementing the curriculum. The study may help teachers to develop more efficient method of teaching and evaluation. The findings may help make the teaching, learning process to be learners' centered. It may help the students participate more in the learning process and hence making it enjoyable.

### **1.7 Limitations of the study**

The ICT sector is highly dynamic and could change in a short span of time making the findings obsolete. To mitigate this setback the term ICT was used largely to cover any new technology that may arise, for example the newly launched E-learning. There is inadequate literature on ICT education. This limitation was minimized by including related research done in developing countries in Africa and Middle East. The participants who were to take part in this study were teachers in rural, semi-urban and urban schools and this places a limitation on the generalization that could be made on the findings of this study.

### **1.8 Delimitations of the study**

Although there are many factors that influence implementation of ICT in public secondary schools in Nyeri Central district, the study restricted itself on the teachers' demographic factors and their influence on ICT implementation.



The study was confined to public secondary schools that have implemented ICT because the private secondary schools may not release information easily and a lot of monitoring takes place hence implementation of ICT may not be influenced by demographic factors.

### **1.9 Basic assumptions of the study**

The study assumed that

- i) Information given by the respondent on ICT was not biased.
- ii) The respondents had the relevant information for the study.
- iii) The respondents were conversant with ICT related terms.

### **1.10 Definitions of significant terms**

The following terms are used as defined in the context of the study.

**Demographic factors** refer to characteristics or variables of a population such as age, gender, experience, or geographical location.

**Educational qualification** refers to teachers official records of achievement in ICT.

**E- Learning** refers to learning activities based on any electronic format.

**Gender** refers to the state of a teacher being male or female.

**Information Communication Technology** refers to any product that stores, retrieves, manipulates, transmits or receives information electronically in digital form such as projector, television, laptops, desktop computers, cellular phones, satellite systems and internet

Implementation refers to the realization of an application or execution of a plan, idea, model, design, specification or policy.

**Innovation** refers to the use of new ideas or the process that renews something that exists and not, as is commonly assumed, the introduction of something new.

**Stakeholders** refer to those people who are involved in the implementation of ICT namely the teachers, students, parents, Ministry of Education, Kenya Education Staff Institute and development partners

**Teacher's experience** refers to the act of a teacher being skillful from extensive participation in teaching.

### **1.11 Organization of the study**

The study is organized into five chapters. Chapter one comprises of introduction, the background to the study, statement of the problem, purpose of the study, objectives of the study, research questions, significance of the study, limitations of the study, delimitations of the study, assumptions of the study, definition of significant terms and organization of the study. Chapter two includes material on literature review with subsections of introduction, definition of ICT, and teachers' demographic factors that influence ICT implementation.

The third chapter entitled, research design and methodology consists of introduction, design of the study, location of the study, study population, sampling procedures, description of research instruments, reliability and

validity, administration of research tools and data analysis techniques. Chapters four discuss data analysis interpretation and discussion of findings. Lastly, chapter five contains summary, research findings, discussion, conclusion and recommendations.

## **CHAPTER TWO**

### **LITERATURE REVIEW**

#### **2.1 Introduction**

The chapter reviews literature that is relevant to the study. That is, teachers' demographic factors and their influence on implementation of ICT. This section will discuss ICT definition as applied in the realms of education and earlier studies on teachers' demographic factors and their influence on the implementation of ICT, summary of literature review and theoretical framework. The study is based on Diffusion of Innovation Theory.

#### **2.2 The Concept of ICT**

Information Communication Technology is defined as any product that will store, retrieve, manipulate or receive information electronically in digital form (Tinio, 2003). ICT can be divided into two groups; traditional or old ICTs namely the printed books, postal services, the printed press film radio and television are referred to as the traditional ICTs whereas the computers, internet, overhead projectors, mobile phones (telephony) are the modern ICTs (William, Cole & Wilson, 2000).

The "I" in ICT refer to the nature of information and this covers topics such as the meaning and value of information, how information is controlled, the limitation of ICT and legal consideration The "C" part of ICT refers to communication of data by electronic means, usually over some distance. This

is often achieved via networks of sending and receiving equipments, wires and satellite links. "T" refers to technology.

According to Karuru (2005) the world is undergoing an information revolution with enormous changes in the information system thus leading to a global village. Information communication technology dates back in 1936 with advent of computer in the 1960s'. Countries like United States of America (USA), Britain, Russia and Germany started to include it in the education sector mostly for administrative purposes. However, in mid 1970s' America, Canada and Britain started piloting ICT in their schools as part of teaching learning resource (Mioduser, 2000).

Information communication technology was first integrated in education back in 1980 and made compulsory in the developed nations (Tinio, 2003). It was assumed that the integration of ICT into education would revolutionize outdated or old ICTs in education systems (Waema, 2002). Phipps and Merisotis (1999) state that when ICT integration in education was pointed out, educators embraced it in spite of their demographic differences and declared it was a new educational technology. They state that such hype is typical for new technologies, and in no areas is this seen more keenly than in education.

Apart from South Africa, Egypt and Botswana, the other African Countries lag behind in modern information age. According to Amutabi (2004) the impact of technology has been slow and sporadic because of a number of problems which African Nations face. The failure by African countries to recognize and

exploit developmental potentials and opportunities of the information and technological revolution could seriously undermine capacities of these countries to embark on sustainable socio-economic development efforts in the emerging age. According to World Bank report (2003) ICT is an important landmark for transforming Africa and other developing countries into knowledge and information based societies and resultant economic prosperity

According to Ngugi (2004) ICT is important to the realization of improvement in productivity and empowerment of the citizenry. Against this background the current National Development plan (2002 -2008) stresses the need for an IT policy to play an important role in the digital economy. Thus, training at all levels of education and capacity building are necessary.

The MoEST policy is to integrate ICT education and training into education and training systems so as to prepare learners and staff of today for the future economy. The Republic of Kenya policy is to see teacher training colleges empower teachers to operate within an all-inclusive education so as to help achieve national and international goal of education by 2005 (Republic of Kenya, 2005).

### **2.3 Influence of gender on ICT implementation**

Some researchers considered gender to be a main factor in their application of technology usage (Hu, Clark & Ma, 2003; Yuen & Ma, 2002). Gefen and Straub (1997) found that there were differences between females and males in

the usage of computers particularly concerning the use of e-mail. Venkatesh and Morris (2000) identified the significant difference between females and males in introducing a system for information retrieval. They found that men emphasized more on perceived usefulness in determining behavioral intention to use, while women regarded perceived ease of use as a more significant factor in determining behavioral intention to use.

Houtz and Gupta (2001) found that male teachers regard computer technology as a male domain. Gattiker and Nelligan (1998) showed that there is an association between gender and attitudes of computer technology. It seems that male teachers have a greater tendency to try new technology. Lee (1997) identified that male teachers were more active in computer and they were also found to be more confident in handling computers than female teachers.

A study by Plomp and Reinen (2000) reported that male teachers are more computer literate than or have the same level of computer literacy for all levels of education. Mehloff (2001), Sia (2000), and Woodrow (1992) reported that there was no significant difference in computer usage means score based on gender. The results garnered above showed that there were mixed results on the relationship between gender and AUC. Some studies showed that there were significant difference between AUC and gender while other studies showed the opposite. Hence, this study will explore to see the relationship between AUC and gender.

Previous research generally found no differences between males and females in attitudes towards e-learning, for example Al khashab (2007) found no significant difference between males and females on the use of ICT in delivering their courses in the classroom situation. Females, however, were significantly more interested than their male counter parts in receiving ICT training. Another example of inconsistency is on the studies between gender and actual usage of computer.

Studies by Yuen and Ma (2002), Houtz and Gupta (2001) and Lee (1997) showed that there is a relationship between gender and actual usage of computer. However, Sia (2000) and Woodrow (1992) reported that there was no significant difference in computer usage mean score based on gender. Farrell and Isaac (2007) note that ICT are not gender neutral and that gendered power relations are inherent in the production, distribution and consumption of ICTS, even within education system because they take place through institutions with socially embedded gender relations.

#### **2.4 Influence of age on ICT implementation**

Age does affect teachers' perception of information technology and its usage. Out of the 12 studies reviewed, 62% suggested insignificant relationships and 38% found significant relationships (Gattiker & Nelligen, 1998). On the other hand, Gan (2001) and Sia (2000) identified that the younger, less experienced teachers use computers in a broader, more transformational fashion since these teachers are probably more likely to be computer proficient, will have had



more digitally focused teacher education courses, and will be less constrained by prior habits or attitudes than their older, more experienced colleagues. Besides, Smith (2001) concluded that studies with wider age range tend to report age effect. Studies had shown inconsistent results, for example, Young (2000) reported that out of the 12 studies that had been reviewed between computer usage and age, 62% suggested insignificant relationships and 38% found significant relationships.

### **2.5 Influence of teaching experience on ICT implementation**

Several studies have been conducted that addressed the relationships between selected demographic variables such as teaching experience and usage of computer. One such study was Zidon and Miller (2002) who found weak relationship existed between years of teaching with computer usage. Conversely, in a study of teachers usage of computers, Martin and Lundstrom (2002) found that almost 60% of the teachers in their study who had under 10 years of teaching experience believed computers in the classroom were essential and hence they use it extensively, while only 25% of teachers with over 20 years of teaching experience shared this belief.

Meta-analysis and review of 81 research studies by Rosen and Maguire (1990) concluded that teachers teaching experience does not eliminate computer phobias and many experienced teachers display some wariness, discomfort and/or mild anxiety in relation to computers. Over the years, computer usage issues related to various subjects taught have been debated in the literature.

## **2.6 Influence of training in computer usage on ICT Implementation**

One of the pertinent factors contributing to the usage of computer is that teachers need to be computer literate and thus be given appropriate training in computer usage (Ropp, 1999). Different people hold different views about computer literacy. They are those who take a literal interpretation of computer literacy. They regard writing and reading computer programs as the basic skill of a computer-literate person. Training too plays an important role in a teacher's readiness to use computers (Gan, 2001). With regards to the issue of having attended formal computer courses, it was identified through numerous studies that there is a significant relationship between usage of computers and computer training (Wong et al., 2002; Sia, 2000).

Training makes a positive difference to those who receive it. Angers and Machtmes (2005) state that teachers who receive eleven or more hours of curriculum-integration training are five times more likely to say they believe they are much better prepared to integrate technology into their classroom lessons than teachers who received no such training. Teachers receiving more training of either type, but especially of integration training, are more likely to use software to enhance instruction in their classrooms. The empirical findings provided an insight that the variable training in computer usage has a positive impact on AUC. The number of computer skills acquired by teachers', its' currentness, and the number of hours of formal training play an important role in positioning the AUC of teachers' in a higher level.

The courses aimed at development of teachers on ICT were begun in the training institutions. Ideally teachers are being trained in simple operational skills like word processing, use of internet and e-mil, the construction and use of simple data bases which will give teachers an opportunity to review a range of educational software. The courses offered are taught by experts and they are consistent with the widely accepted philosophy in Greece, these are aimed at changing the teachers' passive attitude to active. When teachers are being trained the experts expected increases in competence. It was realized that being skilled in ICT does not improve teachers' classroom teaching efficiency (Yuen & Ma, 2002).

Teachers appear to have little understanding of the range of the uses of ICT in school (William et al 2000). The MoEST needs to improve the learning and teaching materials. According to what was found out by the above mentioned researchers, ICT is a useful tool for both teachers and students. Through supervision, challenges of implementing ICT in secondary schools can be identified pointing towards a need to up-date or revise the existing problem.

Findings from the reviewed literature showed that very minimal supervision if any is done in Kenya, the MOE, though has given out some computers to secondary schools; there is laxity in supervision so follow-ups should be encouraged. Supervision is also a vital aspect in effective implementation of program if well carried out, as it is likely to improve teachers' and student's literacy in ICT, strategies of teaching and learning.

## **2.7 Influence of teachers level of education on ICT implementation**

Level of education contributed greatly towards integration of e-learning in schools where teachers who had previous knowledge on computer and had bachelor of education qualification were always using e-learning in their class teaching daily. Sia (2000) conducted a study among urban secondary school teachers in Miri, Sarawak to determine the levels of computer literacy and computer anxiety. The study found out that the computer literacy levels among secondary school teachers were low, and there were significant differences in computer literacy levels between teachers of different age groups, and teachers with different years of computer experience with different software.

