

**THE USE OF INFORMATION AND COMMUNICATION  
TECHNOLOGIES (ICTs) IN ENHANCING TEACHING AND LEARNING  
IN PUBLIC PRIMARY TEACHER TRAINING COLLEGES IN KENYA**

**By  
Kara Augustine Muchiri**

University of NAIROBI Library



0501341 2

**A Research Project Submitted In Partial Fulfillment of the Requirements For  
The Award of Degree Of Masters Of Education In Educational Planning.**

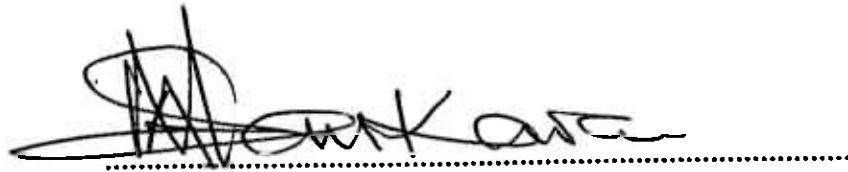
**UNIVERSITY OF NAIROBI**

**2008**

AG  
LB  
1028.46  
K37

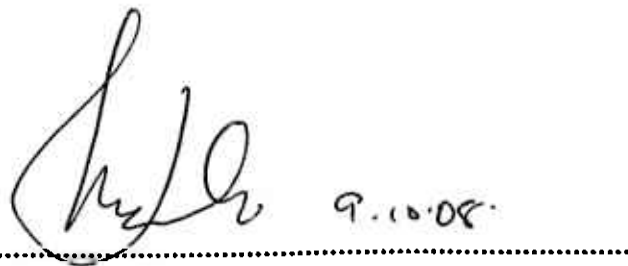
## DECLARATION

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

A handwritten signature in black ink, appearing to read 'KARA AUGUSTINE MUCHIRI', written over a horizontal dotted line.

KARA AUGUSTINE MUCHIRI

This research project has been submitted for examination with my approval as the university supervisor

A handwritten signature in black ink, appearing to read 'Loise Gichuhi', followed by the date '9.10.08', written over a horizontal dotted line.

DR. LOISE GICHUHI

Lecturer

Department of Educational Administration and Planning

University of Nairobi

## **DEDICATION**

I dedicate this work to my dear parents: Paul Kara Mumbu and Teresiah Mwihaki Kara and to my brothers and sisters.

Their love, support, patience and encouragement gave me the will and determination to complete my post graduate studies.



## **ACKNOWLEDGEMENT**

I extend my most sincere thanks to the following people and institutions for their kind assistance and tolerance without which this study would not have been successful: My supervisor Dr. Loise Gichuhi for her guidance, professional advice and constructive criticism which kept me going to the end and more so, her intersubjective presence whenever I required her assistance. I also extend my thanks to the Chairperson of the Department of Educational Administration and Planning, Prof. Kimani for his understanding and encouragement; to the members of the Department of Educational Administration and Planning whom we encountered each other during the course work and who helped me in shaping the study through their contributions during defence.

I also thank the University of Nairobi Staff Movement Programme for the financial assistance through out my studies and for funding part of the research. The University of Nairobi, I.D.S, World Bank, and the UNESCO Library, all supported the study materially and provided a reading space for the researcher. Special thanks to them.

My heartfelt appreciation goes to my mother; Teresiah Mwihaki Kara and father; Paul Kara Mumbu for their continued moral support in my academic endeavors. I cannot forget to pass my special tribute to my siblings; Njeri, Wachera, Wambui, Kimani and Kamau for any assistance they offered in the course of my studies. Their endless support and belief in me made me what I am today. I also want to

thank my very dear friend and companion Ruth Christine Cigua for her moral and financial support and for her encouragement through out my studies. To her, I am highly indebted.

Above all, I am grateful to the Almighty God for giving the wisdom, knowledge and life to pursue my studies successfully.

## **ABSTRACT**

The purpose of this study was to investigate the use of Information Communication Technologies (ICTs) in enhancing teaching and learning in public primary teacher training colleges in Kenya. Six research questions were formulated to guide in the study. Research question one was aimed at establishing the extent to which public primary teacher training colleges have established ICT infrastructure for use in enhancing teaching and learning. Question two aimed at establishing the extent to which tutors and teacher trainees are endowed with skills on ICT use in enhancing teaching and learning. Research question three sought to determine the attitudes of principals, tutors and teacher trainees towards the use of computers in teaching and learning. Research question four aimed at determining the extent to which tutors and teacher trainees had integrated ICTs in enhancing teaching and learning. Research question five aimed at investigating the challenges affecting the use of ICTs in enhancing teaching and learning. Research question six sought to investigate the factors which enhance the use of ICTs in teaching and learning.

The study applied a descriptive survey design and data was collected through the use of questionnaires and an observational schedule. The findings revealed that, public primary teacher training colleges had established some ICT infrastructure which was not adequate for teaching and learning needs. Majority of the tutors did not have access to the available ICTs compared to the teacher trainees. It was also revealed that both the tutors and the teacher trainees had basic computer skills but lacked in skills which required advanced use of ICTs such as use of internet for

information gathering, collaboration, and interactive learning between the tutors and the learners. The attitude of the principals, tutors and teacher trainees towards the use of computers in teaching and learning was positive implying acceptance that computers can be used to enhance teaching and learning.

The findings of the study revealed that there was a low uptake of ICTs in enhancing teaching and learning and the use of available ICTs was limited to the acquisition of basic ICT skills by the teacher trainees. Among the key challenges identified in use of ICTs in enhancing teaching and learning includes inadequate ICT infrastructure, lack of knowledge and skills on how to integrate ICTs in teaching and learning, lack of time to explore and integrate ICTs in the lessons and lack of technical assistance. Among the factors that would enhance the use of ICTs in teaching and learning include ensuring that teacher training colleges have adequate ICT infrastructure for both tutors and teacher trainees, training of tutors on use of ICTs in teaching and learning, posting of more ICT tutors who are qualified teachers, and allocating more time for ICT in the college timetable. Based on the findings, the study concluded that there was a low uptake of ICT in enhancing teaching and learning. The study recommended that the government should step in and upgrade the ICT infrastructure such as computer laboratories and internet connectivity. The study also recommended that the current ICT curriculum should be revised to ensure that it is geared towards the pedagogical value of ICTs instead of just equipping the learners with basic ICT skills such as Microsoft Software applications such as Word, Excel and Access.



**Further research on the perception of tutors towards the use of ICT in supporting teaching and learning and the most successful and relevant strategies for using ICT to change teaching and learning practices should be conducted.**

## TABLE OF CONTENTS

Contents	page
DECLARATION.....	ii
DEDICATION.....	iii
ACKNOWLEDGEMENT.....	iv
ABSTRACT.....	vi
TABLE OF CONTENTS.....	ix
LIST OF TABLES.....	xiv
LIST OF FIGURES.....	xvi
LIST OF ABBREVIATIONS.....	xvii

### CHAPTER ONE

INTRODUCTION.....	1
1.1 Background to the Study.....	1
1.2 Statement of the problem.....	8
1.3 Purpose of the study.....	9
1.4 Objectives of the study.....	9
1.5 Research questions.....	10
1.6 Significance of the study.....	11
1.7 Delimitations of the study.....	11
1.8 Limitations of the study.....	11
1.9 Basic assumptions of the study.....	12
1.10 Definition of significant terms.....	12

1.11 Organization of the the study.....	13
---	----

## **CHAPTER TWO**

<b>REVIEW OF LITERATURE.....</b>	<b>15</b>
2.1 Introduction.....	15
2.2 Definition of ICTs.....	15
2.3 Theoretical background.....	16
2.4 Global context on ICT use in education.....	18
2.5 African context.....	19
2.6 ICT in Education: Kenyan Context.....	20
2.7 ICTs in primary teacher training colleges in Kenya.....	21
2.8 Competencies required for the effective and efficient use of ICT in teaching and learning.....	23
2.9 Benefits of using ICTs in education.....	25
2.9.1 Supporting pre and in- service of teachers.....	25
2.9.2 Individual learner interactivity.....	26
2.9.3 Increasing access to global knowledge base.....	26
2.9.4 Enhancing the delivery of educational resources.....	26
2.9.5 Enhancing the efficiency and effectiveness of educational administration.....	27
2.9.6 Enhancing research.....	27
2.9.7 Enhancing education access and equity.....	27
2.10 Uses of ICTs in teacher training colleges.....	27
2.11 Challenges affecting the integration of ICT in teaching and learning.....	29
2.11.1 Attitude.....	29

1.11 Organization of the the study.....	13
---	----

## **CHAPTER TWO**

<b>REVIEW OF LITERATURE.....</b>	<b>15</b>
2.1 Introduction.....	15
2.2 Definition of ICTs.....	15
2.3 Theoretical background.....	16
2.4 Global context on ICT use in education.....	18
2.5 African context.....	19
2.6 ICT in Education: Kenyan Context.....	20
2.7 ICTs in primary teacher training colleges in Kenya.....	21
2.8 Competencies required for the effective and efficient use of ICT in teaching and learning.....	23
2.9 Benefits of using ICTs in education.....	25
2.9.1 Supporting pre and in- service of teachers.....	25
2.9.2 Individual learner interactivity.....	26
2.9.3 Increasing access to global knowledge base.....	26
2.9.4 Enhancing the delivery of educational resources.....	26
2.9.5 Enhancing the efficiency and effectiveness of educational administration.....	27
2.9.6 Enhancing research.....	27
2.9.7 Enhancing education access and equity.....	27
2.10 Uses of ICTs in teacher training colleges.....	27
2.11 Challenges affecting the integration of ICT in teaching and learning.....	29
2.11.1 Attitude.....	29

2.11.2 Training in ICT use.....	29
2.11.3 Access to ICTs and other related infrastructure.....	31
2.11.4 Administrative support.....	33
2.11.5 Awareness of appropriate use of ICTs in the teaching and learning process .....	34
2.11.7 Human resource for development and sustainability of ICT.....	35
2.11.8 Funding for ICT investment in education.....	35
2.11.9 Lack of locally produced content.....	36
2.11.10 Inadequate time to prepare and teach with ICT.....	36
2.11 Conclusion.....	36

### **CHAPTER THREE**

RESEARCH METHODOLOGY.....	40
3.1 Introduction.....	40
3.2 Research design.....	40
3.3 Population of the study.....	40
3.4 Sample size and sampling procedure.....	41
3.5 Research instruments.....	42
3.6.1 Validity of the instruments.....	43
3.6.2 Reliability of the instrument.....	44
3.7 Data collection procedure.....	45
3.8 Data analysis techniques.....	46

### **CHAPTER FOUR**

Data analysis, interpretation and discussion of findings.....	47
4.1 Introduction.....	47
4.2 Questionnaire return rate.....	47
4.3. Demographic information of respondents.....	47
4.3.1 Demographic information of the principals.....	41
4.3.2 Demographic information of the tutors at the teacher training colleges.....	52
4.3.3 Demographic information of teacher trainees.....	57
4.4 Extent to which public primary teacher training colleges have established for use in enhancing teaching and learning.....	60
4.5 Attitude towards the use of computers in supporting teaching and learning.....	68
4.6 The extent to which tutors and teacher trainees have skills in ICT use in enhancing teaching and learning.....	70
4.7 The extent to which tutors and teacher trainees have integrated ICTs in teaching and learning.....	90
4.8 Challenges affecting the use of ICTs in enhancing teaching and learning in teacher training colleges.....	107
4.9 Factors that would enhance the use of ICTs in supporting teaching and leaning in teacher training institutions.....	114

## **CHAPTER FIVE**

SUMMARY CONCLUSIONS AND RECOMMENDATIONS.....	116
5.1 Introduction.....	116
5.2 Summary.....	116

5.3 Conclusions.....	121
5.4 Recommendations.....	124
5.5 Policy implications.....	126
5.6 Suggestions for further research.....	127
BIBLIOGRAPHY.....	128
APPENDICES.....	139
Appendix a	
Transmittal letter.....	139
Appendix b	
Questionnaire for the principals.....	140
Appendix c	
Questionnaire for the tutors.....	146
Appendix d	
Questionnaire for the teacher trainees.....	152
Appendix e	
Observation schedule.....	157
Appendix f	
Public primary teacher training colleges' enrolment as at January 2007.....	158

## **LIST OF TABLES**

<b>Table</b>	<b>Page</b>
Table 4.3.1: Gender distribution of the principals.....	48
Table 4.3.2: Age of the Principals.....	48
Table 4.3.3: Professional qualifications of the Principals.....	49
Table 4.3.4: Respondents' experience as principal the whole of their career.....	50
Table 4.3.5: Respondents' experience as college principal in the current station....	51
Table 4.3.6: Number of teacher trainees currently enrolled in the sampled colleges.	52
Table 4.3.7: Gender of the tutors.....	53
Table 4.3.8: Professional qualifications of the tutors.....	54
Table 4.3.9: Year of study for the teacher trainees.....	57
Table 4.3.10: Age distribution of the teacher trainees.....	59
Table 4.3.11: Cluster subject specialization of the teacher trainees in second year.	60
Table 4.4.1: Availability of various ICTs in teacher training colleges.....	62
Table 4.4.2: Functioning computers in computer laboratories in the colleges.....	64
Table 4.5 (a): Results of attitude scale for the principals.....	69
Table 4.5 (b): Results of attitude scale for the tutors.....	69
Table 4.5 (c): Results of attitude scale for the teacher trainees.....	69
Table 4.6.1: Theme of the ICT course/training that the tutors had attende.....	72
Table 4.6.2: Tutors expertise in creating students reports using MS Word.....	76
Table 4.6.3: Tutors expertise in use of power point.....	77
Table 4.6.4: Tutors expertise in searching the internet.....	79



Table 4.6.5: Teacher trainees who had received training on ICT use.....	81
Table 4.6.6: Teacher trainees' expertise in creating a document on a computer.....	85
Table 4.6.7: Teacher trainees' expertise in attaching files to an E –Mail.....	88
Table 4.7.1: Use of MS Word or desktop publishing by tutors.....	91
Table 4.7.2: Use of computers to calculate marks and other assessments.....	92
Table 4.7.3: Tutors use of computers to monitor teacher trainees' enrolment.....	93
Table 4.7.4: Tutors accessing the internet to find and collect lesson ideas.....	94
Table 4.7.5: Tutors having teacher trainees watch video to obtain information.....	95
Table 4.7.6: Tutors having teacher trainees use computers to write assignments....	96
Table 4.7.7: Tutors having teacher trainees use computers to process data.....	97
Table 4.7.8: Tutors use of ICTs to deliver educational resources to teacher trainees.....	98
Table 4.7.9: Tutors use of ICTs to engage and motivate the teacher trainees.....	99
Table 4.7.10: Tutors having teacher trainees record their class presentations for discussion.....	100
Table 4.7.11: Use ICTs for acquisition of basic ICT skills.....	101
Table 4.7.12: Use of ICTs to access information.....	103
Table 4.7.13: Use of computers for composing, editing and presenting project work.....	104
Table 4.7.14: Discussion of audio and video training materials.....	105
Table 4.7.15: Teacher trainees use E – Mail to share information.....	106
Table 4.8.1: Availability of personnel in the ICT department.....	111

## **LIST OF FIGURES**

<b>Figure</b>	<b>page</b>
Figure 1: Conceptual framework for the study.....	38
Figure 2: Age of the tutors.....	53
Figure 3: Respondents' experience as tutors in the whole of their career.....	55
Figure 4: Respondents' experience as a tutor in their current college.....	56
Figure 5: Gender of the teacher trainees in the teacher training college.....	58
Figure 6: Tutors who had attended an ICT course or training.....	71
Figure 7: Tutors expertise in basic computer part and functions.....	73
Figure 8: Tutors' expertise in software applications.....	75
Figure 9: Tutors expertise in use of E - Mail.....	78
Figure 10: Tutors expertise in technology management such as trouble shooting...80	80
Figure 11: Teacher trainees' expertise in opening a file on a computer.....	84
Figure 12: Teacher trainees' expertise in printing a computer document or file.....	86
Figure 13: Teacher trainees' expertise in writing and sending E - Mails.....	87
Figure 14: Teacher trainees' expertise in copying/downloading files.....	89

## **LIST OF ABBREVIATIONS**

<b>ASALs:</b>	Arid and Semi Arid Lands
<b>CFSK:</b>	Computer for Schools in Kenya
<b>DFID:</b>	Department for International Development
<b>EFA:</b>	Education for All
<b>FPE:</b>	Free Primary Education
<b>GOK:</b>	Government of Kenya
<b>ICTs:</b>	Information and Communication Technologies
<b>IEC:</b>	International Extension College
<b>IIEP:</b>	International Institute for Educational Planning
<b>IPS:</b>	Information Programme and Services
<b>IRI:</b>	Interactive Radio Instruction
<b>IT:</b>	Information Technology
<b>KESSP:</b>	Kenya Education Sector Support Programme
<b>MOEST:</b>	Ministry of Education Science and Technology
<b>NEPAD:</b>	New Partnership for Africa's Development
<b>NFE:</b>	Non Formal Education
<b>PTR:</b>	Pupil Teacher Ratio
<b>PTTCs:</b>	Primary Teacher Training Colleges
<b>PPTTCs:</b>	Public Primary Teacher Training Colleges
<b>RAM:</b>	Raw Access Memory
<b>TTCs:</b>	Teacher Training Colleges

<b>UN:</b>	<b>United Nations</b>
<b>CD:</b>	<b>Compact Disk</b>
<b>DVD:</b>	<b>Digital Versatile Disk</b>
<b>MDGs:</b>	<b>Millennium Development Goals</b>
<b>UNESCO:</b>	<b>United Nations Educational, Scientific and Cultural Organization</b>
<b>UPE:</b>	<b>Universal Primary Education</b>
<b>AIDS:</b>	<b>Acquired Immuno Deficiency Syndrome</b>

## **CHAPTER ONE**

### **INTRODUCTION**

#### **1.1 Background to the Study**

It is essential to have motivated and well trained teachers if the Millennium Development Goals (MDGs) for Africa have to be achieved by 2015 (UN, 2004). Without successful teacher training programmes, it will be impossible to ensure that all boys and girls complete a full course of primary schooling, and that gender disparity in primary and secondary education is eliminated (UNESCO, 2003).

Given the very importance of teacher training, it's not surprising that more emphasis is placed on its enhancement by national governments, donors, and civil society organizations alike. The urgency of the issue has frequently been identified. In the Draft Initiative for Teacher Education in Africa, UNESCO (2004) emphasized that an estimated 4 million additional teachers are needed by 2015 to meet the Universal Primary Education (UPE) and Education for All (EFA) goal alone. The EFA Global Monitoring Report (2002) indicated that 180 million children in Africa will be enrolled in primary school by 2015 hence the need for the education system to attract, educate and retain sufficient numbers of well qualified teachers (UNESCO, 2002b).

The number of teachers required is hugely insufficient especially when the decimating influence of HIV/AIDS in Africa is factored in (Unwin, 2004). The

Department for International Development (DFID, 2001) reported that in Zambia, for example, it has been estimated that more teachers are dying of HIV /AIDS related illnesses than are being trained. The number of primary school teachers who died in 2000 in that country is equivalent to 45 percent of all teachers that were educated that year (UNESCO, 2002b). Over and above this, there is a pressing need for teachers with a minimal level of training to have opportunities to upgrade their skills and qualifications. In countries like Ghana, Malawi and Zambia, untrained and under-qualified teachers make up a significant percentage of the teaching force (Mattson, 2006). In Ghana alone, it was estimated that in 2003, there were 30,000 untrained teachers working in schools (DFID, 2001).

The Report on the Task Force on Implementation of Free Primary Education (2003) clearly suggest that pre-service teacher training programmes should be redesigned to prepare the trainees to cope with emerging challenges of Universal Primary Education (UPE) (G.O.K, 2003). On the other hand, the nature of the Teacher Training Colleges (TTCs) is supposed to be influenced by the demands of achieving the objectives of the “2030 industrialization” Policy and the international commitments to “2015 Education for All (EFA)” goals. Issues relating to globalization, modernization, and technology need to be taken on board (Galabawa, 2003).

The growth of the global economy and the information based society has pressurized education systems around the world to use the new Information and Communication Technologies (ICTs) to teach students the knowledge and skills

they need in the 21<sup>st</sup> century (World Bank, 2004). The rapid development of these new technologies coupled with the world-wide challenge to educate all children has led to a global reform and development in teacher education and motivated educational institutions to redesign and restructure their teaching methods such as to enable the students to equip themselves for the future (Moon, 2004).

The growth of the ICT sector has challenged teacher training institutions to prepare a new generation of teachers to effectively use the new teaching and learning tools in their teaching profession (UNESCO, 2002a). Teacher education institutions and programmes have a critical role to provide the necessary leadership in adapting pre-service and in-service teacher education to deal with the current demands of society and economy. Moreover, teacher education institutions and programmes must also provide leadership in determining how new technology can best be used in the context of culture, needs and economic conditions within their country (UNESCO, 2002a).

Laferriere, Breuleux and Bracewell (1999) argue that there are significant benefits of using ICT as part of the teaching and learning process as long as teachers recognize the relationship between use of ICT and overall curriculum. Haddad and Draxler (2005) claim that different ICTs do make some valuable contributions to various parts of educational development and effective learning through expanding access, promoting efficiency, improving the quality of learning, enhancing quality of teaching, and improving management systems. Furthermore, Haddad and Jurich (2005) elaborate on the introduction of ICTs for educational purposes and the

resulting benefits in that it brings about positive changes in teaching practices. According to Galagan (2002), the advantages that technology provides to training and learning include not only the possibility of one-on-one interaction for every learner and the ability to simulate new ideas but also the chance to try out things at ones own pace and fail in private without the fear of ridicule from other students. The Internet, according to Webb, Jones, Barker and Schaik (2004), has also become an important instructional tool to facilitate the transfer of many types of information from one computer to another, and is rapidly becoming an effective means of communication in students and colleges.

According to Poole (1998), educators in United States of America are able to put computers to good use in preparing teaching and learning materials by using computer-based document production and record keeping. They are able to produce syllabi, schedules and classroom materials professionally and more efficiently using computers. By use of productivity tools such as word processors, database management software, communication systems and graphic tools educators are able to 'duplicate excellence' in managing the process of teaching and learning. According to Unwin(2004) computers and Internet can be used to increase teachers' basic skills and subject mastery, to provide access to resources that can latter be used in classroom, and to help teachers build familiarity with specific instructional approaches. Research done by Bransford, Brown and Cocking (1994) showed that ICT can enhance critical thinking, information handling skills, the level of conceptualization, and problem solving capacity.



Privateer (1999) also notes that ICT is supposed to add value to education and to support more effective pedagogy by providing knowledge for learners and by enhancing communication that promotes learning. Gregoire, Bracewell and Laferriere (1996) also noticed that the opportunities for networking and collaborative learning indicate that several principles or theories, which promote learning, can be more easily integrated in teaching.

The Dakar Framework for Action (World Education Forum, 2000) identified the use of ICTs as one of the main strategies for achieving the Education For All (EFA) goals. This is a view also supported by the Ministry of Education Science and Technology (MOEST) which views ICT as having the potential to support the implementation of Free Primary Education (FPE) and to address the emerging challenges including crowded classrooms, high pupil teacher ratio (PTRs) particularly in densely populated areas, and shortage of teachers in certain subjects and areas, and relatively high cost of teaching and learning materials (G.O.K, 2005a). Thus, for FPE to reap the full benefits of ICT in teaching and learning, it is essential that pre-service and in-service teachers have basic ICT skills and competencies (UNESCO, 2002a).

According to the Government of Kenya, Ministry of Education Science and Technology (MOEST) ICT in Education Options Paper (G.O.K, 2005a), providing pre-service teachers and other educational professionals with access to and use of ICT is one key component to developing the necessary human capital which the education sector requires for the wide adoption of technology. Teachers as

multipliers of knowledge are the key agent in respect to education change and innovation and, therefore, they are a foundation for any new strategy and innovation in education to establish. Each teacher trained in the use of ICT is capable of sharing that knowledge/ learning and cross cultural awareness among at least forty students in Africa and in some cases more than two hundred in one class (Leach and Moon, 2002).

The pedagogical experiences of primary pre-service teacher trainees in the use of ICTs such as Interactive Radio Instruction (IRI), computers and internet, video, Compact Disk-Read Only Memory (CD-ROM), among others, is key to ensuring that costly ICT infrastructure supply initiatives in Kenyan primary schools by organizations such as Kenya Education Network (KENET), Computer for Schools in Kenya (CFSK), School Net Kenya, Network of Initiatives in Computer Education (NICE), and donor partners are not wasted because of lack of an ICT literate teaching force.

According to Murphy and Greenwood (1998), ICT is significantly under-utilized by students and teachers. The problem is worldwide and many explanations were offered for it, among them being the unavailability and or inaccessibility of resources in schools (Wild, 1996; Dearing, 1997). The scarcity of opportunity to use computers, lack of experience and training at the pre-service level in using ICT, lack of teacher trainee or teacher trainer encouragement to use ICT and, lack of confidence on the part of student teachers and their trainers in computing skills were cited as reasons why students and teachers were slow in the uptake of ICT

(Oliver, 1993; Van Braak, 2001). Baylor and Ritchie (2002) also observe that regardless of the amount of technology and its sophistication, technology will not be used unless faculty members have the skills, knowledge and attitudes necessary to infuse it into the curriculum.

According to GOK (2006a) there is considerable technology lag in the Kenyan educational institutions. Most of the institutions still use nearly obsolete systems and consequently are unable to exploit educational potential of the emerging technologies. Use of ICT in education at all levels is limited by poor ICT infrastructure, weak policy and regulatory framework, limited number of teachers who are ICT proficient, low telecommunication services penetration and poor quality services (Abdulrazak, 2005). Access to ICT facilities is presently one of the major challenges in Kenya and other African countries. The Government of Kenya, Ministry of Education Draft Information and Communication Technology Strategy for Education and Training (2006) notes that the ratio of 1 computer to 15 students is the norm in most of the developed countries. The ratio in Africa stands at 1 computer to 150 students. In Kenya, the ratio for universities and colleges is one computer to 45 students, at secondary schools level, the ratio is 1 computer to 120 students and primary schools remain much more limited to 1 computer to 250 students (G.O.K, 2006b).

In an effort to boost the ICT capacity for education and training, the Ministry of Education has already implemented an ICT programme in all the public primary teacher training colleges (PPTTCs). Almost all PPTTCs have computer labs and

are making bold efforts to establish and improve PTTC ICT capacity (G.O.K, 2005a).

According to Unwin (2004), there is a gap between those advocating for the use of ICT in teacher education and the classroom practice. Several investments into computerizing schools have failed to live up to the ambitious aspirations of those who have promoted them. The GOK (2006b) also notes that most schools use less than 40 percent of the available ICT infrastructure and there is therefore a need to ensure optimum use of ICT resources by students, teachers and administrators in order to exploit educational potential of the technology. It is against this background that the researcher intends to investigate the use of Information and communication Technologies in enhancing teaching and learning in public primary teacher training colleges in Kenya.

### **1.2 Statement of the problem**

There is an urgency to improve the quality of teaching and learning in teacher training and ICT is perceived as a necessary tool for this purpose. However, the presence of ICT infrastructure alone will not stimulate significant changes in teaching and learning. Teachers are an important ingredient in the implementation of ICT in education. Without involvement of teachers, most students may not take advantage of all the available benefits on their own. Teacher trainers and teacher trainees need to actively participate in using ICTs. They must have a positive attitude and acquire skills and competencies that will enable them to integrate

ICTs in the teaching - learning processes in order to enhance critical thinking and creativity.

The effective use of technology in teaching and learning is directly associated with the intertwining of technical and social elements which must be overcome in order to tap the full potential of ICTs. ICTs have a powerful impact on meeting basic teaching-learning needs, and it is clear that the educational potential of these new technologies has barely been tapped in the Kenyan teacher training institutions. There was therefore a need to establish the use of ICTs in supporting teaching and learning in teacher training institutions. This study therefore aimed at investigating the use of ICT in enhancing teaching and learning in primary teacher training colleges in Kenya.

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

The purpose of this study was to investigate the use of ICTs in enhancing teaching and learning in public primary teacher training colleges (PPTTCs) in Kenya.