## **2.8 Influence of locality of the teacher on ICT implementation**

The place where a teacher stays affects the implementation of ICT. Teachers who live in urban areas are more responsive to the use of ICT in teaching and learning due to exposure unlike the teachers who stay in the rural areas where the resources are limited (Kambua, 2008).

## **2.9 Summary of literature review**

Studies by Yuen and Ma (2002), Houtz and Gupta (2001) and Lee (1997) showed that there is a relationship between gender and actual usage of computer. However, Sia (2000) and Woodrow (1992) reported that there was no significant difference in computer usage and gender. This therefore calls for further research to address the existing conflict. According to Smith (2001) studies with wider age range tend to report age effect. Studies shows

inconsistent results, for example, Young (2000) reported that out of the 12 studies that had been reviewed between computer usage and age, 62% suggested insignificant relationships and 38% found significant relationships. The literature review of the various variables under study clearly indicates that there are gaps in knowledge.

### **2.10 Theoretical Framework**

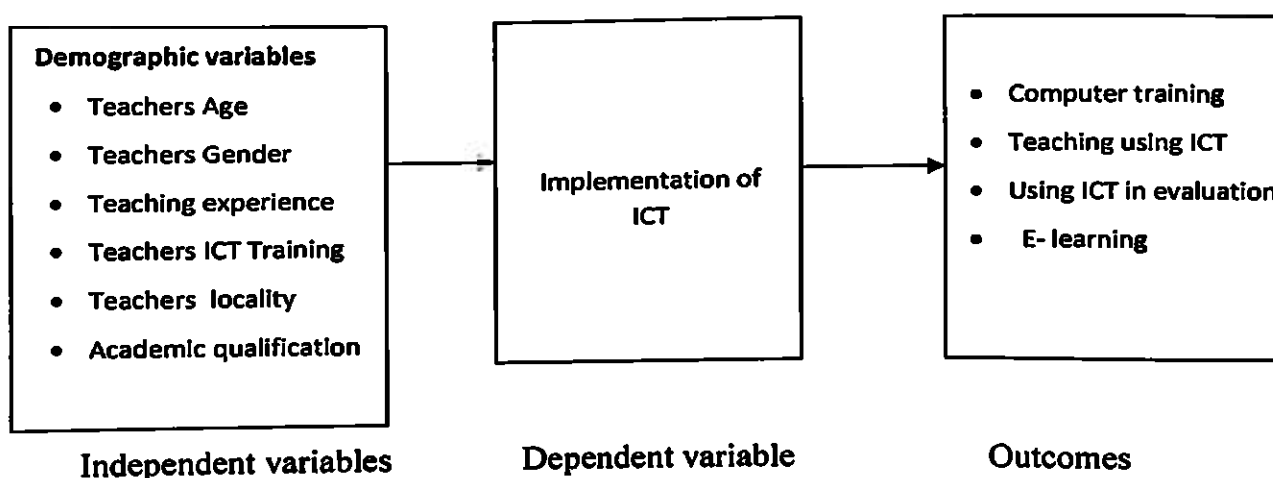
This study was guided by the Diffusion of Innovation Theory (Rogers, 1962). Diffusion of Innovation Theory sees innovations as being communicated through certain channels over time and within a particular social system (Rogers, 1995). Individuals are seen as possessing different degrees of willingness to adopt innovations and thus it is generally observed that the portion of the population adopting an innovation is approximately normally distributed over time (Rogers, 1995). Breaking this normal distribution into segments leads to the segregation of individuals into the following five categories of individual innovativeness (from earliest to latest adopters): innovators, early adopters, early majority, late majority, laggards (Rogers, 2003).

According to Gross (1971) the theory treats staff resistance to change as problematic and proposes that data should be gathered to determine the extent and nature of the resistance. Obstacles should be neutralized by making sure that five conditions exist. First, the teachers must have a clear understanding of the proposed innovation. Secondly the teacher within the school must be

given the skills and possess the capabilities requisite for carrying out the innovation. The third condition is necessary materials and the equipment for the innovation. The fourth condition is that the school must be modified so that it is compatible with the innovation. In adapting this theory the first two conditions are applicable, for one teachers need to have clear understanding of modern ICT and how demographic variables affect its implementation. Secondly training teachers on ICT should be done may be through workshops and seminars to ensure teachers have requisite skills.

## 2.11 Conceptual framework

**Figure 2.1. Conceptual Framework on Effect of Teachers' Demographic Variables on Implementation of ICT**



Independent variables are teachers age, teachers gender, teaching experience, teachers ICT training, teachers locality and academic qualification. Dependent variable is the factor which will be measured to determine the effect of the independent variables. In this research, implementation of ICT is the

**dependent variable that is affected by the independent variables. Outcomes are what we will get when the teachers demographic variables interact with the dependent variable. The major outcome will be using ICT in teaching and in evaluation.**

## **CHAPTER THREE**

### **RESEARCH METHODOLOGY**

#### **3.1 Introduction**

The chapter outlines the method which was used in carrying out the study. This section is divided into six sub-sections. These are research design, target population, sample size and sampling techniques, research instruments, validity of the instruments, reliability of the instruments, data collection procedures and data analysis techniques.

#### **3.2 Research Design**

The study used descriptive survey research design which according to Orodho (2003) is a method of collecting information by interviewing or administering a questionnaire to a sample of individuals. According to Orodho (2005) descriptive research design is used because accurate information can be obtained for large number of people with a small sample. It is used to explore relationship between variables and allows generalizations across populations. The design is suitable for this study because it is used to explore and evaluate in details the teachers' demographic factors influencing ICT implementation.

#### **3.3 Target population**

According to Kombo and Tromp (2006) population refers to the larger group from which a sample is taken. According to Nyeri Central District Education Offices statistics section there were a total of 15 public secondary schools. The



target population for this study was 275 teachers and principals from the 15 public secondary schools.

### **3.4 Sample size and sampling techniques**

According to Nyaga (1995) in order to validly generalize the findings for a sample of the defined population it is imperative that the sample be a representative of the population. According to Mugenda and Mugenda (2003) a sample of 30% is appropriate in social science study therefore, out of the 275 teachers, 82 participated. Stratified random sampling was used in selecting one teacher from every department. Purposive sampling was done to select 15 computer teachers.

### **3.5. Research Instruments**

The study relied on primary data. This was collected through the use of teachers' questionnaire, principal's questionnaire, an interview schedule for computer teachers and an observation schedule. The questionnaires had open ended statements with information pertaining to the respondents' opinion on teachers' demographic variables and their influence on implementation of ICT. The principal's questionnaire was subjected to the same process. Also attached to each questionnaire was a section designed to gather background information of the teachers and their schools. The interview was carried out using an interview schedule. The interview schedule was to help gather information on ICT implementation. Questionnaires were divided into two sections. Section one demographic data about the respondents such as age,

experience and qualifications among others. The second section sought information on the demographic factors and their influence on ICT implementation.

### **3.6 Validity of the instruments**

Mugenda and Mugenda (2003) define validity as accuracy and meaningfulness of inference, which are based on research results. It is the degree to which results obtained from the analysis of data actually represent the phenomenon under study (Mugenda & Mugenda, 2003). This involved assessment of face validity, content validity, constructs validity and criterion validity to ensure that the instruments measures what they are supposed to measure. Validation entailed collecting and analyzing data to assess the accuracy of an instrument, which involved pilot testing.

### **3.7 Reliability of the instruments**

Mugenda and Mugenda (2003) define reliability as a measure of degree to which a research instrument yields consistent results or data after repeated trials. Reliability was established through computation of Cronbach's alpha. Coefficient (Cronbach, 1951). Cronbach's  $\alpha$  is defined as

$$\alpha = \frac{K}{K - 1} \left( 1 - \frac{\sum_{i=1}^K \sigma_{Y_i}^2}{\sigma_X^2} \right)$$

Where  $K$  is the number of components ( $K$ -items or testlets),  $\sigma_X^2$  the variance of the observed total test scores, and  $\sigma_{Y_i}^2$  the variance of component  $i$  for the

current sample of persons. Alternatively, the Cronbach's  $\alpha$  (Cronbach, 1951) can also be defined as

$$\alpha = \frac{K\bar{c}}{(\bar{v} + (K - 1)\bar{c})}$$

Where  $K$  is as above,  $\bar{v}$  the average variance, and  $\bar{c}$  the average of all covariances between the components across the current sample of persons. The test-retest method was used to test reliability of the instrument. In this method an instrument was given to the same individuals on two occasions within relatively short duration of time. A correlation coefficient was calculated to determine how closely the participants' responses on the second occasion matched their responses on the first occasion.

Instruments were also assessed for internal consistency using half-split technique (that is answers to one half of the items were compared with answers to the other half of the items). This was confirmed by calculating the alpha coefficient which resulted to 0.72. A coefficient reliability of 0.70 or higher indicates that the instrument used is reliable (Cronbach & Richard, 2004).

### **3.8 Data collection procedure**

First permission was obtained from National Council for Science and Technology (NCST). A copy of the permit was given to the District Education officer in Nyeri Central district. Data was collected through administration of questionnaires, conduction of interviews by the researcher and use of observation schedule. The questionnaires were administered to teachers and principals personally. The researcher waited for the questionnaires to be filled in and later conducted interviews with the computer teachers.

### **3.9 Data analysis**

Data were first edited then coding was done. Open ended questions were analyzed qualitatively. This involved use of content analysis. Content analysis measures the sematic content or what aspect of a message. Its breadth makes its flexible and wide ranging tool of analysis (Cooper & Emoly, 1995). The Statistical Package for Social Science (SPSS) was used to analyze the quantitative data. The data was presented using frequency and percentages tables, bar graphs and pie charts.

## **CHAPTER FOUR**

### **DATA ANALYSIS AND INTERPRETATION**

#### **4.1 Introduction**

This chapter presents the interpretation and discussion of the findings from the data collected in the research study. The findings of the study were presented as per the research questions.

#### **4.2 Instruments return rate**

The sample size of the teachers was 82 but 69 teachers returned the questionnaires. The response rate was at 84%. The principal's questionnaires were 15 but the return rate was 14 questionnaires at a response rate of 93%. There were 15 interview schedules and 15 observation schedules but 14 interviews were conducted (93%) and 12 observation schedules used (80 %).

#### **4.3 Demographic Information of the Respondents**

The data on demographic variables was collected to determine their effect on implementation of ICT. The researcher deemed it necessary to look into demographic information of the teachers as they make a person who he or she is. These variables are teachers' gender, age, teaching experience, highest level of ICT training, teachers' residential area and teachers' highest level of education

#### **4.3.1 The school category**

The research study sought information on the category of the school from the principals in order to find out its influence on implementation of information communication technology in public secondary schools in Nyeri Central district.

**Table 4.1**

**Category of the School as indicated by the Principals**

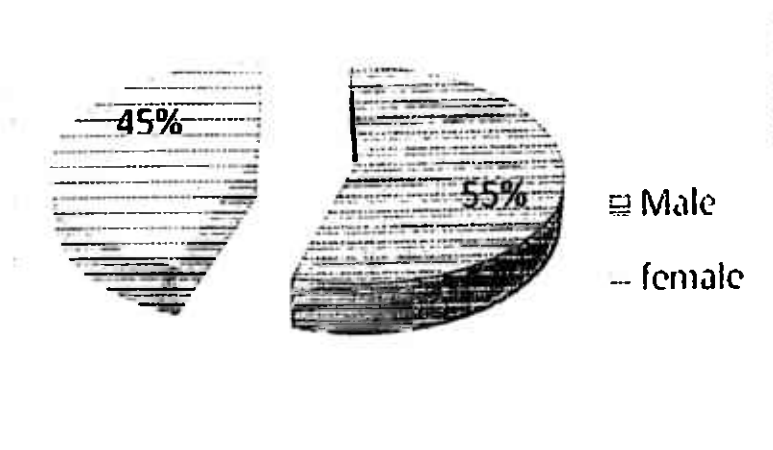
<b>School Category</b>	<b>Frequency</b>	<b>Percent</b>
Rural	10	71
Semi urban	3	21
Urban	1	8
<b>Total</b>	<b>14</b>	<b>100</b>

The findings of the study revealed that 71 % of the respondents were in rural schools, (21 %) were in semi-urban schools and 8 % were in urban schools. From the findings, there was an indication that majority of the principals were from rural schools and a very small percentage from urban schools.