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

The study was set to investigate the following objectives

1. Investigate the extent to which public primary teacher training colleges have established ICT infrastructure for use in enhancing teaching and learning.
2. Establish the extent to which tutors and teacher trainees are endowed with skills on ICT use in enhancing teaching and learning.

3. Investigate the principals, tutors and teacher trainees' attitude towards the use of computers in teaching and learning.
4. Investigate the extent to which tutors and teacher trainees have integrated ICTs in enhancing teaching and learning.
5. Identify the challenges affecting the use of ICTs in enhancing teaching and learning.
6. Establish the factors which encourage the use of ICTs in enhancing teaching and learning.

### **1.5 Research questions**

Based on the objectives, the following were the research questions for examination in this study:

1. To what extent have public primary teacher training colleges established their ICT infrastructure for use in enhancing teaching and learning?
2. To what extent are tutors and teacher trainees endowed with skills on ICT use in enhancing teaching and learning?
3. What are the principals, tutors and teacher trainees' attitude towards the use of computers in teaching and learning?
4. To what extent have tutors and teacher trainees integrated ICTs in teaching and learning?
5. What are the challenges affecting the use of ICTs in enhancing teaching and learning processes?

6. Which are the factors that encourage the use of ICTs in enhancing teaching and learning processes?

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

Data and information obtained in this study will hopefully provide education policy makers and managers/administrators with information to help formulate their teacher training programmes involving ICTs for education. It may also help MOEST in formulating institutional capacity building framework to empower ICT users in education. The study will also make possible recommendations towards increasing the use of ICTs in enhancing teaching and learning processes. Data obtained from the study will also be a basis for future research.

### **1.7 Delimitations of the study**

In this study, not all teacher training colleges in Kenya were covered. The study concentrated only on public primary teacher training colleges in Kenya. Private primary teacher training colleges and universities have a significant input in pre-service and in-service teacher training but were not covered and the findings therefore do not reflect the overall situation of ICT use in enhancing teaching and learning processes in teacher education.

### **1.8 Limitations of the study**

The ICT sector is highly dynamic and could change in a short span of time making the findings obsolete. The principals, instructors, and teacher trainees may have

given responses that tended to cover up their weaknesses in using ICTs for purposes of safeguarding their self interests. It was also not possible to use related literature research on use of ICTs to enhance teaching and learning in Kenya primary teacher training colleges to adequately support or disapprove the findings of the study. However this limitation was minimized by including related research done in other countries.

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

The study assumed that:

- (i) Principals, tutors and teacher trainees were conversant with the various uses of ICTs to enhance teaching and learning.
- (ii) Primary teacher training institutions had the required capacity to support the use of ICTs in enhancing teaching and learning.
- (iii) There were a number of factors that affect the use of ICTs to enhance teaching and learning processes in educational institutions.

### **1.10 Definition of significant terms**

**Information and Communication Technologies:** Refers to equipments such as computers, the internet, CD Rom, and other software, radio and television, video and digital cameras that can be used by teachers to support the teaching and learning process.



**Public primary teacher training institution:** Refers to educational institution owned and financed by the government and charged with the responsibility of training teachers to teach in primary schools.

**Capacity building:** Refers to activities that improve an organization/institution ability to achieve its mission or a person's ability to define and realize his or her goals or do a job effectively.

**Hardware:** Refers to the physical components of a computer

**Software:** Refers to computer programmes and data.

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

The study was organized into five chapters. Chapter one covered introduction and comprised of the background, the statement of the problem, purpose of the study, objectives of the study, research questions, significance, limitations, delimitations, basic assumptions of the study, definition of significant terms and the organization of the study. Chapter two covered literature review on what ICTs in education entail, theoretical background in use of ICT in teaching and learning, global overview of ICT, ICT in education in the African context, ICT in education in the Kenyan context, competencies required for the effective and efficient use of ICTs in teaching and learning, benefits of using ICT in education, uses of ICTs in teacher training colleges, and factors affecting the use of ICT in teaching and learning in educational institutions. Chapter three described the research methodology used. This included the research design, target population, sample

and sampling procedure, and data analysis techniques. Chapter four focused on data analysis, interpretation and discussion of findings. Chapter five contained the summary, research findings, discussion, conclusion, and recommendations.

## **CHAPTER TWO**

### **REVIEW OF LITERATURE**

#### **2.1 Introduction**

This chapter discussed literature on what ICTs in education entail, theoretical background in use of ICT in teaching and learning, global overview of ICT, ICT in education in the African context, ICT in education in the Kenyan context, competencies required for the effective and efficient use of ICTs in teaching and learning, benefits of using ICT in education, uses of ICTs in pre - service teacher training, and factors affecting the use of ICT in teaching and learning in educational institutions. Specifically, this review provides a framework of understanding regarding this study.

#### **2.2 Definition of ICTs**

ICTs are defined as a diverse set of technological tools and resources used to communicate and to create, disseminate, store and manage information (Blurton, 1999). ICTs can be divided into two groups: traditional or old ICTs (namely, radio and television) and the new ICTs (namely, the internet and telecommunications). Certainly, in educational practices, information technology falls into two parts:

1. Computer technology, which is computer based course, computerized tests, word processors, graphics software, spreadsheets, data bases, and presentation software.

2. Telecommunication software, which offers distance courses, distributed educational resources, e-mail, video conferencing, bulletin boards, white boards and charts. (Juma, 2004).

### **2.3 Theoretical background**

According to Mishra (2002), Villalba and Romiszowski (2001), three schools of thought have been widely used in the use of technology for learning purposes. These include: behaviourism, cognitive psychology, and constructivism. Of the three, constructivism has been identified as the most suitable one for use of ICT in teaching and learning (Hung, 2001). Constructivist learning theory is based on education psychology. Jean Peaget (1896-1980) was the first theorist who regarded children as 'builders of their intellectual structures'. Another Soviet psychologist Lev Semanovitch Vygotsky (1896-1934) studied how children learn through communication with others (such as parents and peers). These educational theories have further been developed by a number of constructivists (Wilson, 1996; Duffy, Lowyck and Jonassen, 1993; Papert, 1980) in recent years. With the rapid development of ICTs, especially computer-based teaching and learning, several teaching models based on the constructivist theory, such as Problem Based learning (PBL) and Case Based Learning (CBL), have widely been adopted (Lou, 2005).

In comparison with other teaching methodologies, approaches based on constructivism have certain unique characteristics. These include:

1. Student-centred learning, students have more control on their study;
2. Group work, students are divided into groups when they are learning which in turn can help them improve their communication skills; and
3. During the process of learning knowledge, the ability to learn is developed, with tasks such as: seeking meaning; forming opinions; evaluating information; and thinking critically (Lou, 2005).

In a constructivist learning environment, the role of the lecture shifts from being the source of knowledge to facilitating learning. Khine (2003) argued that students should not be left to explore alone, rather lecturers should provide support, coaching and modelling to the students to make certain learning takes place. Unlike the teacher-centred model in which lecturers impart knowledge to students, 'knowledge for constructivism can not be imposed or transferred intact from one knower to the mind of other' (Kargiorgi and Symeou, 2005). Research carried out in an ICT supported Constructivism learning environment such as World Links for Development Programmes ([www.worldbank.org/worldlinks/](http://www.worldbank.org/worldlinks/)) demonstrated the impact of the Programme on student learning. Quellmalz and Zales (2000) designed a special assessment instrument that measures student's technology knowledge and use, their reasoning with information, and their communication skills. Students from six schools in Uganda who had participated in the programme took the assessment, along with students in four schools that had not participated in the programme. Students in the World Link for Development schools outperformed non-World students in all measures. Teachers agreed with

the students' assessment. A large majority of teachers agreed that students improved their information, communication, collaboration, and technical skills and attitudes, as a result of participation in the programme. However, putting lecturers and students in an ICT supported constructivist teaching-learning environment does not guarantee constructivist learning. Russell and Schneiderheinze (2005) argued that a critical factor which shaped how lecturers used ICT to support learning was the lecturer's academic belief and acceptance of constructivism. Rickards (2003) observed that a problem for many is developing skills to effectively utilize ICT in a meaningful manner. Against this theoretical background, it is important to investigate the various applications of ICTs in enhancing teaching and learning in primary teacher training colleges.

#### **2.4 Global context on ICT use in education**

Today, most countries include ICT integration, either in the national policies or in the laws pertaining to the education sector. In Australia, for example, the Commonwealth Government has set goals for schools in relation to ICT development. The Government wants students to leave schools as confident, creative and productive users of new technologies on society ([http://www.curriculum.edu.au/mceetya/national\\_goals/natgoals.html](http://www.curriculum.edu.au/mceetya/national_goals/natgoals.html)). The same trend is seen in Indonesia, Malaysia, Uzbekistan, Vietnam and others, where the national governments set goals for ICT integration in education. In Asia and the Pacific, including emerging countries, teachers in primary, secondary and tertiary

levels are being trained in the use of ICTs in education with varying degree of scope. Most of the training programmes carry general objectives aimed at developing awareness, knowledge and skills in either the use of computers per se, or the integration of computers into teaching and learning (IPS, 2003).

## **2.5 African context**

In Africa, pre-service teacher training institutions in even the poorest African countries are slowly being equipped with computers, and increasingly, teachers are being exposed to this technology, through various school networking initiatives as well as the presence of telecentres, multi purpose community centers and internet cafe's ( James, Hesselmark, Akoh, and Mware, 2003).Among the most ambitious African initiatives is the NEPAD e-school programme (<http://www.nepad.org/en.html>). This has developed through various guises since its announcement at the African Economic Summit in Durban in June 2003, and does now place the important role of teacher training. Never the less, as with so many other educational –ICT initiatives in Africa, its focus remains primarily on the importance of giving pupils and teachers ICT skills, rather than on using ICT to enhance their wider learning experience. A review of experience with ICTs in education project by IEC (2001) finds that in Africa, projects tend to follow a pattern of high levels of initial motivation, followed by a drop off in stakeholder interests and low levels of take-up.

## **2.6 ICT in Education: Kenyan Context**

In her 2005 ICT in Education Options Paper, 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 (G.O.K, 2005b) and the Kenya Education Sector Support Programme (KESSP) document (G.O.K, 2005c) and which include: Quality Teaching and Learning through ICT; ICTs in teacher training colleges; ICT for in-service teacher training; interactive radio interaction (IRI) for in-service teacher training and open and distance learning among others.

Despite the attendant benefits of use of ICT in education, and the Government's recognition of the potential of ICT to enhancing development, Kenya's involvement in the ICT revolution in education is still low. In a research project (Kenya School Net, 2003) conducted in November 2002, only 46.4% of the sampled schools had computers although there did appear to be a high level of awareness of the benefits of computers in schools. Almost 40% of schools had less than 10 computers, and therefore inadequate numbers for teaching and learning. More than 20% had less than 5 computers indicating that the computers were largely used for administrative purposes.

Ndiku (2003) conducted a research based on the experience of managers and computer teachers in eight schools in Uasin Gishu District, Western Kenya, with a



focus on problems encountered in the implementation of educational ICT projects. The research identified the following as the most significant factors inhibiting the success of computer development projects: Insufficient numbers of computers and peripheral devices; teacher's lack of knowledge; inadequate software for instruction and inadequate technical assistance. In another study by Wims and Lawler (2007) investigating the use of computers in educational institutions in Keiyo District, Rift Valley Province in Kenya, half of Keiyo's District 32 secondary schools had at least some computer equipment installed. Just over half of these (28% of all schools) offered computer lessons to students. The ratios of students to computers were as follows: St. Patrick's high school, 25:1, Singore Girls secondary school, 32:1, and Baraka Agricultural college 4:1. No institution, however, had more than two students per machine during lessons. The software installed on these PCs for use by students came exclusively from Microsoft Office®. The cost of licenses for these software packages was prohibitive for most educational institutions. No educational software in any subject was found. No secondary school in Keiyo District exploited the resource of the internet for educational purposes. The teachers interviewed appeared not to use internet to search information related to their teaching and learning.

## **2.7 ICTs in primary teacher training colleges in Kenya**

According to Kenya Education Sector Support Programme (G.O.K, 2005c), the government is committed to the improvement of Primary Teacher Education and

has continuously reviewed the programme to make it more relevant to the needs of the country and in line with the latest international trends in teacher education. Currently there are 20 public primary teacher training colleges (PTTCs) in Kenya, almost all of which have computer labs and are making bold efforts to establish and improve PTTC ICT capacity (G.O.K, 2005a). Due to lack of funding, however, a number of challenges have emerged:

- Access to computers for students is poor. PTTCs enroll 500 to as many as 1000 students with 68-80 staff members. In most cases, the number of functioning computers is around 15 which if made available to students, each student has only 1 hour per week at a computer. This is not sufficient.
- The condition of the computers is not up to very basic standards. Many of the computers are donated by different organizations and have inadequate RAM, processors and software. PTTCs do not require the latest ICT equipment, but it must be of a very basic level.
- The Teacher Service Commission is unable to find qualified Education Technology instructors. Many of the ICT teachers are hired by the Board of Directors for their computer knowledge but are not qualified teachers and have no background on pedagogy.

With these difficulties faced, a number of positive factors have been identified regarding the integration of ICTs at the PTTCs:

- ICTs are demand driven from PTTC's Board of Directors and Association of Principals, so there is very little need to sell the value of ICTs.
- Many PTTCs have already designated a secure place for ICT infrastructure.
- Many of the PTTCs have mechanisms in place where they are charging ICT fees to students- one of the keys to sustainability models.
- PTTCs are ready for leverage usage of ICTs for education as evidenced in multiple visits (G.O.K, 2005a).

## **2.8 Competencies required for the effective and efficient use of ICTs in teaching and learning**

According to Waugh and Handler (1997), most educators in developing countries during the late 1990s were not competent to use computers in education. Pascopella (2001) further notes that, globally, most educators are not competent to integrate application software meaningfully into the learning content of a learning area, and this may be the reason that schools do not appear to be exploiting the opportunities offered by ICTs. Fisher (1996) in his study provided a view of the top ten IT competencies require of pre-service teachers as perceived by practicing teachers in United States of America schools. The findings revealed that competency to use different technological tools is a pre-requisite for increasing technological use by teachers. Robertson (1996) studied the snapshot of IT skills of teachers in a secondary school prior to their receiving personal computers.

Majority of teachers remained unsatisfied with the gap between potential of computer use and quality of in-service training in the use of IT in general. The findings highlighted the need for adequate and careful teacher training on the gadgets which are supposed to be used in the classroom setting. The study by Russel, Finger and Russel (2000) aimed at establishing baseline information about teachers experience and skills in ICT. The investigation revealed that teachers saw themselves as competent with basic computer skills but were less confident with activities requiring advanced use of computers. According to Digital Links International (2000), there is almost universal interest among teachers in becoming computer literate. This interest can be tapped for educational purposes. Coral (2001) suggests that training in educational ICT should not only be confined to acquiring computer literacy skills, but should extend to using ICTs as a means to enable educators to change the way they teach. IPS (2003) notes that teacher training on ICT use in teaching and learning must focus on the following key areas.

1. Basic ICT literacy dealing with hardware and software applications without necessarily being connected to teaching and learning.
2. Basic ICT literacy but in relation with or in support of teaching and learning activities.
3. Use of ICT in teaching specific subjects in the classrooms; the internet as a pedagogical innovation and use for collaborative activities; trouble shooting and school/classroom management.

Shapka and Ferrari (2003) note that ICT gender inequalities create specific challenges for pre – service teacher training. Pre – service training programmes should consider possible gender differences in use of ICT. They should provide aspiring teachers with versatile gender inclusive ICT training, which allows females and males to attain high levels of ICT literacy. Kirkpatrick and Cuban (1998) noted that the gender gap is narrowed when both genders are exposed to the amounts and types of experiences on computers.

Among the strategic objectives to build ICT capacity for the Kenyan education sector is to ensure that all players in the education sector have ICT skills (G.O.K 2006b). There is hence a need to investigate the extent to which both tutors and learners in primary teacher training institutions have acquired the necessary skills and competencies which are required for the wider adoption of technology in the Kenyan education sector.

## **2.9 Benefits of using ICTs in education**

### **2.9.1 Supporting pre and in- service of teachers.**

Teacher education using new ICTs is increasingly becoming popular because of the possibility of multiplier effects, greater interactivity between students and tutor, opportunities for learners to proceed at their own pace, the possibility of combining video, audio, and texts to improve delivery and quality of instruction, and finally, the possibility of establishing teacher resource centers with access to

power and telecommunications equipped with computers and internet facilities (Sanyal, 2001).

### **2.9.2 Individual learner interactivity**

Recent trends towards the constructivist approach and teacher–learner interaction suggest that the learning process can be enhanced through the use of technology, which adapts to the presentation of user needs, preferences and requests. Due to the interactive nature of the Internet, it is well suited for a creative learning approach in which experimentation and critical thinking are emphasized (World Bank, 2004).

### **2.9.3 Increasing access to global knowledge base**

Perhaps the clearest benefit of internet to education comes from the ability to share knowledge and experiences with an emerging networked global community. Students can actively seek out their counterparts in other countries to develop joint research projects on a variety of topics. (World Bank, 2004). Furthermore, online resources offer teachers access to a vast and diverse collection of educational materials enabling them to design curricula that best suits the needs of their learners (<http://go.worldbank.org>).

### **2.9.4 Enhancing the delivery of educational resources**

ICTs can be used to provide immediate and up to date resources using one or more media to a large number of educators and learners in an easy and cheap way.

Changes made to resources are immediately available to educators and students without incurring major distribution costs (Karani, 2005).

### **2.9.5 Enhancing the efficiency and effectiveness of educational administration**

New technologies can help improve the quality of administrative activities and processes including human resource management, student registration and monitoring of students enrolment and achievement (Mugenda, 2006).

### **2.9.6 Enhancing research**

The development of scientific research networks on a worldwide basis, usually over the internet, is also helping to empower indigenous research and development programmes in developing countries. Virtual research groups composed of interconnected specialists in different parts of the world allow databases to be shared, conferences to be organized, papers to be circulated and discussed, and collaborative research and report to be undertaken (Mugenda, 2006).

### **2.9.7 Enhancing education access and equity**

ICTs can and are used to extend educational provisions through enhanced distance education opportunities. The World Education Forum (2000) listed “harness new ICTs” as one important strategy to help achieve the Education for All goals.

### **2.10 Uses of ICTs in teacher training colleges**

Within pre-service teacher training colleges, ICTs can best be used for the acquisition of basic ICT skills; self-paced learning through access to resources on

servers, CDs, or where available, on-line; group discussions of audio and video training materials available on videos, CDs, DVDs, or even on-line; filming of practice teaching sessions, followed by individual review and group discussion; training in use of educational management information systems; training in the development of Learning Management Systems (LMS) and Content Management Systems (CMS); group development of learning resources shared collectively; formative and summative assessment, which can be undertaken at own pace; and introduction to the use of ICT in support of people with disabilities (Unwin,2004).

Waite (2004) indicates that although teachers in schools show great interest and motivation to learn about the potential of ICT, in practice the use of ICT in initial teacher training is relatively low and is focused on a narrow range of applications, with word processing being the predominant use, and e – mail and internet being rarely used. Midoro (2005) observe that teachers continue to rely on lectures, textbooks, reading, and fill – in – the worksheets practices that reduce students to passive recipients of information and fail to develop their thinking skills.

Muriithi (2005) has argued that in Kenya ICT usage is still limited to computer literacy training. She contends that the present ICT curriculum merely deals with teaching about computers and not how computers can be used to transform the teaching and learning in our schools.



## **2.11 Challenges affecting the integration of ICT in teaching and learning.**

### **2.11.1 Attitude**

Brooks (1999) believes that many educators perceive computers as just another burden, commenting on the lack of awareness among educators of the potential offered by computers in the education context, and noting that educators have tended in consequence to confine the possibilities of computer use to word processing and e-mail. Pascopella (2001) observed that some educators felt that computers served only a recreation function, with learners being allowed, for instance, to play games after computing work. This attitude led to underutilization of computers in education, and funding for the integration of computers in schools was being wasted. Potosky and Bobko (2001) demonstrated that computer training has a positive impact on computer attitudes. Lack of positive attitudinal change and limited computer literacy leads to problems of technophobia and personal reluctance to switch from traditional methods of teaching to technology oriented approaches (Adam, 2003).

### **2.11.2 Training in ICT use.**

According to Tsubira and Mulira (2004), research on the use of ICTs in different educational settings over the years, invariably identify as a barrier to success, the inability of teachers and other staff on how they can use ICTs to help them work better. Various ICT competencies, hence, must be developed through the education system for ICT integration to be successful. Hakkarien (2001) analyzed

the relations between teachers' skills in using the new ICTs, their pedagogical thinking, and their self-reported practices. The results indicated that only a small percentage of teachers had adequate technical ICT skills. Furthermore, Veen (1993) suggested that the lack of initial training of teachers was a serious obstacle to ICT use and implementation. In a study conducted by Murphy and Greenwood (1998), it was reported that the lecturers felt that, compared to their students, they were not well trained and adequately exposed to ICT tools. Pelgrum (2001) reports on an international survey of teachers' perceived obstacles to using ICTs and identifies lack of knowledge and skills and pedagogical difficulties to integrate technology in instruction. Furthermore, Faggiano and Fasano (<http://tsq.icme11.org/documents.get/229>) study show that one of the major factors preventing teachers from using ICT in teaching and learning is lack of adequate teacher training focusing on the pedagogical use of ICT which is still far from being realized. Olumbe (2006) also notes that teachers are not well trained in using ICTs in teaching as a means for educational sustainability. Goveia and Soule (2003) further notes that the recent proliferation of computers in schools has placed further challenges on teacher training. This is already having the effect of increasing the number of teacher development programmes focusing training teachers to use ICT. However, many of these programmes concentrate almost exclusively on giving teachers ICT skills or competencies in ICT use, and do not take into consideration the more fundamental need of increasing teachers' conceptual knowledge in practice. School Net Africa (2003) capture the magnitude

of this challenge and notes that most newly qualified teachers coming out of African teacher training institutions today have only limited exposure to ICT and almost no actual training in how to incorporate ICT into their teaching practice.

### **2.11.3 Access to ICTs and other related infrastructure**

Cuban (1993) claimed that placement of computers within the reach of teachers and within supportive school cultures was very important so that teachers and learners can improve their ICT potential. Cox, Preston and Cox (1999) carried out a study examining the factors relating to the uptake of ICT in learning. The results showed that teachers who are already regular users of ICT have confidence in using ICT, perceive it to be useful for their personal work and for their teaching. Sheingold and Hadley (1990) study observed that teachers, who worked in schools where hardware and access to resources were twice the average on ICT use, were comfortable with technology and used computers for many purposes. Gunter (2001) notes without access to ICTs in pre-service teacher training institutions, there is no way teacher educators will implement ICT integration effectively. School Net Africa (2004) notes that the biggest challenge with encouraging African teachers to use ICT in their teaching is the lack of sustainable access to ICT. Many African teachers complain that, even where their schools do have computer rooms, their access is restricted to certain times which are frequently inconvenient. This is as a result of having to share access to a limited number of computers with students, administrators, and other teachers. SAIDE (2003) report

indicates that the key problem in use of ICT in teaching and learning is not that teachers did not want to use ICTs but the research found out that teachers did not use computers for a range of reasons including: ICT resource provision was poor, internet connection was unavailable or unreliable, arrangements were not made to ensure sufficient access to school computers for either teachers or their learners, and that teachers lacked knowledge on how to browse on the web.

A survey carried out by AAU (2000) revealed that internet connectivity in African tertiary institutions is inadequate, expensive and poorly managed. Computers and peripherals such as scanners, printers and projection devices remain a major challenge. Listed in order of rank, aspects that inhibit schools from acquiring computer are an absence of electricity, lack of funding, insufficient building space, lack of available and trained personnel, and poor security. For example, in Kenya, duties and taxes are levied on ICT products while value added tax (VAT) is levied on ICT services, making both expensive (Waema, 2002). The student-computer ratio is conceived as an indicator of the availability of computers, whereas the percentage of multimedia machines (defined as “computers equipped with a CD-ROM and a sound card”) provides an indication of the quality of the equipment. These two indicators differ quite considerably between developed and developing countries. These ratios in economically less developed countries are much less favorable (Pelgrum and Law, 2003). Faggiano and Fasano (<http://tsq.icme11.org/documents.get/229>) in their study report that 67 % of teachers indicated lack of personal computers was a major challenge in using ICTs

for teaching and learning while 78% of the tutors indicate concentration of computers in laboratories as a major impediment. A UNESCO report (2004) indicated that in some countries, the monopoly of telecommunication commissions has resulted to inadequate national infrastructure and poor telecommunication services. According to Plaisance (2003) the life span of computer equipment is rarely more than five years, and local capacity to trouble shoot problems and repair the equipment is often limited. The lack of reliable electricity, readily available spare-parts, and reliable service providers further limits reliable use of many technologies. Chronic problems such as viruses, lack of proper data back-up, and use of licensed software are difficulties faced by computer users in low resource setting.

#### **2.11.4 Administrative support**

Anderson and Dexter (2000) have argued that unrestricted access and training would not amount to effective use of computers if teachers were not encouraged, or expected to use technology in meaningful ways. In this regard, they suggested that strong leadership is critical to computer integration and ICT implementation in general. Ertmer, Bai, Dong, Khalil, Mark and Wang (2002) stated that few educators would disagree with the premise that the principal plays an important role in facilitating technology use in schools. Crystal (2001) added that encouraging administrators for technology leadership is the nexus through which all issues flow. Since, however, many of the faculty leaders and administrators

were novice technology users, who use the computers only for the basic functions such as word processing and power-point presentations, they had gained little experience or training in the knowledge and skills needed to be effective technology leaders.

#### **2.11.5 Lack of awareness of appropriate use of ICTs to the teaching and learning process.**

As a result, while teachers and students in schools that have computers learn basic computer skills such as word processing, the integration of computers across learning areas happens in only a minority of schools (Isaacs, Broekman and Mogale, 2003).

#### **2.11.6 ICT policy**

Hawkins (2004), in *Ten Lessons for ICT and Education in the Developing World*, notes that while many ministries of education around the world have made the commitment to computerize schools, few have developed coherent strategies to fully integrate the use of computers as pedagogical tools in the classroom. Educational institutions are required to develop an ICT strategy that incorporates the goals of the institution and how this will be met using ICTs, provide a supporting framework for the development of ICT in the institution and, outline how the full potential of ICT is to be exploited to support all aspects (Chisenga, 2006).

### **2.11.7 Human resource for development and sustainability of ICT**

The success in the use of ICT in all sectors requires sufficient and competent human resources that are developed and equipped in the education and training sector (GOK, 2005b). As in many sectors, the migration of skilled ICT professionals from developing to developed countries contributes to a scarcity of human resources to support ICT in education (<http://www.parliament.uk/documents>). This problem is further compounded by the fact that there are not enough people graduating with ICT skills at the rate at which the technologies are evolving and being adopted. Rosen and Weil (1995), Hadley and Sheingold (1993) found a list of inhibitors in the uptake of ICT in teaching and learning. Among the inhibitors include lack of on site technical support for teachers using technology and lack of ICT specialist teachers to teach students computer skills.

### **2.11.8 Funding for ICT investment in education**

Cost is an important factor that guides the adoption and growth of ICT in a country. Most developing countries are constrained by resource scarcity. Even where the importance of ICTs is recognized, allocation for the development of ICTs is often inadequate. Mugenda (2006) points out that one of the greatest challenges in ICT use in education is balancing educational goals with economic realities.

### **2.11.9 Lack of locally produced content**

In Africa, ICTs have evolved without cultural orientation for the local conditions. Similarly, application programmes are based on western countries model, types of problems and types of solutions and these do not always fit in with the problems, cultural realities and sensibilities of those in Africa. Also, much of the technology is transplanted without provision for reengineering to suit local conditions (Lelliott, Pendlebury and Enslin, 2000).

### **2.11.10 Inadequate time to prepare to teach with ICTs.**

According to Laborde (2002) adequate time must be allowed for teachers to develop new skills, explore their integration into their existing teaching practices and curriculum, and undertake necessary additional lesson planning, if ICTs are to be used effectively. Rosen and Weil (1995) reports that lack of time required to successfully integrate ICT into the curriculum is a major obstacle in the integration of ICT in teaching and learning.