### 4.3.2 Gender of the teachers

The study sought information on the gender of the teachers.

**Figure 4.1. Teachers' Gender**



According to the findings, majority (55%) of the teachers were male while the smaller proportions (45%) of the respondents were females. This could be because male teachers and female teachers regard computer technology as male domain.

### 4.3.3 Age of the teachers

The researcher gathered information on the age of the respondents.

**Table 4.2**

**Age of the Teachers**

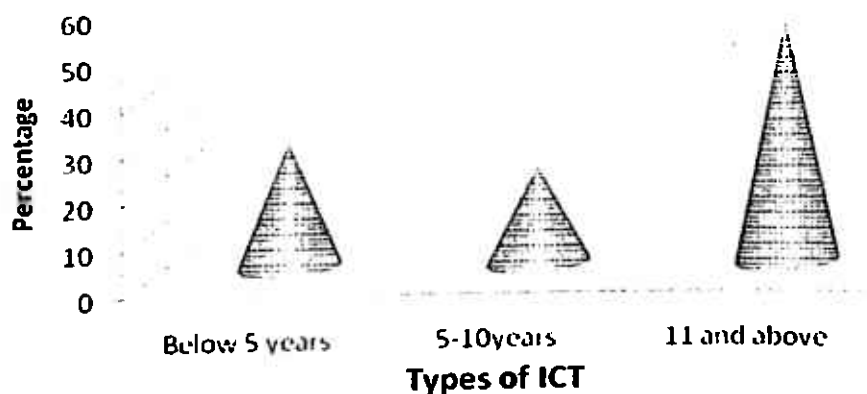
Age(years)	Frequency	Percent
20-29	14	21
30-40	32	46
41-49	20	29
50-60	3	4
<b>Total</b>	<b>69</b>	<b>100</b>

From the findings, 46 % of the respondents were in the age bracket of 30-40 years, while 29 % were in the age bracket of 41-49 years. 21 % were in the age bracket of 20-29 years and 4 % in the age brackets of 50-60 years. The number of teachers decreased by an increase in age because at the age between 30-40 years teachers are newly employed and some are under a contract of 5 years. At the age between 41-49 the number reduced because the teachers shift to other jobs since there is limited upward mobility in the teaching profession. In the age of 50-60 years many teachers prefer early retirement and engage themselves in business.

#### 4.3.4 Teaching experience of the teachers

It was necessary for the researcher to find out the effects of teaching experience on the ICT implementation in public secondary schools.

**Figure 4.2. Teaching Experience of the teachers**



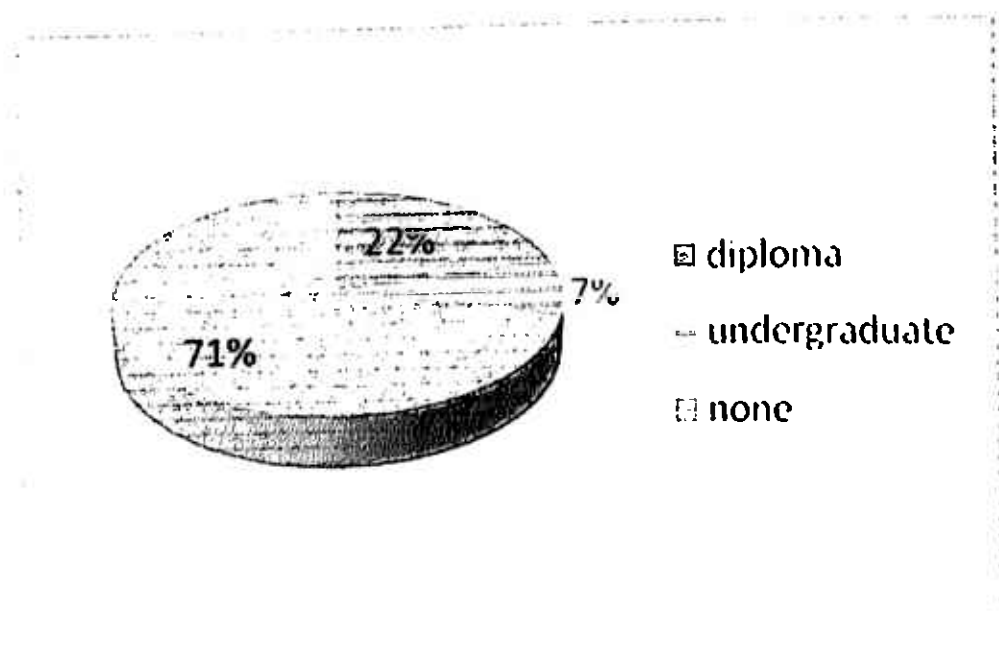


From the findings 52% of the teachers respondents had 11 years and above of teaching experience, 27% had the teaching experience below 5 years while 21% of the teachers had taught between five to 10 years. The government initially employed many teachers and majority of them did not change careers from teaching profession to others. Today government employs limited number of teachers to replace those who have retired and those who have passed on.

#### 4.3.5 Teachers' highest level of ICT training

Training plays an important role in teachers' use of ICT. The researcher sought to find out the highest level of ICT training in order to establish its effects on the ICT implementation by teachers in public secondary schools.

**Figure 4.3. Teachers' Highest Level of ICT Training**



From the study, 71% of teachers had no training in the use of ICT, 22% of the teachers had trained up to diploma level, while 7% of the teachers had trained up to the undergraduate level.

#### 4.3.6 Teachers' residential area

The researcher sought to find out the effects of teachers' residential area on ICT implementation in public secondary schools.

**Table 4.3**

**Teachers' Residential Area**

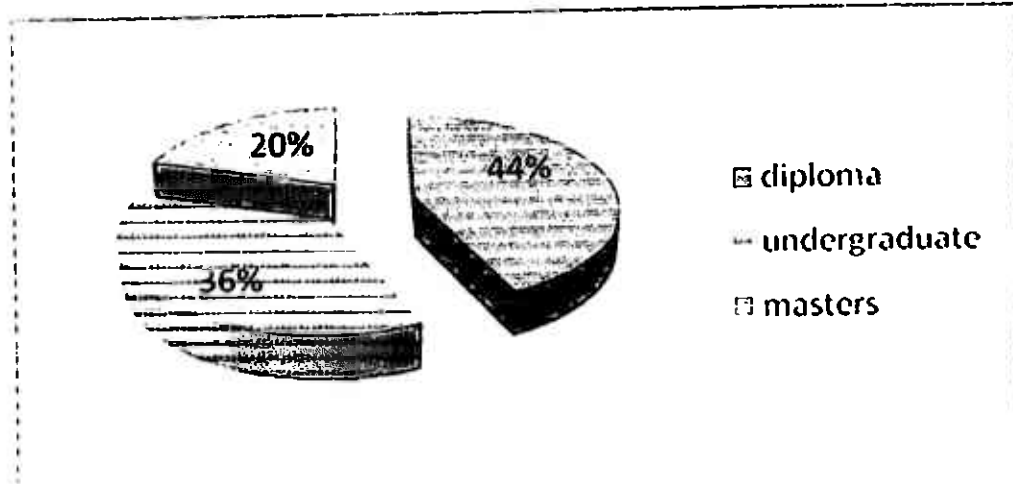
<b>Residential area</b>	<b>Frequency</b>	<b>Percent</b>
Rural	26	38
Semi urban	25	36
Urban	18	26
<b>Total</b>	<b>69</b>	<b>100</b>

Majority (38%) of the teachers respondents live in rural areas and 36 % live in semi-urban areas while 26 % live in urban areas. Majority of the teachers were living in rural areas where the cost of living is low.

#### 4.3.7 Teachers' highest level of education

The findings on the highest educational level are presented in the figure 4.4.

**Figure 4.4 .Teachers' Highest Level of Education**

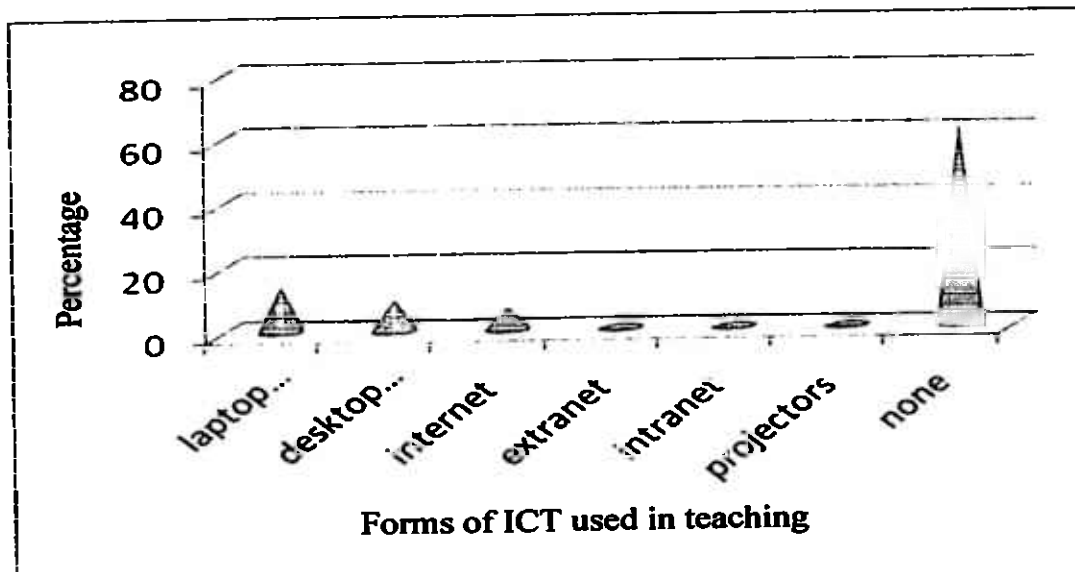


From the findings, majority (44%) of the teachers were diploma holders while 36% were at undergraduate level of education and the other smaller proportion 20% had masters' degree in education. This information shows that majority of the teachers who are in charge of ICT implementation were diploma holders, since most of the computer related courses have been introduced in the universities recently.

#### 4.4 Forms of ICT used in teaching

The respondents were asked to state the various forms of ICT used in teaching. The findings were as presented in the figure 4.5.

**Figure 4.5. Forms of ICT Used in Teaching**

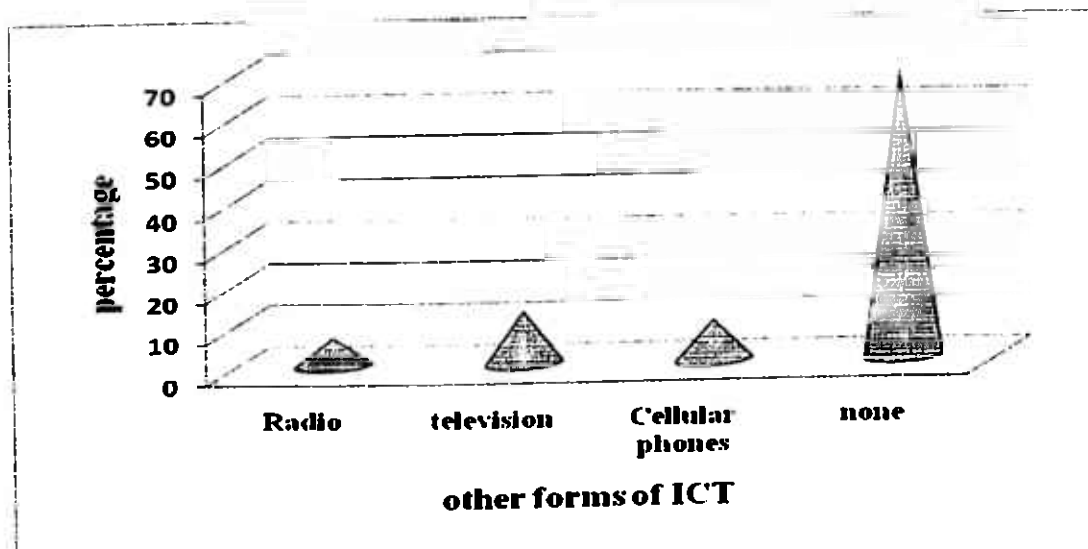


According to the findings, 59 % of the teachers did not use any form of ICT in teaching but 15 % of the teachers respondents indicated that they used laptop computers while 10 % indicate that they used desktop computers. This shows that many public schools have not fully implemented the use of ICT as it is noted in the smaller percentage of the forms of ICT in various public schools. Other findings indicated that 7 % of the teachers respondents use internet, 3 % used extranet, intranets, and projectors in teaching.

#### **4.4.1 Other forms of ICT used in teaching**

Other forms of ICT used in teaching included; radio, television and cellular phones. The figure 4.6 presents the responses of the teachers on the use of these forms of ICT in teaching. This is because these forms can be used even in remote areas where there is no electricity.

**Figure 4.6. Other forms of ICT used in Teaching**

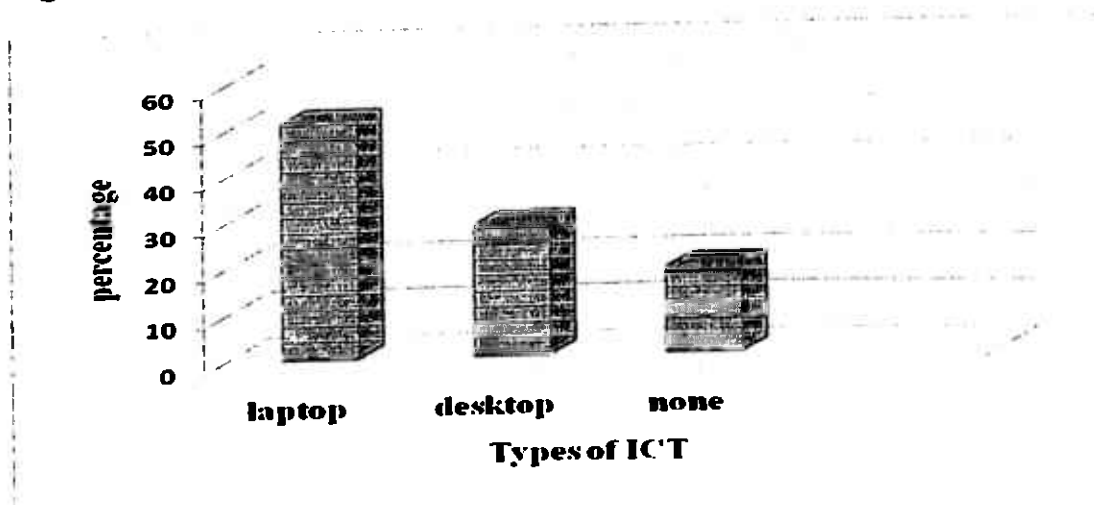


The findings revealed that 70 % of the teachers did not use these forms of ICT in teaching, while 13 % indicated that they use television, 10 % use radio and 7 % used cellular phones. This shows that even other forms of ICT have not been highly used by the teachers in learning and teaching process.

#### **4.4.2. Types of ICT in schools as indicated by the principals**

The figure 4.7 shows the findings of types of ICT in public secondary schools.

**Figure 4.7. Types of ICT in Schools as Indicated by the Principals**

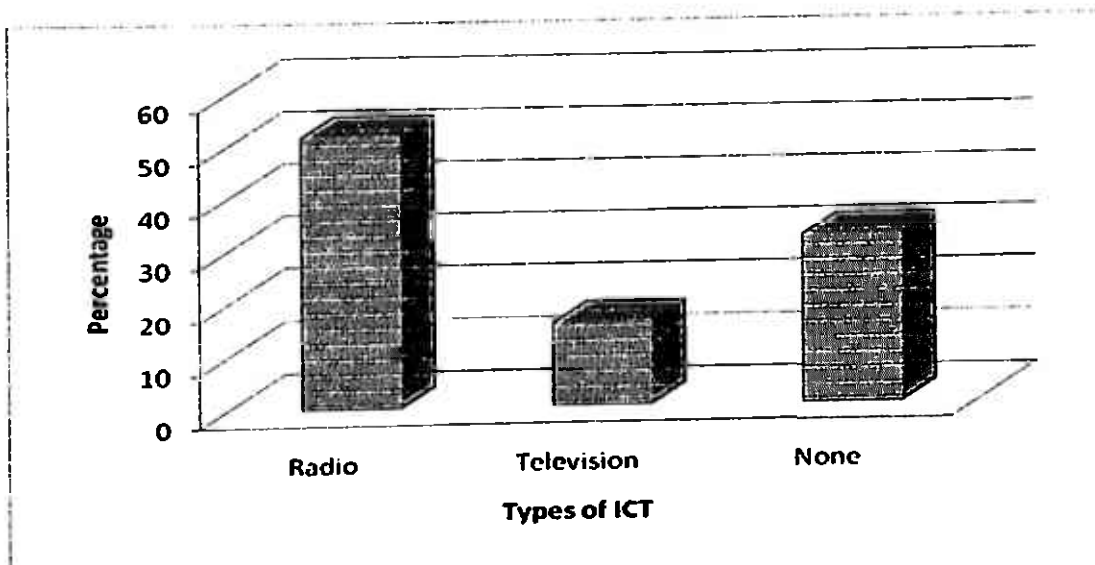


The findings on types of ICT in public secondary schools show that majority (52 %) of the respondents indicated that there were laptops in public schools. The other percentage 29 % noted that there were desktops in public schools. From the findings, the principals reported that there were various types of ICT in public schools but as noted in the findings on teachers' use of ICT in schools, majority of the teachers did not use any type of ICT in teaching. This shows that ICT has not been fully implemented by the teachers in public secondary schools.

#### 4.4.3 Other types of ICT in schools

As reported by the principals, the researcher sought to find out other types of ICT in public schools. The findings were as presented in figure 4.8.

**Figure 4.8. Other Types of ICT in Schools**



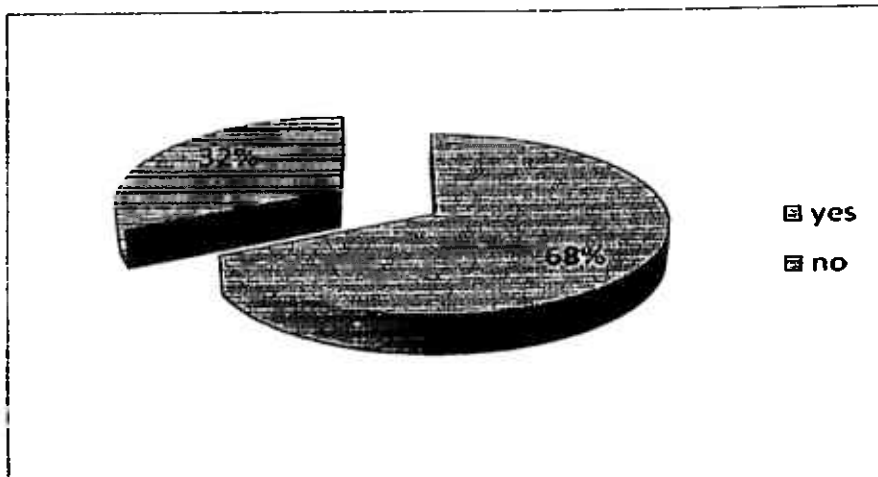
From the findings 52% of the principals indicated that there were radios in public schools, while 32 % of the principals reported to have no other types of ICT in public schools. A smaller percentage of 16 % had the opinion that there

were televisions in schools. This shows that the principals had purchased other types of ICT in schools that were not fully utilized by the teachers.

#### **4.4.4 Use of ICT in setting examinations and recording of marks**

The researcher was set to find out whether teachers use ICT in setting examinations and recording of marks. The findings were as presented in figure 4.9.

**Figure 4.9. Use of ICT in Setting Examinations and Recording of Marks**



According to the figure 4.9, 68% of the respondents said that they did not use ICT to set exams and record marks whereas 32% used the ICT to set the exams and record the marks. It is clear that majority of teachers did not use ICT in setting examinations and marks recording. From the interview with computer teachers, some teachers indicated that they used ICT in typing, printing and photocopying examinations.

**Table 4.4****How ICT is used in Setting Examinations and Recording of Marks**

<b>Use of ICT</b>	<b>Frequency</b>	<b>Percent</b>
Saving past papers in the computer	1	1
Typing examination	13	19
Printing examination	7	10
Recording marks in computer	17	25
Don't use	31	45

N=69

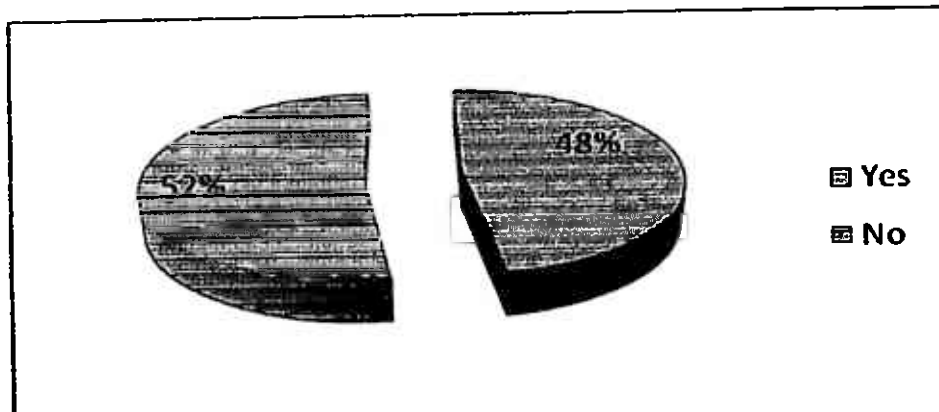
The findings of this study revealed that 45 % of the respondents did not use ICT in setting examination and recording of marks while 25 % recorded their marks in the computers. The other proportion 19 % used ICT in typing examinations and the other 10 % of the respondents used ICT in printing examination and smaller percentage 1 % used ICT in saving past papers. It is shown in the findings that although some teachers used ICT in setting and recording of marks, majority of the teachers did not use ICT in doing the same. This shows poor implementation of ICT in public secondary schools.

**4.4.5 Use of ICT to monitor students' progress**

The researcher sought to find out whether teachers use ICT to monitor students' progress. The findings were as presented in figure 4.10.



**Figure 4.10. Use of ICT to monitor students' progress**



52% of the teacher's respondents indicated that they do not use ICT to monitor student's progress, while 48% said they used. From the interview schedule, the respondents said that the computer software shows the students progress over the years maintaining the student's data base and records of performance. The other respondents in the interview argued that the information of the students stored in the computer can be compared in various terms which help in monitoring the students' progress. This information was mainly from the teachers who used ICT in various ways to monitor students' progress.

#### **4.4.6 Use of ICT to monitor students' progress**

The table 4.5 presents the findings on how ICT is used to monitor students' progress.

**Table 4.5**

**Use of ICT in monitoring students' progress**

<b>ICT Usage</b>	<b>Frequency</b>	<b>Percent</b>
Comparing performance for terms	8	12
Marks analysis	11	16
Feeding marks in the computer	5	7
Do not use	45	65

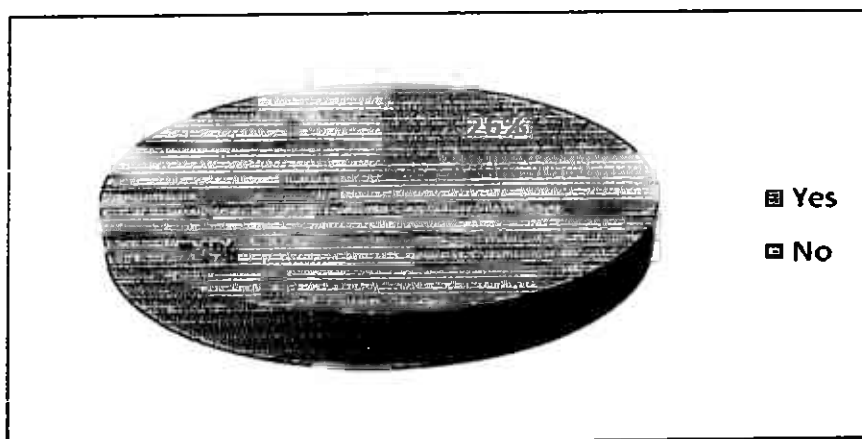
N=69

Majority of the teachers (65%) do not use ICT to monitor student progress while 16 % used ICT in the marks analysis and 12 % used ICT in comparing performance for different terms. Teachers in public secondary schools with ICT are mainly using it in the monitoring of the students progress. This has been through the students' marks analysis and storing records of the students' performance.