## **2.11 Conclusion**

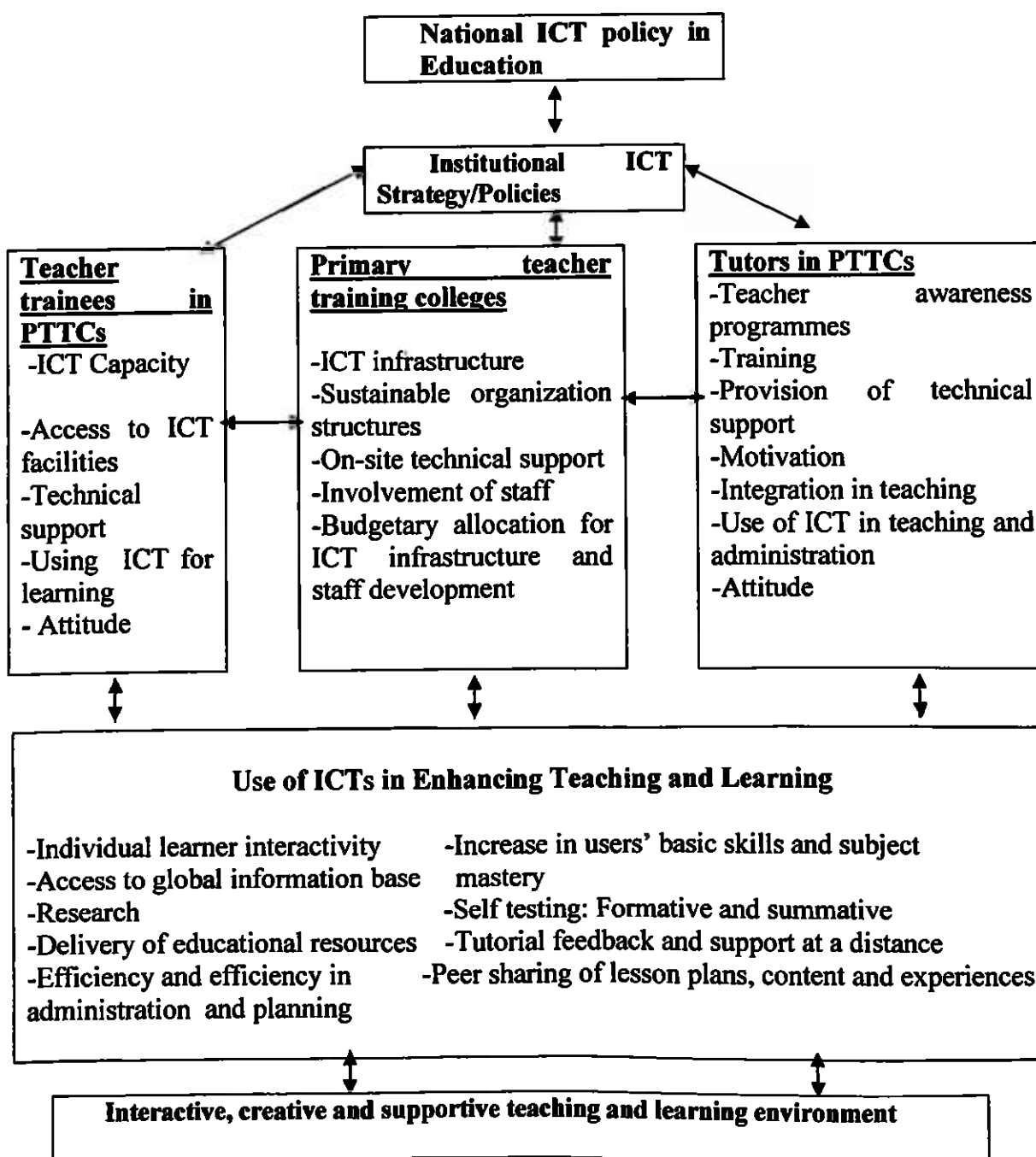
The use of ICT is most definitely not a cheap solution for teacher education, but by facilitating the creation of new types of learning environment, by supporting distance based models of teacher training, and by opening up a wealth of new educational resources, it has significant role to play. To date, the emphasis of supply- led initiatives across the continent has been to provide teachers and pupils with so- called ICT skills, more often than not defined largely as the ability to use



Microsoft Office packages, in the hope that this will mystically enable them to become better citizens and to gain information that will be of some use to them and the society in which they live. This has frequently led to wasteful and inappropriate initiatives that have done little to enhance the interactive learner-teacher teaching and learning experience.

## 2.12 Conceptual Framework on Interrelated Factors on Use of ICTs in Enhancing Teaching and Learning

Figure 1: Conceptual framework for the study



Source: Researcher, 2008.

The national ICT policy in education defines how ICT will be adapted and used to achieve its goals and objectives. Educational institutions are expected to develop an ICT strategy that incorporates the overall goals of the education sector and how they will be met using ICTs in the context of the prevailing socio-economic environments. The institutional policies guide the integration of ICT in teaching and learning by articulating the expected teacher and student characteristics and experiences and how they will be used to enhance the use of ICTs in enhancing teaching and learning teaching and learning. This further enhances the creative, interactive and supportive teaching and learning environment and learner-teacher interactions based on the constructivist approach to teaching and learning.

The success of the institutional strategies depends largely on the management/ administrative support and structures put in place to support the development of the required ICT infrastructure and facilitating the development of the various capacities required by teacher trainees and tutors for effective and efficient use of ICT in teaching and learning in teacher training institutions. These factors are intertwined and the use of ICT in supporting teaching and learning depends on the absence or presence of the ICT infrastructure, skills, positive attitude, technical support, training, support from the administration and adequate budgetary allocations for the development and maintenance of ICT infrastructure. The presence of these factors ensures that tutors and teacher trainees can effectively and efficiently use ICTs to promote an interactive, creative and supportive teaching and learning environment.

## **CHAPTER THREE**

### **RESEARCH METHODOLOGY**

#### **3.1 Introduction**

This chapter explains the methods applied in carrying out this research study. The chapter covered the following sections: Research design; Target population; Sample and Sampling Procedures; Research instruments; Validity and Reliability of instruments; Data collection and Data Analysis Techniques.

#### **3.2 Research design**

The design selected for this study was descriptive survey. The choice of this design was dictated by its effectiveness to secure evidence concerning all existing situations or current conditions, identify standards or norms with which to compare present conditions in order to determine how to take the next step having determined where we are and where we wish to go. Descriptive survey can be adopted to collect generalizable information from almost any human population. The study sought to survey the use of ICT in enhancing teaching and learning in PTTCs in Kenya.

#### **3.3 Population of the study**

The target population for this study consisted of the college principals, tutors and teacher trainees in all public primary teacher training colleges in Kenya. Principals were chosen because they are pivotal to planning, implementing and evaluating

ICT projects in their respective teacher training colleges. Tutors play a key role in operational planning on ICT use in teaching and learning. They were in a better position to provide relevant information about the use of ICT in teaching and learning. Teacher trainees' experiences in use of ICT in teaching and learning were also important for the study. There are 20 principals, 1,200 tutors and 17713 teacher trainees.

### **3.4 Sample size and sampling procedure**

According to Ary and Razariah (1972), Gay (1976) a sample of 10% of the population is considered minimum while 20% of the total population is required in a survey study. Four (4) colleges which represented a 20% of the total number of colleges were sampled out. The four colleges were selected using simple random sampling. The names of the colleges were written on small pieces of paper which were folded and placed in a box. The researcher mixed the folded papers and picked the required sample randomly. All the 4 principals of the selected colleges were therefore included as respondents in the study. Twenty (20) percent of the tutor population from the selected college was sampled out. The sampled colleges had a tutor population of 282 hence a sample of 56 tutors. The sample was divided equally in the four colleges hence a sample of 14 tutors per college. The tutors were selected purposefully to ensure that all the seven departments were represented. The departments included maths, languages, social sciences,

integrated sciences, creative arts, education and ICT. In each department and in every college, 2 tutors per department participated in the study.

To select the teacher trainees, the table by Krejcie and Morgan (Mulusa, 1988), was used. According to the table, a population of 17,713 required a sample of 377. This number was divided by 4 hence a sample of 94 teacher trainees per college. Both first and second year teacher trainees were involved in the study. A proportionate sample was taken from each year resulting to a sample of 47 teacher trainees for each year. Simple random sampling was used to pick the teacher trainees who participated.

### **3.5 Research instruments**

In order to explore the use of ICTs in enhancing teaching and learning, data was collected using three sets of questionnaires and an observation schedule: The three sets of questionnaire included: college principals' questionnaires, tutors' questionnaires and, teacher trainees' questionnaires. The questionnaires attempted to answer the research questions developed by the researcher.

The principals' questionnaire had five sections which covered the following areas: demographic information, attitude towards the use of computers in teaching and learning, condition of ICTs in the college, ICT infrastructure and access, and challenges affecting the use of ICTs in supporting teaching and learning.

The tutors' questionnaire had six sections which included: demographic information, attitude towards the use of computers in teaching and learning,

knowledge and skills in ICT, use of ICTs in supporting teaching and learning with students, use of ICTs by students and challenges faced by teachers in use of ICTs to support teaching and learning.

The teacher trainees' questionnaire had five sections which included: demographic information, training in ICT use, attitude towards the use of computers in teaching and learning, ICT skills and knowledge and challenges affecting the use of ICTs in supporting teaching and learning.

The observation schedule had four sections namely: ICT infrastructure put in place at the computer laboratory and the Learning Resource Centre, access to the ICTs for both tutors and teacher trainees, technical support available and the various uses of ICTs.

### **3.6.1 Validity of the instruments**

The study used content validity. Content validity is a measure of the degree to which data collected using a particular instrument represents a specific domain of indicators or content of a particular concept (Borg and Gall, 1989). The researcher arrived at content validity through the results and comments of the pilot study conducted in two public primary teacher training colleges. Items that failed to measure the variables they were intended to measure were modified and others discarded completely. The colleges that were used in the pilot study were excluded from the main study. Consultations and discussions with the supervisor were done to establish content validity.

### **3.6.2 Reliability of the instrument**

The questionnaires were first piloted in two public primary teacher training colleges. 2 principals, 22 tutors and 56 teacher trainees were involved in the pilot study. The split half method was used during the pre-test to establish the internal consistency of the instrument (Borg and Gall, 1989). This involves splitting the instruments into two: one half of even numbered items and the other of odd numbered items. The correlated results value provided the internal consistencies of one half of the instrument, that is, the degree to which the two halves of the test are equivalent or consistent in terms of items.

The reliability of the instrument coefficient of internal consistency was calculated by splitting all the items which had a Likert type scale into two and by placing odd numbers in one subset and all even numbered items in another subset for the three sets of questionnaires. This was to divide the scores of each individual in two sets of scores.

The scores for the odd numbered subset was then computed separately and correlated with the computed even numbered subset for each set of questionnaire. Correlation coefficient ( $r$ ) of the two halves was 0.796 for principals, 0.883 for tutors, and 0.897 for the teacher trainees. The obtained correlation coefficients ( $r$ ) were then entered into the Spearman's Brown formula (shown below) to calculate the whole test reliability of the sets of questionnaires.



Spearman Brown Prophecy Formula  $Re = \frac{2r}{1+r}$

Where:  $Re$  = Reliability of entire test

$R$  = the reliability of Coefficient

This procedure yielded an estimate called split half reliability; it enabled the researcher to determine whether the halves of the test were measuring the same quality characteristics. The coefficients vary between 0.00 and 1.00 with 0.00 showing no reliability and 1.00 showing perfect reliability. Reliability was found to be 0.89 for principals, 0.94 for tutors and 0.95 for the teacher trainees. The instruments were therefore taken to be reliable.

### **3.7 Data collection procedure**

The administration of research instruments was done by the researcher both at the pilot and the main study. A research permit was obtained from the permanent secretary, Ministry of Education Science and Technology; a copy was presented to the principals of the selected institutions to request for data collection. The principals, tutors and teacher trainees were given questionnaires to fill while the researcher conducted a visit to the Learning Resource Centres and the computer laboratories. All the respondents were assured of confidentiality and security in dealing with their responses.

### **3.8 Data analysis techniques**

The responses of the questionnaires were tabulated, coded and entered in the Statistical package for Social Sciences (SPSS) computer software for windows programme to enable analysis. Frequencies, percentages, means, standard deviations obtained were used to answer the research questions.

To establish the attitudes of the principals, tutors and teacher trainees in use of computers in teaching and learning, the respondents were asked to indicate on a Likert scale their feelings and biases towards computers. Half of the items (6) were written in positive and the rest (6) in negative form. The positive items were scored by the following key; Strongly Agree (SA) was awarded 5 points, Agree (A) was awarded 4 points, Undecided (U) 3, Disagree (D) 2, and Strongly Disagree (SD) 1. For negative items, the key was reversed so that, Strongly Agree (SA) 1 point, Agree (A) 2, Undecided (U) 3, Disagree (4), and Strongly Disagree (SD) 5. Reversing the scoring of the negative items has the advantage of reflecting positiveness towards the object in question. The scores were added for all the items to give a measure of the attitude of the responses of principals, tutors and the teacher trainees.

The maximum score possible was therefore 5 points x 12 items = 60, representing perfectly positive attitude, on the other hand the lowest score was equal to 12, that is 1 point for 12 items, representing perfectly negative attitude. A perfectly neutral level was represented by a score of 36 that is  $3 \times 12 = 36$ . (Nyaga, 1997).

## **CHAPTER FOUR**

### **DATA ANALYSIS, INTERPRETATION AND DISCUSSION OF FINDINGS**

#### **4.1 Introduction**

This chapter focused on the questionnaire return rate, demographic information of the respondents, presentation, interpretation and discussion of findings. The presentation of findings was done based on the research questions.

#### **4.2 Questionnaire return rate**

Questionnaire return rate is the proportion of the sample that participated as intended in all the research procedures. All the four (4) principals (100%) returned the questionnaires. Of the fifty six (56) tutors, 48 (85.7%) returned the questionnaires. Of the 377 teacher trainees, 352(93.4%) from the public primary teacher training colleges returned the questionnaires.

#### **4.3 Demographic information of respondents**

This section dealt with demographic information of respondents: Principals, tutors and teacher trainees at the primary teacher training colleges.

### **4.3.1 Demographic information of the principals**

#### **Gender of the principals**

The principals were asked to indicate their gender. This information was tabulated in table 4.3.1.

**Table 4.3.1: Gender distribution of the principals**

<b>Gender</b>	<b>Frequency</b>	<b>Percentage (%)</b>
Male	3	75
Female	1	25
<b>Total</b>	<b>4</b>	<b>100.0</b>

Data in table 4.3.1 indicates that there were three (75%) male respondents and one (25%) females. Majority of the principals (75%) were male. This data indicates that principalship in primary teacher training colleges is male dominated.

#### **Age of the principals**

The principals were asked to indicate their age. The distribution of the principals by age is as shown in table 4.3.2

**Table 4.3.2: Age of the Principals**

<b>Age bracket</b>	<b>Frequency</b>	<b>Percentage (%)</b>
46 – 50 years	2	50
51 – 55 years	2	50
<b>Total</b>	<b>4</b>	<b>100.0</b>

Data in table 4.3.2 indicates that 2 principals (50%) were within the age bracket 46 – 50 years and 2 principals (50%) in 51 – 55 years. These findings indicate that majority of the principals fall in the age bracket of 46 to 55 years.

### **Professional qualifications of the principals**

To find out the professional qualifications of the principals, the principals were asked to indicate the same. Table 4.3.3 represents the data.

**Table 4.3.3: Professional qualifications of the Principals**

<b>Professional qualification</b>	<b>Frequency</b>	<b>Percentage (%)</b>
M. Ed	1	25
B. Ed	2	50
B.A/B.Sc with PGDE	1	25
<b>Total</b>	<b>4</b>	<b>100.0</b>

Information in table 4.3.3 reveal two principals (50%) were Bachelor of Education graduates with only one principal (25%) reporting to have a Masters degree in Education and another one principal (25%) reporting to have a Bachelor of Arts/Bachelor of Science with a Post Graduate Diploma in Education. Majority of the principals (50%) have a Bachelor of Education qualification. These findings indicate that teacher training colleges are run and managed by principals who have the relevant professional qualifications and can therefore adapt to changes posed by ICT in pre – service teacher training.

### **Respondents' experience as principals in the whole of their careers**

The respondents were also asked to indicate their experience as principals in the whole of their career. The findings are presented in table 4.3.4

**Table 4.3.4: Respondents' experience as principals in the whole of their careers**

<b>Experience in years</b>	<b>Frequency</b>	<b>Percentage (%)</b>
Below 1 year	1	25
1 – 5 years	1	25
6 – 10 years	1	25
16 – 20 years	1	25
<b>Total</b>	<b>4</b>	<b>100.0</b>

One principal (25 %) had served for the longest period of time, that is, 16 – 20 years. One principal (25 %) had an experience below one year. This data indicates that teacher training colleges are headed by principals with varied experience. Experience as a principal has influence on how individuals respond to the innovation and change presented by the use of ICTs in teaching and learning.

### **Respondents' experience as principal in the current college**

The principals were also asked to indicate their experience as principal in their current station. The findings are as indicated in table 4.3.5

**Table 4.3.5: Respondents' experience as college principal in the current station**

<b>Experience in years</b>	<b>Frequency</b>	<b>Percentage (%)</b>
Below 1 year	3	75
6- 10 years	1	25
<b>Total</b>	<b>4</b>	<b>100.0</b>

Data represented in table 4.3.5 reveal that three principals (75 %) had an experience below one year in their current college. One principal (25%) had an experience of 6 – 10 years. Majority of the principals (75%) therefore had an experience of below one year in their current station. This is because of routine transfers of principals by the Ministry of Education. The time that a principal has been in the current station can be considered important in the principal's involvement in planning and implementation of ICT projects in their respective colleges.

**The number of students currently enrolled in the sampled colleges**

The principals were also asked to indicate the number of teacher trainees currently enrolled in their colleges. The findings are as summarized in table 4.3.6

**Table 4.3.6: Number of teacher trainees currently enrolled in the sampled colleges**

<b>Number of teacher trainees</b>	<b>Frequency</b>	<b>Percentage (%)</b>
541 – 720 teacher trainees	1	25
721 – 1100 teacher trainees	2	50
1100 and above	1	25
<b>Total</b>	<b>4</b>	<b>100.0</b>

Data represented in table 4.3.6 reveal that two colleges (50%) had a teacher trainee enrolment of 721 – 1100. One college (25%) had a teacher trainee enrolment of 541 – 720 teacher trainees while one college (25%) had a teacher trainee enrolment of 1100 and above. Majority of the colleges (50%) had a teacher trainee enrolment of 721 – 1100. This data is important as it will help capture the level of access to the established ICT infrastructure in the colleges.

#### **4.3.2 Demographic information of the tutors at the teacher training colleges**

This section describes the gender, age, professional qualifications, and experience of the respondents as tutors and duration of time they had been in the current college.

##### **Gender of the tutors**

In order to find out the gender of the tutors, they were asked to indicate their gender. Table 4.3.7 represents the data.



**Table 4.3.7: Gender of the tutors**

<b>Gender</b>	<b>Frequency</b>	<b>Percentage (%)</b>
Male	24	50
Female	24	50
<b>Total</b>	<b>48</b>	<b>100.0</b>

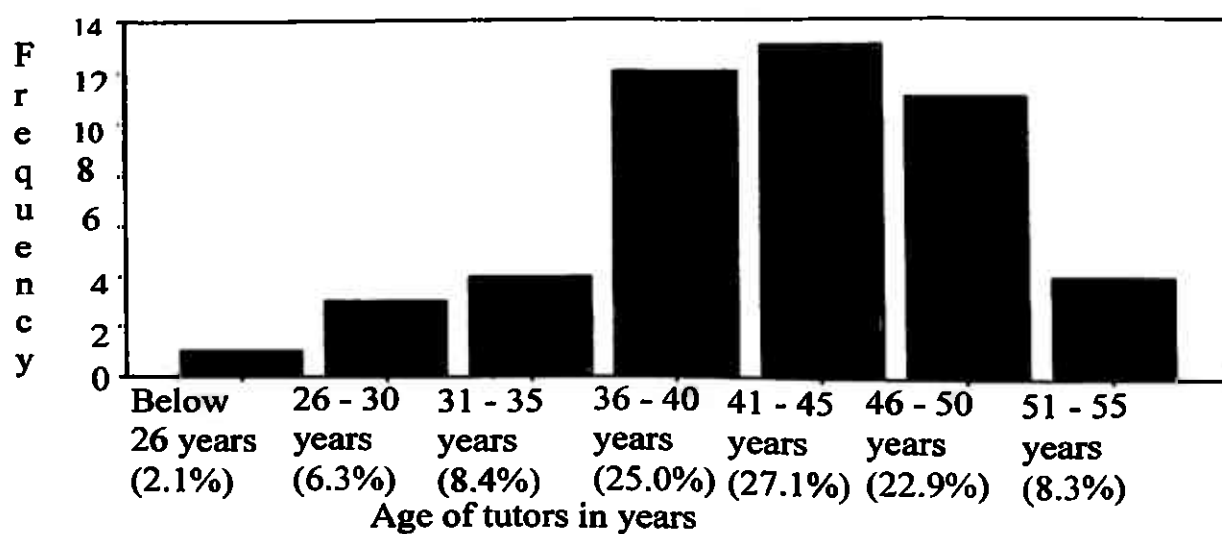
Findings in table 4.3.7 show that 24 tutors (50 %) in the teacher training colleges who were respondents to the study were male and 24 tutors (50%) were female.

Hence there was a gender balance in the study.

#### **Age of the tutors**

To establish their age, the tutors were asked to indicate their age. Their age distribution is represented in figure 1.

**Figure 2: Age of the tutors in teacher training colleges**



Data in figure 2 indicates that 27.1 % of the tutors were in the age bracket 41 – 45 years. 25 % were between the age bracket of 36 – 40 years. 22.9% were in the age bracket 46 and 50. The age brackets 31 – 35 years, and 31 – 35 years had 8% each. 6.3 % were in the age bracket of 26 – 30 years and only 2.1% were below twenty six years. Majority of the tutors (27.1%) were therefore above 41 years.

### **Professional qualifications of the tutors**

Tutors were also asked to indicate their professional qualifications. Table 4.3.8 represents their responses.

**Table 4.3.8: Professional qualifications of the tutors**

<b>Professional qualification</b>	<b>Frequency</b>	<b>Percentage</b>
M.A	1	2.1
M.Ed	11	22.9
B. Ed	22	45.8
B.A/ B.Sc with PGDE	2	4.2
EACA/KACE(A level with Diploma)	7	14.6
Any other	5	10.4
<b>Total</b>	<b>48</b>	<b>100.0</b>

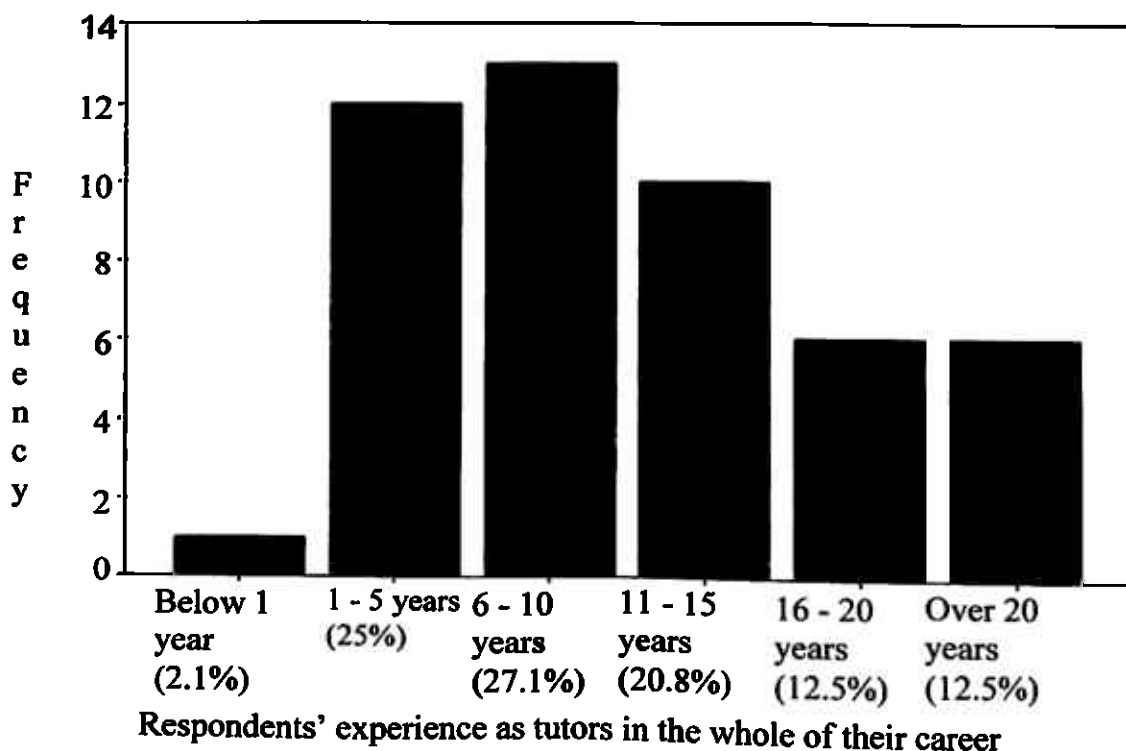
Information in table 4.3.8 revealed that twenty two tutors (45.8%) were Bachelor of Education holders. Eleven (22.9%) were Masters of Education holders. Seven tutors (14.6%) had A level with a Diploma. Five tutors (10.4%) had other qualifications, two tutors (4.2%) had B.A/B.Sc with PGDE, and one tutor (2.1%)

had a Masters of Art degree. The presence of Many B.Ed tutors (45.8%) show that the highest percentage of the respondents had a university degree and this implies that most teachers have basic skills in teaching presumably obtained from teacher education for them to prepare future teachers in a changing global world especially in the era of ICT.

**Respondents’ experience as tutors in the whole of their career**

The respondents were also asked to indicate their experience as tutors in the whole of their career. The findings are presented in figure 3.

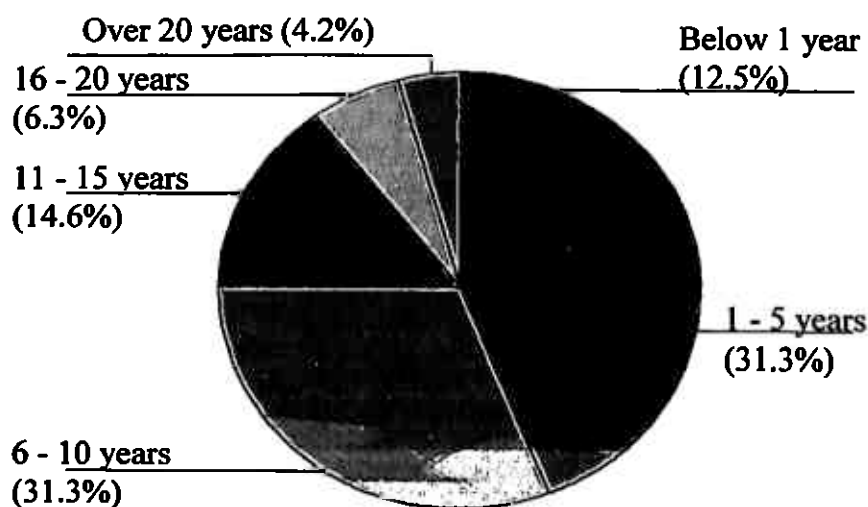
**Figure 3: Respondents’ experience as tutors in the whole of their career**



Findings from figure 3 show that thirteen tutors (27.1%) had a teaching experience of 6-10 years. Twelve tutors (25%) had a teaching experience of 1 -5 years. Ten tutors (20.8%) had a teaching experience of 11 – 15 years. Six tutors (12.5%) had a teaching experience of 16-20 years. The same percentage (12.5%) had an experience of over 20 years. Only one tutor (2.1%) had a teaching experience of below one year. These data shows that majority of the tutors have experience in preparing teachers for primary schools.