**4.4.7 ICT in-service course undertaken**

The ICT in-service course is very important for the teachers to enable them implement ICT in public schools. The researcher sought to find out the number of teachers who have undertaken ICT in service course. The findings of the study are as presented in the figure 4.11.

**Figure 4.11. ICT In-Service Course Undertaken**

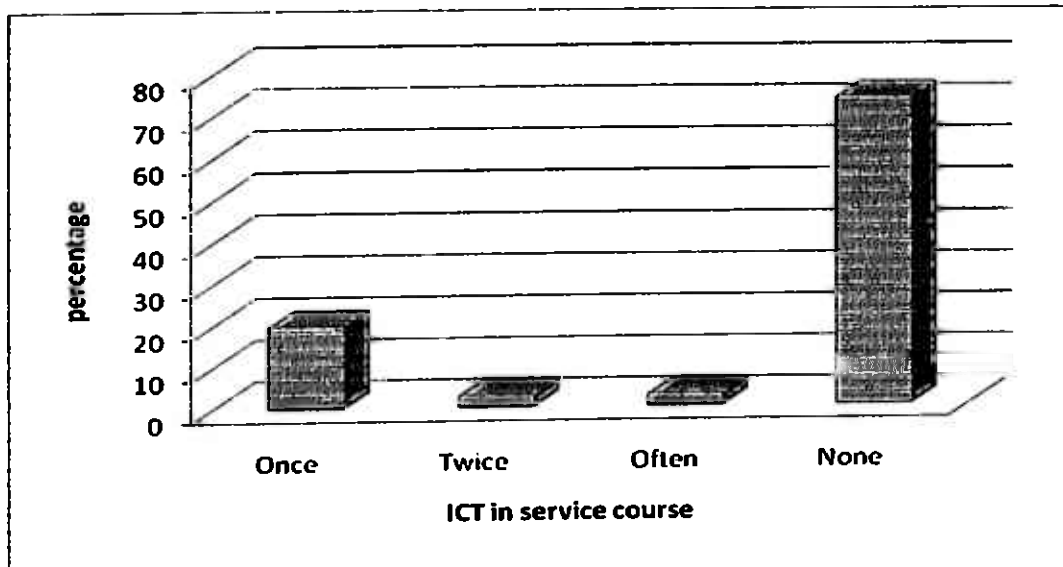


As indicated in the figure 4.11, majority 73 % of the respondents have not taken any form of ICT in-service course while, 26 % of the teachers revealed that they have undertaken some form of ICT in-service course. During the interview schedule conducted with the computer teachers, majority of them argued that in service training has improved ICT implementation in public secondary schools by teachers who have participated in the training while other teachers were of the opinion that ICT training has made teachers to be enlightened on use of ICT to carry out research, prepare notes, schemes of work and examination analysis. This shows that the failure to attend ICT in-service course has negatively influenced its implementation in public secondary schools.

#### **4.4.8 Findings on how often ICT in service course is undertaken**

The researcher set to find out how often ICT in-service course is undertaken and the findings are as presented in the figure 4.12.

**Figure 4.12. Findings on how often ICT in Service Course is Undertaken**



Majority 74 % of the respondents indicated that they have not trained on any form of ICT in service course. The other respondents 20 % said that they have gone for ICT in service training but, only once in a year, 3 % of the respondents indicated that they have gone for the course twice a year and a similar percentage 3 % revealed that they have gone for the course quite often. This shows that majority of the teachers in public secondary schools have not undertaken any form of in- service training which has led to poor implementation of ICT in public secondary schools.

#### **4.4.9 Use of ICT in lesson preparation**

The researcher's interest was to find out whether teachers used ICT in preparing for the lessons and the findings of the study were as presented in table 4.6.

**Table 4.6****Use of ICT in lesson Preparation**

<b>ICT usage</b>	<b>Frequency</b>	<b>Percent</b>
Research	16	23
For assessment	4	6
Photocopying examination materials	5	7
Do not use	44	64
<b>Total</b>	<b>69</b>	<b>100</b>

64% of the teachers respondents revealed that they do not use ICT in preparing lessons while, others indicated that they used ICT in preparing for the lessons in various ways; 23 % said that they use ICT to research on the subject before the lesson, 7 % stated that they used ICT for photocopying examination materials during revision and 6 % were of the opinion that ICT is used for assessing students during the lesson. This is in line with the researcher's observation that teachers in some schools used ICT in typing and printing exams. During the observation, the researcher noted that teachers in some schools used ICT to prepare time tables and teach. For instance television was used in teaching set books for English. Although, some teachers in various schools used ICT in preparing lessons, majority of them did not use ICT leading to its poor implementation in public secondary schools.

## Demographic Factors and ICT Implementation

**Table 4.7**

### **Gender and use of ICT in Examination Setting and Marks Recording**

Gender	Use of ICT in examination setting and In marks recording			
	Yes		No	
	F	%	F	%
Male	26	55	12	55
Female	21	45	10	45

Note. N = 69. F = frequency.

From the findings, (55 %) of the male teachers and (45%) of the female teachers indicated that they use ICT in examination setting and marks recording while (55 %) of the male teachers and (45 %) of the female teachers said they do not use. From the research findings, it is noted that there is more usage of ICT by male teachers than female teachers. This is supported by Lee (1997), who stated that male teachers were more active in computer and they were found to be more confident in handling computers than female teachers. This is inconsistent with Ray, Sormunrn and Harris (1999); Woodrow (1991) who reported that there was no significant difference in computer usage mean score based on gender

**Table 4.8.****Gender and use of ICT in monitoring student progress**

Gender	Use ICT in monitoring student progress			
	Yes		No	
	F	%	F	%
Male	21	64	17	47
Female	12	36	19	53

Note. N = 69. F = frequency.

According to table 4.8 majority (64%) of the male teachers and (36 %) of the female teachers use ICT to monitor students progress. While (47 %) of the male teachers and (53 %) of the female teachers reported that they do not use ICT in monitoring student progress. According to the findings, male teachers have used ICT more than female teachers which show that male teachers are more determined in ICT implementation in schools. This is consistent with Houtz and Gupta (2001) who found out that male teachers regard computer technology as a male domain.

**Table 4.9****Gender and use of ICT in lesson preparation**

Gender	Usage of ICT							
	<u>Research</u>		<u>Assessment</u>		<u>Photocopying</u>		<u>Do not use</u>	
	F	%	F	%	F	%	F	%
Male	10	63	2	50	4	80	22	50
Female	6	37	2	50	1	20	22	50

Note. F=Frequency. N=69.

From the findings, 63 % of the male teachers (37%) of the female teachers said that they use ICT in research when preparing for a lesson.50.0% of the male and 50% female teachers respectively indicated that they use ICT in assessing the students. Majority (80%) of the male teachers and (20%) of the female teachers argued that they used ICT in photocopying examination materials. The other smaller proportions (50%) of both male and female teachers do not use ICT in preparing for lessons. From the findings it is clear that male teachers have implemented ICT in schools more than female teachers. This is consistent with Farell and Isaac (2007) who indicate that ICT is not gender neutral.

**Table 4.10**

**Age of the respondents and use of ICT in monitoring students' progress**

Age	Use ICT to monitor students progress			
	Yes		No	
	F	%	F	%
20-29	6	18	8	22
30-40	18	55	14	39
41-49	7	21	13	36
50-60	2	6	1	3

Note. F=frequency N=69

From the table 4.10, (55%) of age bracket 30–40 years said that they use ICT to monitor students progress and (39%) of the same age bracket reported that they do not use ICT in monitoring students progress. While (21 %) of the 41-49 age bracket use ICT in monitoring students progress and (36 %) indicated



that they do not use ICT in monitoring students progress. 18 % in the age bracket 20-29 said that they use ICT to monitor students progress and (22 %) they do not. The other smaller proportion (6 %) in the age bracket 50-60 use ICT to monitor students progress and (3 %) in the same age bracket do not use ICT to monitor students progress. As revealed from the findings, the teachers' respondents in the age bracket of 30-40 years use ICT more than the other age groups. This indicates that there was no significant relationship between age and use of ICT in monitoring student progress. This is consistent with Young (2000) who reported that out of 12 studies that had been reviewed 62% suggested there was no significant relationship between age and computer usage.

**Table 4.11**

**Age of the Respondents and use of ICT in Lesson Preparation**

Teachers' Age	Use of ICT in preparing lessons							
	Research		Assessment		Photocopying		Do Not Use	
	F	%	F	%	F	%	F	%
20-29	6	38	0	0	1	20	7	16
30-40	5	31	2	50	2	40	23	52
41-49	5	31	2	50	2	40	11	25
50-60	1	0	0	0	0	0	3	7

Note. N= 69. F = frequency.

Teachers in the age bracket of 30-40 years and 41-49 years compare in the use of ICT in preparing lessons as indicated by 31 % in research, 50% in assessment and 40 % in photocopying examination materials. To lesser extent teachers in the age bracket of 20-29 use ICT in lesson preparation as indicated

by 37 % in research. This indicates insignificant relationship between age and use of ICT in lesson preparation. This is inconsistent with Gan (2001) and Sia (2000), who identified that the younger teachers are more likely to be computer proficient than their older colleagues.

**Table 4.12**

**Teaching experience and use of ICT in examination setting and marks recording**

Teaching experience	Use of ICT in examination setting and marks recording			
	Yes		No	
	F	%	F	%
Below 5 years	13	28	6	27
5-10 years	10	21	4	18
11 and above	24	51	12	55

Note. N= 69. F = frequency.

Teachers with the teaching experience of 11 years and above use ICT in examination setting and marks recording as indicated by 51 %, on the same level of experience 55 % of the teachers said they do not use it. Teachers who have taught for less than five years have also used ICT at a lower percentage of 28 % while 27 % of the same teaching do not use it. Teachers who have taught for a period of 5-10 years have the lowest percentage of ICT usage in setting examinations and marks recording as shown by 21 %. From the analysis, teachers with more teaching experience use ICT in setting examinations and marks recording. This could have been prompted by the fact that teachers with higher teaching experience may have gone back to the University for further studies and could have been exposed to ICT usage. This

indicates an inconsistent relationship between teachers' teaching experience and ICT usage. This is consistent with Zidon and Miller (2002) study which found weak relationship that existed between teaching experience with ICT usage.

**Table 4.13**  
**Teaching experience and use of ICT to monitor students' progress**

Teaching experience	Use of ICT to monitor student progress			
	Yes		No	
	F	%	F	%
Below 5 years	10	30	9	25
5 – 10 years	6	18	8	22
11 and above	17	52	19	53

Note. N= 69. F = frequency.

Teachers with experience of 11yrs and above, 52 % use ICT to monitor student progress and 53 % do not use .For teachers with 5-10 years experience 18 % use ICT to monitor student progress while 22 % do not use. The findings indicate that the more the teaching experience (5-10 years and 11years and above) the more use of ICT in monitoring students' progress but there is inconsistency for teachers below 5years experience. Rosen and Maguire (1990) concluded that teachers teaching experience does not eliminate computer phobia and many experienced teachers display some discomfort and anxiety in relation to computers.

**Table 4.14****Teaching experience and use of ICT in preparing lessons**

Teaching experience	Use of ICT in preparing lesson							
	<u>Research</u>		<u>Assessment</u>		<u>Photocopying</u>		<u>Not used</u>	
	F	%	F	%	F	%	F	%
Below 5 years	6	38	2	50	1	20	10	23
5-10 years	4	24	0	0	0	0	10	23
11 and above	6	38	2	50	4	80	24	54

Note. N= 69. F = frequency.

From the table 4.14, it is notable that teachers who have experienced five years of teaching and below, and teachers with 11 and above years of teaching experience use ICT more in carrying out research as indicated by a percentage of 38 %. The same scenario applies to use of ICT in assessment as recorded by 50% in both teaching experiences. Whereas 20% of the teachers with less than five years of teaching experience use ICT in photocopying examination materials, 80% of the teachers who have teaching experience of 11 years and above use ICT for photocopying examination material. 23 % teachers with experience below 5yrs and between 5-10yrs stated that they do not use ICT in preparing lessons. 24 % teachers with 5-10 years of experience use ICT in research when preparing lessons.