**Respondents’ experience as a tutor in their current college**

**Figure 4: Respondents’ experience as a tutor in their current college**



Findings from figure 4 reveal that 10 tutors (31.3%) had an experience of 1 – 5 years. 10 tutors (31.3%) had an experience of 6 – 10 years. Seven tutors (14.6%) had a tutoring experience of 11-15 years while six tutors (12.5%) had an

experience of below one year. Two tutors (4.2%) had an experience of over twenty years in their current station. This data indicates that majority of the tutors have been in their current stations for a considerable period of time as to understand how the available ICTs can be utilized in context of the social, economic and cultural environment of their respective colleges.

**4.3.3 Demographic information of teacher trainees at the primary teacher training colleges**

In order to find out the demographic information of the teacher trainees, the teacher trainees were asked to indicate their year of study, gender, and age. Those in second year were also asked to indicate their subject specialization.

**The year of study for the teacher trainees**

To establish the year of study for the teacher trainees, the teacher trainees were asked to indicate their year of study. Their year of study is as summarized in table 4.3.9

**Table 4.3.9: Year of study for the teacher trainees**

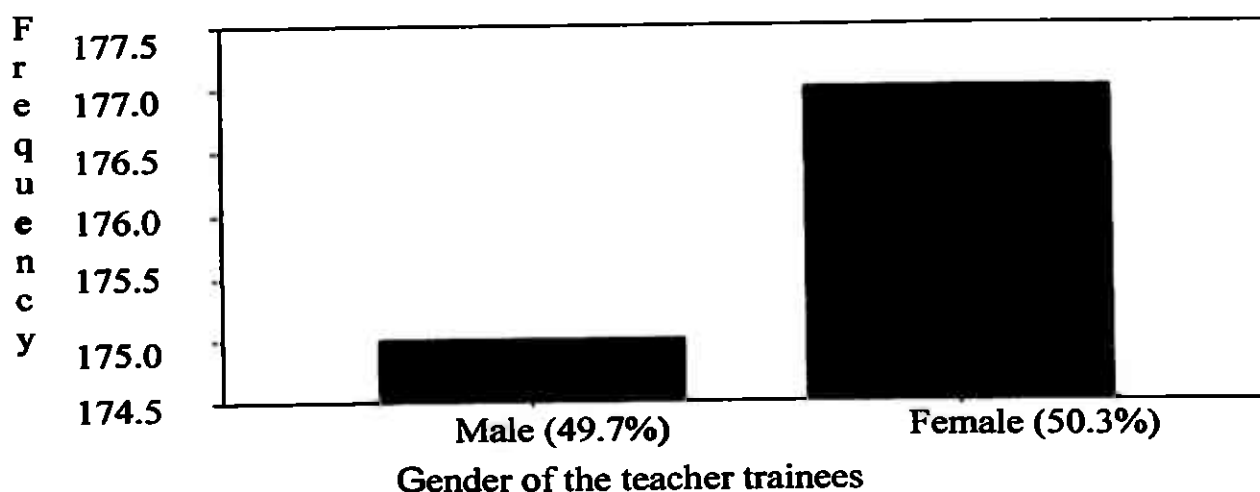
<b>Year of study</b>	<b>Frequency</b>	<b>Percentage</b>
First year	177	50.3
Second year	175	49.7
<b>Total</b>	<b>352</b>	<b>100.0</b>

Findings in table 4.3.9 indicate that 177 (50.3 %) of the respondents were first year and 175 (49.7%) second year. ICT should be infused through out the entire period of study hence the responses of both first year and second year teacher trainees were considered important for the study.

### Gender of the teacher trainees

To establish the gender of the teacher trainees, the teacher trainees were asked to indicate their gender. Their gender distribution is as indicated in figure 5

**Figure 5: Gender of the teacher trainees in the teacher training colleges**



Findings in figure 5 indicate that 177 teacher trainees (50.3%) were female and 175(49.7%) were male. The responses of both male and female teacher trainees exposed to the same amounts and types of experiences on use of ICTs were thus considered important for the study.

### **Age distribution of the teacher trainees**

The teacher trainees were also asked to indicate their age. The findings are as summarized in table 4.3.10

**Table 4.3.10: Age distribution of the teacher trainees**

<b>Age</b>	<b>Frequency</b>	<b>Percentage</b>
18 – 20 years	38	10.8
21 – 23 years	212	60.2
24 – 26 years	60	17.0
27 – 28 years	23	6.5
29 – 31 years	14	4.0
32 – 34 years	5	1.5
<b>Total</b>	<b>352</b>	<b>100.0</b>

Findings in table 4.3.10 indicate that 212 teacher trainees (60.2%) were in the age bracket 21 – 23 years. Sixty teacher trainees (17.0%) were in 24 – 26 age bracket. Thirty eight teacher trainees (10.8%) were in the 18 – 20 years age bracket. Twenty three (6.5 %) teacher trainees were in the age bracket 27 – 28 years while fourteen (4.0%) had fourteen. The age brackets 32 – 34 years had five (1.5%) teacher trainees. The findings indicate that majority of the teacher trainees (60.2%) in public primary teacher training colleges are young and more open to the use of ICTs than are many, but by no means all, older teacher trainees.

### **Cluster subject specialization of the second years**

Those in second year of study were asked to indicate their cluster subject specialization. The findings are as indicated in table 4.3.11.

**Table 4.3.11: Cluster subject specialization of the teacher trainees in second year**

<b>Cluster subject</b>	<b>Frequency</b>	<b>Percentage (%)</b>
Arts	82	46.9
Sciences	93	53.1
<b>Total</b>	<b>175</b>	<b>100.0</b>

The findings in table 4.3.11 indicate that 93 teacher trainees (53.1%) were taking sciences. 82 teacher trainee (46.9%) were taking arts. ICTs use in enhancing teaching and learning cuts across all subjects hence the responses from teacher trainees taking Arts and Sciences were important for the study.

### **4.4 Extent to which public primary teacher training colleges have established for use in enhancing teaching and learning.**

This was the first objective of the study. This part of analysis tried to establish the extent to which the teacher training colleges have established ICT infrastructure for use in enhancing teaching and learning. Relevant questions from the principals' and teacher trainee questionnaire and the comments from the observation schedule were sought and analyzed.



### **Establishment of computer laboratories**

The principals were asked to indicate whether they have computer laboratories in their colleges. Their responses were as follows: All the 4 principals (100%) indicated that they had established computer laboratories. However, from the observation schedules, all the four colleges (100%) had not established standard laboratories for either the computers or the other ICTs. The computers were located in classrooms which were modified to function as computer laboratories. Other ICTs such as television sets, digital video recorders, overhead projectors, film projectors and video cassette recorders were stored in the Learning Resource Centres. The absence of standard computer laboratories may be explained by the high cost of establishing ICT laboratories in an environment where competing educational priorities are competing for scarce financial resources. As Mugenda (2006) points out, one of the greatest challenges in ICT use in education is balancing educational goals with economic realities.

### **Availability of various ICTs**

The principals were asked to indicate the availability or unavailability of various Information Communication Technologies. The findings were summarized table 4.4.1

**Table 4.4.1 Availability of various ICTs in teacher training colleges**

<b>Internet facilities</b>	<b>Computers</b>	<b>Land line telephone</b>
Available and adequate (25%)	Available and inadequate (100%)	Available and adequate (25%)
Available and inadequate (25%)		Available and inadequate (50%)
Not available (50%)		Not available (25%)
<b>Radio</b>	<b>Tape recorder</b>	<b>Overhead projector</b>
Available and adequate (50%)	Available and adequate (75%)	Available and adequate (25%)
Available and inadequate (50%)	Not available (25%)	Available and inadequate (75%)
<b>Cassette recorders</b>	<b>Microphone for audio recording</b>	<b>Television set</b>
Available and adequate (75%)	Available and adequate (25%)	Available and adequate (100%)
Available and inadequate (25%)	Available and inadequate (50%)	
	Not available (25%)	

Data in table 4.4.1 reveal that two colleges (50%) did not have internet facilities. One college (25%) had internet facilities which were available and adequate while another one college (25%) had internet facilities but not adequate. Majority of the colleges (50%) do not have internet facilities. This is because internet connection in education institutions is a costly undertaking. These findings concur with AAU

survey (2000) which revealed that internet connectivity in African tertiary institutions is inadequate and expensive.

Four colleges (100%) reported that the available computers were not adequate. This is attributed to the high cost of computers in the market and inadequate funds to purchase enough computers at once. Waema (2002) notes that in Kenya, duties and taxes are levied on ICT products while value added tax (VAT) is levied on ICT services, making both expensive.

Two colleges (50%) indicated that they had landline telephone but not adequate. One college (25%) indicated that it had landline telephone line which was adequate while one college (25%) indicated that it did not have landline telephone line. Majority of the colleges (50%) therefore had landline telephone lines which were not adequate. This is because of poor penetration of telecommunication infrastructure and inefficiency in maintaining the available telecommunication infrastructure by the government. As UNESCO report (2004) indicated, the monopoly of telecommunication commissions has resulted to inadequate national infrastructure and poor telecommunication services.

Two colleges (50%) reported that they had available and adequate radios while two (50%) colleges indicated that they had available but inadequate radios. Four colleges (100%) indicated that they had available and adequate television sets. The availability of these categories of ICTs is attributed to the fact that they find

application in student activities such as entertainment and information gathering in local and international news.

Two colleges (50%) reported to have available and adequate overhead projectors while two colleges (50%) indicated that they had available and inadequate overhead projectors. One college (25%) reported that it had available and adequate microphone for audio recording, one college (25%) did not have microphone for audio recording while to colleges (50%) had available and inadequate microphone for audio recording. Majority of the colleges therefore have the technologies although they are not adequate.

**Number of functioning computers in the colleges**

The principals were also asked to indicate the number of functioning computers in their laboratories. The findings are as summarized in table 4.4.2

**Table 4.4.2: Functioning computers in computer laboratories in the colleges**

<b>Number of functioning computers</b>	<b>Frequency</b>	<b>Percentage (%)</b>
26	1	25
30	1	25
50	1	25
56	1	25
<b>Total</b>	<b>4</b>	<b>100</b>

Findings from table 4.4.2 indicate that one college (25%) had 56 computers, one college (25%) had 50 computers, one college (25%) had 30 computers and one college (25%) had 26 computers. The findings reveal that different colleges had different number of computers. From the findings, only two colleges (50%) can conduct computer lessons for one class of 45 teacher trainees with a computer to student ration of 1:1. From the observation schedules, the 4 colleges visited (100%) had computers which were not functioning. The highest number of spoiled computers counted was 18. Among factors attributed to these variations are the presences of donors to assist in providing computers, availability of technical personnel to repair computers on breakdown, budgetary constrains on resources to purchase computers and the priorities of the colleges.

The principals were also asked to indicate whether all the functioning computers were connected to the internet. Three principals (75%) reported that not all the functioning computers were connected to the internet while one principal (25%) reported that all the functioning computers were connected to the internet. As noted earlier, one college (25%) reported to have available and adequate internet facilities while one college (25%) reported to have available and inadequate internet facilities. This means that in the college that had available and inadequate internet facilities, only a few computers were connected to the internet. This was confirmed on the observation schedule where one college (25%) had two computer laboratories with computers in one laboratory connected to the internet. Majority

of the functioning computers in teacher training colleges are therefore stand alones. This is attributed to the high cost of internet connection.

### **Access to available internet facilities in the colleges by tutors and teacher trainees**

#### **Access to tutors**

The principals were also asked to indicate whether tutors were able to access the available internet facilities in the colleges. Three principals (75%) indicated that tutors were not able to access internet facilities in the colleges. One principal (25%) indicated that tutors were able to access internet facilities available in the colleges. The findings indicate that majority of colleges (75%) did not have internet facilities available for tutors. The implications of these findings is that majority of the tutors do not use internet facilities to support teaching and learning in their colleges.

#### **Access to teacher trainees**

Two principals (50%) reported that teacher trainees had access to the available internet facilities to the college while two colleges (50 %) indicated that teacher trainees did not have access to internet facilities. The two colleges where students were not accessing internet did not have the facility in their colleges. However, it was earlier noted that one college (25%) had available but inadequate internet facilities. The implication is that only one college (25%) has internet facilities which are adequate for the teacher trainees.

## **Access to computers by tutors and teacher trainees in teacher training colleges**

### **Access to tutors**

The principals were also asked to indicate whether tutors had computers in their offices. One principal (25%) reported that tutors had access to computers in their offices. Three principals (75%) reported that tutors did not have computers in their offices. The findings reveal that in majority of the teacher training colleges (75%), tutors did not have access to computers in their offices. The implication of these findings is that a majority of the tutors were not using computers in teaching and learning because of the problem of accessibility.

### **Access to teacher trainees**

The principals were also asked to indicate whether teacher trainees have access to computers during classes and after classes. Four principals (100%) reported that teacher trainees have access to computer during classes and for some time after classes. The same question was asked to teacher trainees. 328 teacher trainees (93.2%) reported that they had access to computers during classes. On whether they had access to computers for some time after classes, 190 teacher trainees (54%) reported that they had access while 162 teacher trainees (46%) reported that they did not have access to computers after classes.

These findings show that majority of the teacher trainees (54%) had access to computers after classes. However, the findings suggest that priority in terms of

access to available ICTs has been given to teacher trainees while a majority number of tutors (75%) do not have access to computers in their offices. These findings on level of access for both tutors and teacher trainees concur with Murphy and Greenwood (1998), who reported that the lecturers, compared to their students, were not adequately exposed to ICT tools. The findings are also in agreement with School Net Africa (2004) who notes that the biggest challenge with encouraging African teachers to use ICT in their teaching is the lack of sustainable access to ICT. Many African teachers complain that, even where their schools do have computer rooms, their access is restricted to certain times which are frequently inconvenient. This is as a result of having to share access to a limited number of computers with students, administrators, and other teachers. The findings also concur with SAIDE (2003) report which indicates that the key problem in use of ICT in teaching and learning is not that teachers did not want to use ICTs but the research found out that teachers did not use computers for a range of reasons including: ICT resource provision was poor, internet connection was unavailable or unreliable, and arrangements were not made to ensure sufficient access to school computers for either teachers or their learners.

#### **4.5 Attitude towards the use of computers in supporting teaching and learning**

In order to establish the attitude of the respondents towards the use of computers in supporting teaching and learning, the attitude scale test was computed from the



Likert scale for all the principals, tutors, and teacher trainees. Tables 4.5 (a), (b) and (c) represents the results of attitude of the Principals, tutors and teacher trainees.