Teachers with the 5-10 years teaching experience indicate that they do not use ICT for assessment and photocopying examination materials as indicated by

0% while 23 % said they do not use ICT at all in preparing for lessons. This could have been attributed to the fact that teachers who have experience of five years and below were in college when ICT had already been introduced. For teachers who have 11 years and above could have gotten the opportunity of going back to the University for further education and hence got exposed to ICT usage. This indicates there is no significant relationship between teaching experience and use of ICT in preparing lessons. This is consistent with Zidon and Miller (2002) who found weak relationship between teachers experience and computer usage.

**Table 4.15**

**Teaching experience and forms of ICT used in teaching**

Teaching experience	Forms of ICT used in teaching													
	<u>Laptop</u>		<u>Desktop</u>		<u>Internet</u>		<u>Extranet</u>		<u>Intranet</u>		<u>Projector</u>		<u>None</u>	
	F	%	F	%	F	%	F	%	F	%	F	%	F	%
Below 5 years	4	40	2	29	2	40	1	100	0	0	0	0	10	23
5-10 years	1	10	2	29	0	0	0	0	0	0	0	0	11	25
11 years and above	5	50	3	42	3	60	0	0	1	100	1	100	23	52

Note. N = 69. F = frequency.

The table 4.15 shows that teachers who have 11 years and above of teaching experience have the highest percentage of using laptops (50%) desktop (43 %), internet (60%) and intranet (100.0%) compared to other teachers. Teachers who have five years of teaching experience and below have a lower percentage of using laptop(40 %), desktop (29%), internet (40%) and extranet (100 %). Teachers who have 5-10 years of teaching experience have the lowest percentage in using laptop (10%),desktop (29 %), internet (40.0%), and

extranet (100.0%). This could be attributed to the fact that these teachers are more enthusiastic about using the new technology.

**Table 4.16**

**Highest level of ICT training and ICT in-service courses undertaken**

Highest level of training	Any form of ICT in-service course taken			
	Yes		No	
	F	%	F	%
Diploma	4	22	11	22
Undergraduate	0	0	5	10
None	14	78	35	68

Note. N = 69. F = frequency.

The table 4.16 shows that the diploma teachers have higher percentage of 22 % whereas graduate teachers have not, as indicated by 0%. This could be because most ICT courses were initially offered up to diploma level in higher institutions of learning in Kenya. It is recently that ICT courses have been introduced at degree and masters level for example Computer science, information technology among others. This indicates that there is relationship between ICT training and its usage. This is consistent with studies done which found out that with regard to having attended formal computer courses there is significant relationship between usage of computers and computer training (Wong et al, 2002; Sia, 2000).

**Table 4.17**

**Highest level of ICT training and the frequency of ICT in service training**

Highest level of ICT training	How often ICT in service course is undertaken							
	<u>Once a year</u>		<u>Twice a year</u>		<u>Quite often</u>		<u>Not taken</u>	
	F	%	F	%	F	%	F	%
Diploma	2	14	0	0	1	50	12	23
Undergraduate	0	0	0	0	0	0	5	10
None	12	86	2	100	1	50	34	67

Note. N = 69. F = frequency.

The table 4.17 shows that the diploma teachers have had some form of ICT training oftenly as indicated by 14 % and 50.0%. The degree teachers have not had in-service courses in ICT. The reason behind this could be because the schools are the ones which are supposed to fund the teachers going for in-service training and most of the time schools lack the funds to do so.

**Table 4.18**

**Teachers' residential area and forms of ICT used in teaching**

Residential area	Forms of ICT used in teaching														
	<u>Laptop</u>		<u>Desktop</u>		<u>Internet</u>		<u>Extranet</u>		<u>Intranet</u>		<u>Projector</u>		<u>None</u>		
	F	%	F	%	F	%	F	%	F	%	F	%	F	%	
Rural	4	40	3	43	1	20	0	0	0	0	0	0	0	18	42
Semi urban	2	20	4	57	4	80	1	100	1	100	0	0	13	29	
Urban	4	40	0	0	0	0	0	0	0	0	1	100	13	29	

Note. N = 69. F = frequency.

Teachers who reside in the semi urban areas least use the laptops (20.0%). For the other forms of ICT they use more as indicated, desktop (57 %), internet (80%) and (100.0%) extranet. Teachers in urban areas mostly use laptops as indicated by (40.0%) teachers in the rural areas have the same percentage (40.0%) as those in urban areas.'

**Table 4.19**

**Teachers' residential area and other forms of ICT used in Teaching**

Residential area	Other forms used in teaching							
	<u>Radio</u>		<u>Television</u>		<u>Phones</u>		<u>None</u>	
	F	%	F	%	F	%	F	%
Rural	1	14	2	22	2	40	21	44
Semi urban	4	57	4	44	2	40	15	31
Urban	2	29	3	34	1	20	12	25

Note. N = 69. F = frequency.

The table 4.19 shows that the teachers who reside in the semi urban areas use radio (57 %), television (44 %) and cellular phones (40%) more in teaching as compared to those residing in the rural and urban areas. Teachers residing in the rural areas use cellular phones more in teaching as indicated by (40.0%) unlike the radio (14 %) and television (22 ). This could be attributed to the availability of cellular phones unlike other forms of ICT. These findings are inconsistent with studies done by Kambua (2008) which indicated that teachers in urban areas are more responsive in the use of ICT in teaching and learning due to exposure unlike the teachers who reside in rural and semi urban areas.



**Table 4.20****Teachers' highest education level and use of ICT in preparing lessons**

Highest education level	Use of ICT in preparing lessons							
	<u>Research</u>		<u>Assessment</u>		<u>Photocopying.</u>		<u>Not used</u>	
	F	%	F	%	F	%	F	%
Diploma	6	37	3	75	1	20	20	45
Undergraduate	7	44	1	25	2	40	15	34
Masters	3	19	0	0	2	40	9	21

Note. N = 69. F = frequency.

The table 4.20 indicates that Diploma teachers use ICT for assessment to a larger extent (75%), research for a lesser extent (37%) and photocopying examination material (20 %). The graduate used ICT more for research (44 %), photocopying examination materials at (40 %) and for assessment at a less extent of (25 %). For masters degree holders, they used ICT to a great extent for photocopying examination materials (40 %) and to a less extent in research (19%) and did not use ICT for assessment. This shows inconsistent relationship between teachers' level of education and ICT usage. This is consistent with study done by Sia 2000) who conducted a study among urban secondary school teachers in Miri, Sarawak to determine the level of computer literacy and computer anxiety. The study findings indicated that computer literacy levels among secondary school teachers were low and there was no significant difference in computer literacy levels between teachers of different age groups, and teachers with different years of computer experience with different software.

#### **4.5 Strategies put in place for expansion of ICT in schools**

The study sought to find out the principals opinion on the strategies put in place for expansion of ICT.

**Table 4.21**

**Strategies for expansion of ICT in schools**

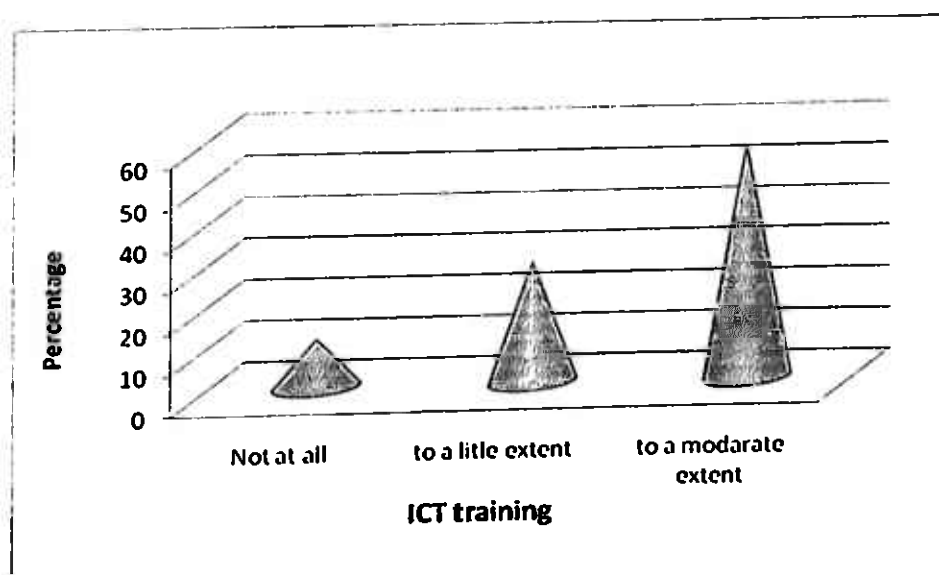
<b>Strategy</b>	<b>Frequency</b>	<b>Percent</b>
Increase number of computers	9	64
Train teachers on ICT	1	7
Construct computer lab	4	29
<b>Total</b>	<b>14</b>	<b>100</b>

The findings revealed that acquiring more computers would lead to expansion of ICT in public secondary schools as reported by 64 % of the respondents. It is also through construction of computer laboratories that the use of ICT will expand in public secondary schools as indicated by 29% of the teachers' respondents who participated in the study. Training of teachers on ICT was another strategy on expanding the use of ICT in public secondary schools as expressed by 7% of the respondents who participated in the study. During the interview other respondents argued that public schools should have adequate forms of ICT and also the government should give donations to facilitate implementation of ICT in public secondary schools. The strategies put in place to expand on use of ICT in public secondary schools are very important in ensuring proper implementation of ICT in these schools.

#### 4.6 Extent to which the schools have organized training on use of ICT

The researcher sought to find out the extent to which the schools have organized trainings on the use of ICT. The findings were as presented in the figure 4.13.

**Figure 4.13 Extent to which the schools have organized training on use of ICT**



From the findings, 58 % of the respondents said that the schools have organized training on the use of ICT to a moderate extent,30 % indicated that they had organized ICT training to a little extent, while a smaller percentage 12% said that they had not organized the training on ICT at all. This information shows that principals in various schools are taking measures in ICT implementation in public secondary schools. Most of them have organized training on use of ICT in their schools.

#### **4.7 Challenges faced in ICT implementation in schools**

The table 4.22 presents the findings on the challenges faced in ICT implementation in schools.

**Table 4.22**

**Challenges Faced in ICT Implementation in Schools**

<b>Challenges</b>	<b>Frequency</b>	<b>Percent</b>
Negative attitude by teachers	1	7
Inadequate facilities	4	29
Computer break down	2	14
Inadequate funds	4	29
Lack of trained personnel	2	14
None	1	7
<b>Total</b>	<b>14</b>	<b>100</b>

There are many challenges facing ICT implementation in public secondary schools. Inadequate facilities and inadequate funds in ICT implementation in schools are the major challenges as 29 % of the respondents indicated. The other major challenges facing ICT implementation in public secondary schools is computer break down and lack of trained personnel as indicated by 14 % of the respondents. Negative attitude by the teachers was the other problem as 7 % of the respondents stated. 7 % of the respondents noted that, there were no challenges facing ICT implementation in public secondary schools. From the findings there are many challenges facing implementation of ICT in public

secondary schools and this has resulted to poor implementation of ICT in these schools.

#### **4.7.1 Measures put in place to overcome the challenges faced in ICT implementation**

The researcher sought to find out measures put in place to overcome the challenges faced in ICT implementation. The findings were as presented in the table 4.23.

**Table 4.23**

#### **Measures put in place to overcome the challenges faced in ICT implementation**

<b>Measures to overcome challenges</b>	<b>Frequency</b>	<b>Percentage</b>
Use computers often	1	7
Request for donations	6	43
Train on ICT	1	7
Repair computers	5	36
None	1	7
<b>Total</b>	<b>14</b>	<b>100</b>

43 % of the respondent argued that request for donations especially from the government can enable ICT implementation in public secondary schools. The other measure supported by the respondents was repair of damaged computers as reported by 36 %. Use of computers oftenly and training on ICT were other measures suggested by the respondents as indicated by 7 % of the respondents. Various measures suggested by the respondents are very important since they enhance ICT implementation in public secondary school.

#### **4.8 Summary**

The researcher embarked on the analysis and interpretation of data concerning instruments return rate, demographic information of the respondents, forms of ICT used in teaching and their implementation. In addition, the strategies put in place for expansion of ICT were explored and the extents to which schools have organized training on use of ICT. Moreover, challenges faced in the implementation of ICT in schools were analyzed and measures taken to overcome challenges faced in ICT implementation were looked into.

## **CHAPTER FIVE**

### **SUMMARY, CONCLUSION AND RECOMMENDATIONS**

#### **5.1 Introduction**

The chapter presents a summary, conclusions, recommendations and suggestions for further research. The main focus of the study was to find out effects of teachers demographic variables on implementation of Information Communication Technology in public secondary schools in Nyeri Central district in Kenya.

#### **5.2 Summary of the study**

The data collected from the study was to answer the question on the effects of teachers' demographic variables on implementation of information communication technology in public secondary schools in Nyeri Central district. The study indicated that teacher's gender influence ICT implementation while age, area of residence, education level, in service training and teachers' experience showed inconsistent relationship.

#### **5.3 Summary of key findings**

##### **5.3.1 Teachers demographic factors that influence ICT implementation in public secondary schools**

The study found out that majority of principals and teachers were from the rural schools as expressed by (71 %) of the respondents. ICT implementation is more effective in urban schools than in rural schools. From the study (55%)

respondents were male as expressed by the teachers' respondents. The teachers respondents were mainly in the age bracket of (30-40 years) as reported by (46 %) of the respondents. Majority of the teachers (48%) had long teaching experience (11 years and above) .71% of teachers' respondent had no training in ICT.38 % of teachers lived in the rural areas which form the majority as compared to semi urban and urban areas. Regarding highest level of education majority 44% of the teachers were diploma holders.59% of teachers did not use any form of ICT in teaching. 68% did not use ICT to set exams and record marks while 52 % of the teachers did not use ICT to monitor student progress. Majority 74 % of the teachers had not taken any form of ICT in service course.

Male respondents used ICT more than female respondents therefore gender had influence on implementation of ICT in public secondary school. The study indicated that 63% of male teachers used ICT in research when preparing lessons. The relationship of age and ICT implementation showed inconsistent results and therefore according to the study age does not influence ICT implementation. Teaching experience does not always influence ICT implementation. According to the study, in examination setting, marks recording and monitoring student progress, the longer the teaching experience the higher the ICT implementation but in preparing lessons and use of various forms of ICT teachers' experience did not influence ICT implementation. Majority of teachers' respondent (69 %) had not undertaken ICT training or any form of ICT in service training which influenced their usage of various forms of ICT in different ways. The influence of teachers' residential area on



ICT implementation was inconsistent in that it varied from one form of ICT to another. Teachers residing in semi-urban areas used radio (57%) and television (44%) more than those residing in rural and urban areas. Teachers residing in urban areas used projector more than those in semi urban and rural areas. The level of education and ICT implementation showed inconsistent results in that in different uses of ICT in preparing lessons, the effect of education level was different. Graduate teachers used ICT in research (44%) for lesson preparation more than diploma and masters holders while diploma teachers used ICT for assessment (75%) more than undergraduate and masters degree holders.

### **5.3.2 Forms of ICT in schools**

According to the research findings, majority of the teachers did not use any form of ICT in their schools as indicated by (59%) of the teachers respondents. Moreover, other teachers indicated that they use some forms of ICT in their schools such as; laptop computers, desktop computers, internet, extranet, intranets and projectors. Other forms of ICT used included; radio, television and cellular phone among others.

### **5.3.3 ICT implementation in public secondary schools.**

From the findings majority (68%) of the teachers respondents said that they do not use ICT in examination setting and recording of marks this shows the poor implementation of ICT in public secondary schools. The teachers also reported that they did not use ICT to monitor students' progress while a few teachers used ICT to store records of students' performance and analyze marks.

Majority of teachers' respondents (74 %) reported that they had not been through any form of in-service training. Those who underwent any form of training only did it once in a year as reported by (74 %) of the respondents. On the question of whether teachers use ICT in preparation of the lessons, majority (64 %) of the respondents revealed that they do not use ICT in preparing for the lessons.

Despite the slow implementation of ICT in various public secondary schools, there were strategies put in place for expansion of ICT in these schools. Some of these strategies were; increase the number of computers as indicated by 64 % of the respondents, training of teachers on ICT, having adequate forms of ICT and requesting the government to offer donations to public schools to facilitate ICT implementation in public secondary schools.

ICT implementation in public secondary schools is faced with various challenges for instance; in adequate facilities and inadequate funds as reported by (29%) of the respondents. Other challenges facing ICT implementation in public secondary schools included; negative attitude towards ICT by the teachers, computer break down and lack of trained personnel. There were only a smaller proportion of respondents (7 %) who said that there were no challenges facing ICT implementation in public secondary schools.

About the measures put in place to overcome the challenges faced in ICT implementation, the respondents suggested on the use of computers more oftenly, request for donations to purchase ICT facilities, repair broken computers to enhance ICT implementation in schools. Training teachers on

ICT would highly enhance the implementation of ICT in public secondary schools.

#### **5.4 Conclusion**

From the study it is evident that teachers' demographic factors affect implementation of ICT in public secondary schools. Gender influence ICT implementation while the age, teachers' residence, education level, in service training and teachers experience indicated inconsistency in their influence. Many schools especially in rural areas have not yet embraced ICT mainly because the teachers lack adequate knowledge on the use of ICT, have negative attitude towards ICT implementation, lower levels of education and ICT training all leading to poor implementation of ICT in public secondary schools. Other factors influencing implementation of ICT in public secondary schools are; inadequate facilities, lack of funds and untrained personnel among other factors. To ensure ICT implementation in public secondary schools, there should be enough ICT facilities and continuous training of the teachers on ICT in these schools.

## **5.5 Recommendations**

The recommendations of the study are as presented below;

1. Public secondary schools should find a way to purchase more ICT facilities.
2. Public secondary schools should support teachers training on the use of ICT.
3. The government needs to give more financial support through free education programme and donations to enhance ICT implementation in public secondary schools
4. The teachers should change their attitude towards the use and implementation of ICT in the schools to create information technology culture in all aspects of learning.

## **5.6 Suggestions for further research**

1. A similar research study should be carried out to identify other factors influencing ICT implementation in public secondary schools.
2. A comparative study on the factors influencing ICT implementation in urban and rural schools.
3. A research in a different context to determine the effect of teachers' demographic variables on ICT implementation.

## REFERENCES

- Amutabi, M.N. (2004). Challenges facing the use of ICT in Kenyan universities  
UNESCO Forum Colloquium. On research and higher education  
policy 1-3 *An ethnographic-case study of beliefs*,
- Al-Khashab (2007) Attitudes toward E-learning. An empirical study in  
Kuwait. Unpublished theses Maastricht School of management.  
<http://www.scribd.com/doc/2931290/Attitude-towards-e-learning>
- Angers, J. & Machtmes, K. (2005). *context factors, and practices of teachers  
integrating technology. The Qualitative Report, 10(4), 771-794.*
- Cooper, R.D., and Emory, C.W. (1995). *Business Research Methods*. 5<sup>th</sup>  
edition, McGraw-Hill Pg 116-117.
- Cronbach, L. J. (1951). Coefficient alpha and the internal structure of tests.  
*Psychometrika, 16(3), 297-334.*
- Cronbach, Lee J., and Richard J. Shavelson. (2004). My Current Thoughts on  
Coefficient Alpha and Successor Procedures. *Educational and  
Psychological Measurement 64, no. 3 (June 1): 391-418.*  
doi:10.1177/0013164404266386.
- Dearling, R. (1997). *Report of the national committee of inquiry into higher  
education London: Her majesty stationary office.*  
Retrieved from <http://www.leeds.ac.uk/edncol/niche>. Accessed 9/1/2011
- Farrel I, G and Isaacs (2007) Survey of ICT and education in Africa. A  
summary report based on 53 country surveys. Washington DC World  
Bank

- Gan, S.L. (2001). *IT & education in Malaysia: Problems, issues and challenges*. Selangor: Pearson Education Malaysia.
- Gathano, C .W. (2009). *An investigation of factor influencing the use of ICT in teaching and learning in secondary schools in Thika district Kenya*. (Unpublished M.A (ppm) project).
- Gattiker, U. & Nelligan, D. (1998). Computer attitudes and learning performance: Issues for management education and training. *Journal of Organization Behavior*, 13, 78-90.
- Gefen, F. & Straub, R . (1997) . Correlates of gender differences in attitudes toward and involvement with computers. *Journal of Vocational Behavior*, 39, 70-85.
- Gichoya, D. (2005). Factors affecting the successful implementation of ICT Projects in Government. *The electronic journal of e-Government* 3 (4). PP175-184. Available online at WWW.ej eg.com. Accessed on 17<sup>th</sup> January 2011.
- Gross, N. (1971). Implementing organizational, innovation.A *sociological analysis of planned educational change*.Newyork: Green wood press.
- Hennesy,S, David. H , & Wamakote. L . (2010). *Teacher factors Influencing classroom use of ICT in sub-saharan Africa*. online journal of African studies, 3 (20100 39-54.
- Houtz, S., & Gupta, P. (2001).Gender roles, computer attitudes, and dyadic Computer [http://www.cambridgetoafrica.org/resources/hennesy\\_etal-final.pdf](http://www.cambridgetoafrica.org/resources/hennesy_etal-final.pdf) Accessed on 9/1/2011.

- Hu, P. J. , Clark, T. H .K ., & Ma, W.W. (2003). Examining technology acceptance by school teachers: A longitudinal study. *Information & Management, 41*, 227-241.
- Kambua, J . (2008). *A research proposal on an analysis of strategies, utilized in effective implementation of information and communication technology (ICT) subject in secondary school in Kibwezi and Nzaiu District Catholic University of East Africa .*
- Karuru,I.W(2005) An investigation into the status of Kenya information and communication technology policy in the educational system .Unpublished M.E.D thesis .Kenyatta university.
- Kombo,D K and Tromp D,L.A(2006) .Proposal and thesis writing.Paulines publications Africa.
- KIE (2001-2005).Strategic plan Kenya institute of education Nairobi, Kenya.
- Kigwilu, P.C. (2005). *Influence of teacher's character on student performance in computer studies in secondary schools in Nairobi province Kenya. (Unpublished MED project) University of Nairobi*
- Lee, V. E. (1997). Effects of high school restructuring and size on early gains in achievement and engagement. *Sociology of Education, 68*, 241-70.
- Makau, B. (1998). *Computer in Kenya's Secondary School*, IDRC Ontario McGraw-Hill Book Co.
- Martin, W., & Lundstrom, R . (2002). Examining the role of teachers

- experience as a factor for the integration of computers in schools.  
*Journal of Computing in Teacher Education*, 18(4), 18-23
- Mehloff, C.E. (2001). Knowledge, commitment and attitudes of Home Economics Faculty towards computer. *Home Economic Research Journal*, 17(4), 300-308.
- Ministry of Education Science and Technology. (2004). *primary teacher education syllabus, volume I, Kenya institute of education, Nairobi Kenya*. Ministry of Education. (June 2006). *National information and communication Technology (ICT) Strategy for Education and Training*.
- Mioduser, D. Tur-Kaspa. H. & Leitner I.(2000). The learning value of Computer based instruction of early reading skills. *Journal of computer assistant learning*, 16(1) 54 – 63 Monica: Milken International.
- Mugenda, O.M & Mugenda ,A .G .(2003).Research methods: Quantitative and Qualitative Approaches. Nairobi. Press.
- Murphy, C & Greenwood, L. (1998). Effective integration of information and communication technologies in teacher education.*Journal of information & technology for teacher education*, 7(3 to use Computers. *British journal of educational technology*, volume27, 134-
- Ndiku, L. (2003). *The problems encountered by school personnel in the implementation of computer use in secondary school in Uasin Gichu District*, Unpublished Thesis )Moi University Eldoret.
- Nyaga, G. (1995). *The Research proposal*. In K Mwiraria and S.P.



- Ngugi ,P(2004).Rural Kenya enters the cyber world. Daily Nation, September, 21<sup>st</sup> 2004. pg 27
- Okanda ,George (2005). *Education and ICTs*, 6<sup>th</sup> Strathmore University ICT conference Retrieved from Accessed on 14th September 2011.
- OLivieira, Modest, A. (1989). Instructional technology in developing crossroads; should the countries go electronic? *International journal of instructional media*, 0092815, 24 (2).
- Ornstein, A & Hunkins P. (1998). *Curriculum Foundations, Principles, and Issues*. Boston, United States of America.
- Orodho, A. J. (2003).Essentials of educational and social sciences Research method. Masola publishers, Nairobi.
- Orodho, A. J. (2005).Essentials of educational and social sciences Research method. Masola publishers, Nairobi.
- Phipps, R, & Merisotis, J. (2000) . *Quality on the line; Benchmarks for success in internet-based distance education, Institute of Higher Education policy* (online) <http://www.ihel.com> (Accessed on 18<sup>th</sup> January 2011
- Plomp, T., & Reinen, I.J. (2000). Some gender issues in educational computing use: Result of an international comparative survey. *Computer and Education*, 20(4), 350-363
- Republic of Kenya . (2005). Sessional Paper No.1 of 2005 on a policy framework for Education, Training and Research: Meeting the challenges of education and training to all Kenyans. Nairobi: Ministry of Education, Science and Technology.

- Rogers, Everett M. (1962). *Diffusion of Innovations*. The Free Press. New York.
- Rogers, Everett M (1995) *Diffusion of Innovations*. 4th ed. New York: Free Press.
- Rogers, Everett M. (2003) *Diffusion of Innovations*. 5th ed. New York: Free Press, 2003.
- Ropp, M .M . (1999). Exploring individual characteristics associated with Learning to use computers in preservice teacher preparation. *Journal of Research on Computing in Education*, 31(4), 402-423.
- Rosen, C., & Maguire, B. (1990). A review of literature on understanding teachers perception towards computers and computerized instruction. *Journal of Research and Development in Education*, 28(2), 60-65.
- Sia, P.W . (2000). *Computer anxiety and computer literacy among urban secondary schoolteachers in Miri*. (Unpublished master's thesis. Kota Samarahan).University Malaysia of Sarawak.
- Smith, S. (2001). Relationships to computer attitudes to gender, age, grade level, and teacher influence. *Education*, 106, 338-344.
- Tinio V. L. (2003). *ICT in Education*. UNDP-APDIP Retrieved from <http://www.apdip.net/publication/iespprimes/eprimer-edu.pdf>  
(Accessed on 18<sup>th</sup> January 2011)
- Tolhurst, D & Grainger. R .2005). *Organizational factors affecting teachers' use and perception of information & communications technology*. Australian computer society. Darhust Australia (online) <http://www.issuu.com/academic-conferences.org>.

- Unwin , T . (2004). towards a framework for teachers training in Africa.  
University of London: Royal Holloway
- Venkatesh, V. & Morris , M.G. (2000). Why do not men ever stop to ask for directions? Gender, social influence, and their role in technology acceptance and usage behavior. *MIS Quarterly*, 24(1), 115-139.
- Waema ,T.M. (2002). ICT human resource development in Africa: Challenges and strategies. ATPS Special paper series no. 10. *African Technology policy studies network. Nairobi. Kenya.*
- William. D, Coles, L. & Wilson, Richardson, A. (2000). Teacher and ICT; current use and future needs. *British journal of education Technology*, 3, (4), 307 – 302).
- Wong, S . L. Kamariah, A .B . Ramlah, H., & Rohani, A.T. (2002). Malaysian in-service teachers: An assessment of their IT preparedness. Proceedings in the International Conference on Computers in education (ICCE), Auckland: University of Massey.
- Woodrow, J. E. (1992). Locus of control and student teacher computer attitudes *Computers & education*, 14(s), 421 – 432.
- World Bank. (2004) .Contribution of ICTS to growth. World Bank, Washington DC USA.
- Young, B. J. (2000). Gender differences in student attitudes toward computers. *Journal of Research on Computing in Education*, 33(2), 204-217
- Yuen, H.K. & Ma, W.K. (2002). Gender differences in teacher computer acceptance. *Journal of Technology and Teacher Education*, 10(3), 365-382.

Zidon, S., & Miller, H. (2002). Affiliations of attitudes and experience with need for learning computer skills. *Journal of Research on Computing in Education*, 35 (2), 180-193.

## **APPENDICES**

### **Appendix I**

#### **Introduction Letter**

University of Nairobi

Department of Educational,

Administration and Planning

P.O. Box 30197-00100

Nairobi

The Principal

..... Secondary School

P.O.Box .....

Nyeri

Dear Sir/Madam

Re: Request for data

I am a Masters student at university of Nairobi .As part of the requirement for the award of degree, I am expected to undertake a research study. I am asking for your participation in a study that examines demographic factors and influence on ICT implementation. Kindly answer all questions as completely as possible. The research results will be used for academic purposes only and will be treated with confidentiality. Should you require a summary of the findings, please indicate so at the end of the questionnaire. Your cooperation will be appreciated.

Yours sincerely,

Reuben Nguyo Wachiuri

## Appendix II

### Questionnaire for Principals

#### Instructions

Answer the following questions in the spaces provided and tick where appropriate.

1. Which category does your school belong to?

i) Rural school ii) Semi urban school iii) Urban School

2. a) Which types of ICT do you have in your school?

(i) Radio.....(ii) Television...(iii) Cellular phones (iv) laptop computer (v) desktop computer (vi) intranet ...(vii) Extranet.....(viii) Internet (viii) Projectors.... (ix) Satellite systems...x) Digital cameras.... xi) email... xii) none.....

b).How many units of each type of ICT identified above does your school have?.....

3. Which strategies have you put in place for expansion of ICT in your school?.....

4. a) Identify the challenges faced in ICT implementation in your school?.....

b).Which measures have you put in place to overcome the challenges faced? .....

5. To what extent does the school organize training on use of different types of ICT (i) not at all.....(ii)to a little extent.....( iii) to a moderate extent ( iv)to a great extent.....( v)to a very great extent.....

**Appendix III**  
**Questionnaire for Teachers**

**Instructions**

The questionnaire has got two (2) sections (A and B). For section A, you will be required to give biodata and school information. For part B you will be required to write your own response on the spaces provided.

**Part A: General Questionnaire**

Personal information (please tick (✓) in the box the option to show your response.

1 What is your gender?

Male  Female

2. Which age bracket do you belong to?

20-29  30-40  41-49  50-60

3. What is your teaching experience?

Below 5 years  5-10 years  11-Above

4. Which is your highest level of ICT training?

Diploma  Undergraduate  Masters  PhD and above

None

5. Where do you reside?

Rural  Semi urban  Urban

6. What is your highest education level?

Diploma  Undergraduate  Masters  PhD and Above

**PART B**

**Please answer the following questions in the spaces provided and tick where appropriate**

1. How do you use ICT in the preparation of your lessons?.....

2. Which forms of ICT do you use in teaching (i) Radio.....(ii)

Television...(iii) Cellular phones (iv) laptop computer (v) desktop computer

(vi) intranet ...(vii) Extranet.....(viii) Internet (viii) Projectors.... (ix) Satellite

systems...x) Digital cameras... xi) email... xii) none.....

3. Do you normally use ICT in setting examinations and recording of marks?

(i) Yes (ii) No If yes how?.....

4. Do you use ICT to monitor students' progress? (i) Yes (ii) No

If yes how?.....

5. Have you undertaken any form of ICT in-service course? If yes how often?

.....

**THANK YOU FOR YOUR PARTICIPATION**



## **Appendix IV`**

### **Interview Schedule for Computer Teachers**

- 1) Which types of ICT do you use in your school?
- 2) In your own opinion what are the demographic factors that influence ICT implementation.
- 3) Identify ways in which ICT training has affected ICT implementation?
- 4) Substantiate whether education qualification has an effect on ICT implementation
- 5) Do you think teachers' teaching experience has any influence on ICT implementation?
- 6) Which strategies can be used to implement ICT successfully in public secondary schools?
- 7) Explain how you have been using ICT in-?
  - (a) Preparation of lessons
  - (b) Teaching
  - (c) Recording and analyzing marks.
  - (d) Monitoring student performance

## **Appendix V**

### **Observation Schedule**

1. Identifying the types of ICT and who uses them by visiting the different offices and departments in the school.  
(i) Radio..... (ii) Television..... (iii) Cellular phones..... (iv) Laptop computer..... (v) Desktop computer..... (vi) Digital cameras..... (vii) Projectors..... (viii) Satellite systems
2. Using a check list I will identify the number of each type of ICT with the assistance of the principal and the computer teacher.  
(i) Radio..... (ii) Television..... (iii) Cellular phones..... (iv) Laptop computer..... (v) Desktop computer..... (vi) Digital cameras..... (vii) Projectors..... (viii) Satellite systems.....
3. Comparing the forms of ICTs in rural, semi-urban and urban schools, using a checklist.  
(i) Radio (ii) Television (iii) Cellular phones (iv) Laptop computer (v) desktop computer (vi) Digital cameras (vii) Projectors (viii) Satellite systems (ix) email (x) internet (xi) intranet (xii) extranet
4. Checking whether the ICT available in the schools are in working condition.
5. Observe the use of various forms of ICT in preparation of lessons and Teaching.
6. Check for availability of computer rooms for students and teachers

## Appendix VI

### Research Authorization

REPUBLIC OF KENYA



## NATIONAL COUNCIL FOR SCIENCE AND TECHNOLOGY

Telegrams: "SCIENCETECH", Nairobi  
Telephone: 254-020-241349, 2213102  
254-020-310571, 2213123.  
Fax: 254-020-2213215, 318245, 318249  
When replying use **NCST/RR/12/1/SS-011/723**

P.O. Box 30623-00100  
NAIROBI-KENYA  
Website: [www.ncst.go.ke](http://www.ncst.go.ke)  
9<sup>th</sup> June, 2011  
Date:

Our Ref:

Reuben Nguyo Wachiuri  
University of Nairobi  
P. O. Box 30197  
NAIROBI

### RE: RESEARCH AUTHORIZATION

Following your application for authority to carry out research on "Effects of teachers demographic variables on implementation of information communication technology in public secondary schools in Nyeri Central District, Kenya" I am pleased to inform you that you have been authorized to undertake research in Nyeri Central District for a period ending *31<sup>st</sup> August, 2011*.

You are advised to report to the District Commissioner & the District Education Officer, Nyeri Central District before embarking on the research project.

On completion of the research, you are expected to submit one hard copy and one soft copy of the research report/thesis to our office.

A handwritten signature in black ink, appearing to read 'P. N. Nyakundi'.


**P. N. NYAKUNDI**  
**FOR: SECRETARY/CEO**

Copy to:

The District Commissioner  
Nyeri Central District

The District Education Officer  
Nyeri Central District

**Appendix VII**  
**Research Clearance Permit**

PAGE 2	PAGE 3
<p>THIS IS TO CERTIFY THAT:</p> <p>Prof./Dr./Mr./Mrs./Miss. <u>REUBEN NGUYO</u> <u>WACHIURI</u></p> <p>of (Address) <u>UNIVERSITY OF NAIROBI</u> <u>BOX 30197 NAIROBI</u></p> <p>has been permitted to conduct research in .....</p> <p style="text-align: right;">.....Location,</p> <p style="text-align: center;"><u>NYERI CENTRAL</u> District,</p> <p style="text-align: center;">.....CENTRAL.....Province,</p> <p>on the topic. <u>EFFECTS OF TEACHERS DEMO-</u> <u>GRAPHIC VARIABLES ON IMPLEMENTA-</u> <u>TION OF INFORMANTION COMMUNICATION</u> <u>TECHNOLOGY IN PUBLIC SECONDARY</u> <u>SCHOOLS IN NYERI CENTRAL DIST.</u> <u>KENYA.</u> 31ST AUGUST 20<u>11</u> for a period ending.....20<u>11</u></p>	<p style="text-align: right;">NCST/RRI/12/1/SS-011/723</p> <p>Research Permit No. ....</p> <p>Date of issue. <u>9/6/2011</u></p> <p>Fee received. <u>KSHS. 1000</u></p> <div style="text-align: center;"></div> <p style="text-align: center;"><i>D. Wachiuri</i></p> <p style="text-align: center;">Applicant's Signature</p> <p style="text-align: center;">Secretary National Council for Science and Technology</p>