**Table 4.5 (a): Results of attitude scale for the principals**

Range of scores	of Category attitude	of Number of principals per category	Percentage (%) of principals
1 –35	Negative	-	0.0
36	Neutral	-	0.0
37 – 60	Positive	4	100.0
<b>Total</b>		<b>4</b>	<b>100.0</b>

*Mean=46.8 Minimum score=41 Maximum score=50*

**Table 4.5 (b): Results of attitude scale for the tutors**

Range of scores	of Category attitude	of Number of tutors per category	Percentage (%) of tutors
1 – 35	Negative	-	0.0
36	Neutral	-	0.0
37 – 60	Positive	48	100.0
<b>Total</b>		<b>48</b>	<b>100</b>

*Mean= 48.3 Minimum score= 42 Maximum score = 58*

**Table 4.5 (c): Results of attitude scale for the teacher trainees**

Range of scores	of Category attitude	of Number of teacher trainees per category	Percentage (%) of teacher trainees
1 – 35	Negative	3	0.9
36	Neutral	-	0.0
37 – 60	Positive	349	99.1
<b>Total</b>		<b>352</b>	<b>100</b>

*Mean= 50.9 Minimum score= 34 Maximum score = 57*

The results from table 4.5 (a), (b) and (c) indicate that all the principals (100%), all tutors (100%) and majority of the teacher trainees (99.1%) had a positive attitude towards the use of computers in supporting in teaching and learning. This was reflected by the large percentage (100%) of the principals, 100% of the tutors and 99.1% of the teacher trainees who obtained 37 points and above out of the maximum 60 points in the attitude test. The mean scores for the three groups of respondents were also high standing at 46.8 for principals, 48.3 for the tutors and 50.9 for the teacher trainees. This shows that they all had very positive attitudes towards the use of computers in supporting teaching and learning. Potosky and Bobko (2001) demonstrated that computer training has a positive impact on computer attitudes. Findings from this study revealed that 50% of the principals, 89.6% of the tutors, and 96.9% of the teacher trainees had received training on ICT use. This explains their positive attitude towards the use of computers in teaching and learning. A positive attitude implies the respondents' acceptance that computers can be used to enhance teaching and learning.

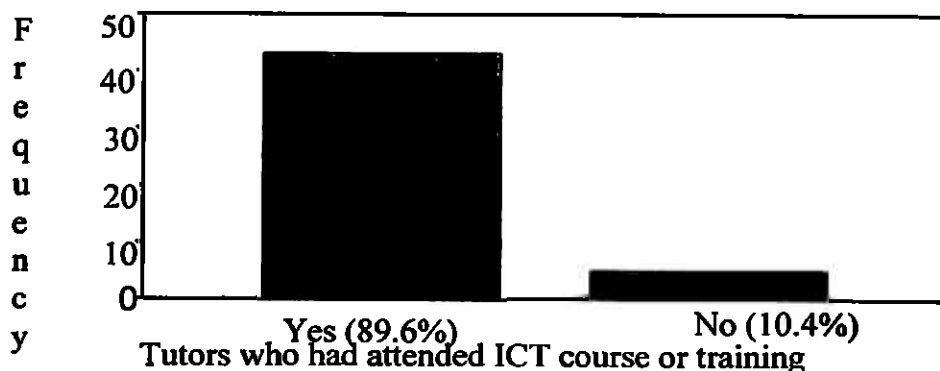
#### **4.6 The extent to which tutors and teacher trainees have skills in ICT use in enhancing teaching and learning**

The third objective of this study was also to establish the extent to which tutors and teacher trainees have skill in ICT use in enhancing teaching and learning. The questions that gave data on the extent to which tutors and teacher trainees have skills on ICT use in enhancing teaching and learning were therefore examined and analyzed.

### **Tutors skills on ICT use in enhancing teaching and learning**

Tutors were asked if they had attended any ICT course or training. Their responses are presented in figure 6.

**Figure 6: Tutors who had attended an ICT course or training**



Data in figure 6 reveal that 43 tutors (89.6%) had attended an ICT course or training. Five tutors (10.4%) had not attended an ICT course or training. Majority of the tutors (89.6%) therefore had attended an ICT course or training. Majority of the teachers had therefore made initiatives to acquire ICT skills and hence ICT literate.

The tutors were also asked to indicate the core theme of the course or training that they had attended. The findings were summarized in table 4.6.1

**Table 4.6.1: The core theme of the ICT course/training that the tutors had attended**

<b>Theme of the training</b>	<b>Frequency</b>	<b>Percentage</b>
Basic computer literacy not linked to teaching and learning	38	79.2
Use of ICT hardware and software linked to teaching and learning	3	6.3
Use of ICT in improving teaching and learning	1	2.1
Not applicable	6	12.5
<b>Total</b>	<b>48</b>	<b>100</b>

Data in table 4.6.1 reveal that majority of the tutors (79.2%) had attended a course whose core theme was basic computer literacy not necessarily linked to teaching and learning. Three tutors (6.3%) had attended a course on use of ICT hardware and software linked to teaching and learning while one tutor (2.1%) had attended a course/training on ICT use in improving teaching and learning. Six tutors (12.5%) had not attended any course.

These findings reveal that majority of the tutors are computer literate. These findings concur with Digital Links International (2000), who notes that there is almost universal interest among teachers in becoming computer literate. However, majority of the tutors had not attended any course or training to enable them to fully utilize the potential offered by ICTs in enhancing teaching and learning. These findings concur with Pascopella (2001) who notes that, globally, most educators are not competent to integrate application software meaningfully into the learning content of a learning area, and this may be the reason that schools do not appear to be exploiting the opportunities offered by ICTs. As the findings reveal,

only 8.4% of the tutors had attended an ICT course or training related to use of ICT in teaching and learning. The implications of these findings is that majority of the tutors do not integrate ICTs in teaching and learning because of lack of knowledge and skills.

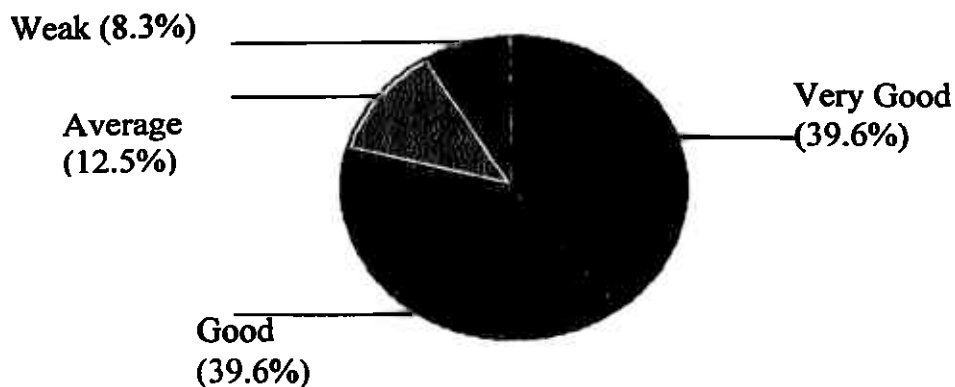
### **The tutors' expertise in various ICT operations**

Tutors were also asked to evaluate their own skills in various ICT operations in order to obtain data on their skills in use of ICTs in enhancing teaching and learning. The findings are as summarized below.

#### **Basic computer parts and functions**

Tutors were asked to rate their expertise in basic computer parts and functions (opening, closing, saving files and folders, opening and renaming files on a computer). Their responses are as represented in figure 7.

**Figure 7: Tutors responses on their expertise in basic computer parts and functions**

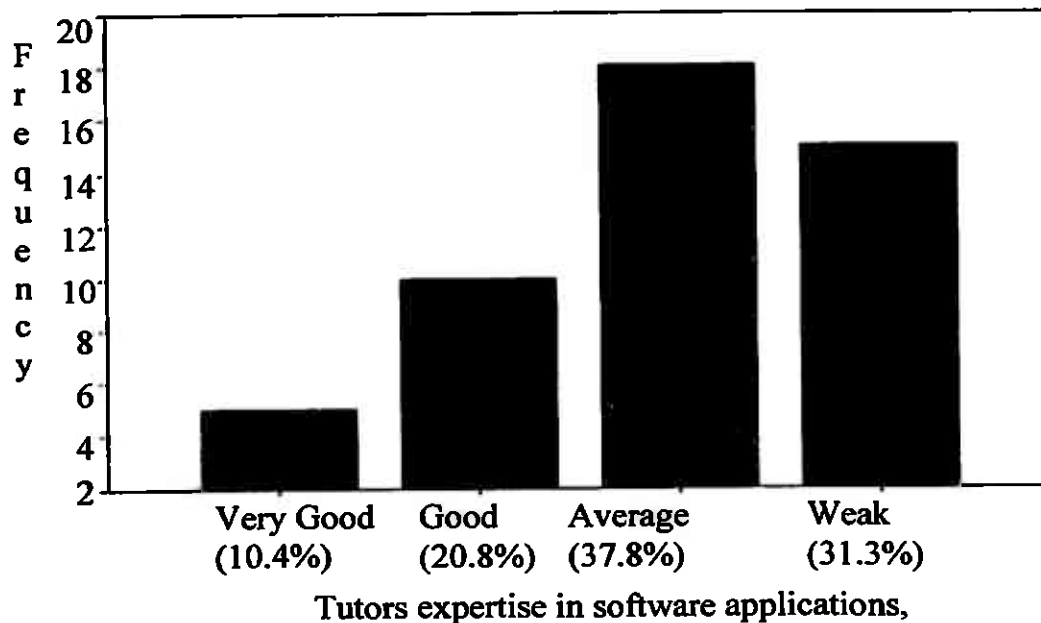


Data in figure 7 reveal that 19 tutors (39.6%) rated their expertise in basic computer parts and function as very good. 19 tutors (39.6%) rated their expertise as good. Six tutors (12.5%) rated their expertise as average while four tutors (8.3%) rated their expertise as weak. The findings reveal that majority of the tutors expertise fall between good and very good. This is because, as reported earlier, majority of the tutors (79.2%) had attended an ICT course/training whose core theme was basic computer literacy. Majority of the tutors therefore had expertise in basic computer parts and functions which can be used or developed through in-service training for purposes of enhancing teaching and learning.

### **Software applications**

Tutors were asked to rate their expertise in software applications such as Microsoft (MS) Office, MS Word, Excel, PowerPoint, Internet and E – Mail , Graphics and drawing, databases and data entry, Desktop publishing, and Video production and editing. Their responses are as indicated in figure 8.

**Figure 8: Tutors' expertise in software applications**



Data in figure 8 reveal that 18 tutors (37.8%) rated their expertise in software applications as average, 10 tutors (20.8%) rated their expertise as good. 5 tutors (10.4%) rated their expertise as very good. 15 tutors (31.3%) rated their expertise as weak. Majority of the tutors (37.8%) therefore rated their expertise as average. This shows that majority of the tutors (37.8%) have average skills on software applications. However, a significant number of teachers (31.3%) rated their expertise as weak indicating a need for training on this area. The implication for these findings is that a significant number of tutors could not use various software applications and this affected their ability to use the software for purposes of teaching and learning.

### **Creating students' reports using software applications such as MS Word**

The tutors were also asked to rate their expertise in creating students reports using software applications such as MS Word. Their responses are as summarized in table 4.6.2

**Table 4.6.2: Tutors expertise in creating students reports using MS Word**

<b>Rating</b>	<b>Frequency</b>	<b>Percentage (%)</b>
Very Good	9	18.8
Good	8	16.7
Average	16	33.3
Weak	9	18.8
Poor	6	12.5
<b>Total</b>	<b>48</b>	<b>100.0</b>

The data in table 4.6.2 indicated that 16 tutors (33.3%) rated their expertise as average, 9 tutors (18.8%) rated their expertise as very good. 9 tutors (18.8%) rated their expertise as weak, 8 tutors (16.7%) rated their expertise as good. 6 tutors (12.5%) rated their expertise as poor. Majority of the tutors (33.3%) therefore were average in terms of their expertise in creating students reports using MS Word. These findings show that majority of the teachers can adopt their skills in MS Word software applications for teaching and learning purposes.



### **Use of Power Point for presentation in the classroom for a variety of curriculum areas**

Tutors were also asked to rate their expertise in using PowerPoint for presentation in the classroom for a variety of curriculum areas. Their responses are as summarized in table 4.6.3

**Table 4.6.3: Tutors expertise in use of PowerPoint for classroom presentation**

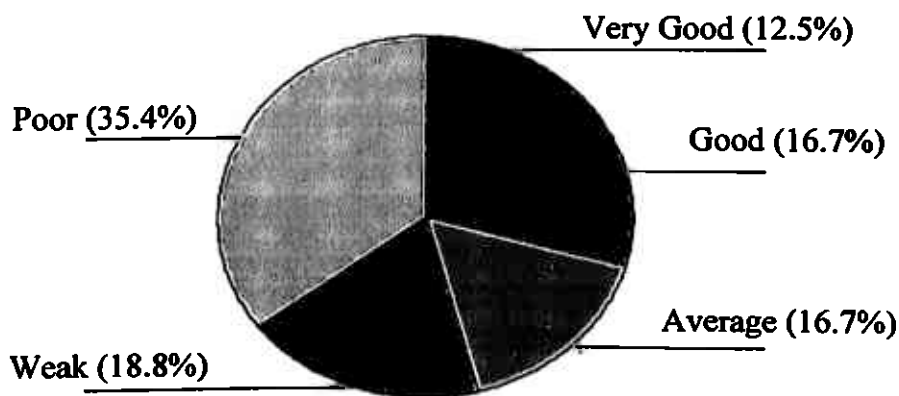
<b>Rating</b>	<b>Frequency</b>	<b>Percentage</b>
Very Good	6	12.5
Good	12	25.0
Average	11	22.9
Weak	9	18.8
Poor	10	20.8
<b>Total</b>	<b>48</b>	<b>100</b>

The data in table 4.6.3 indicate that 12 tutors (25%) rated their expertise in use of PowerPoint as good, 11 tutors (22.9%) rated their expertise as average. 9 tutors (18.8%) rated their expertise as weak, 10 tutors (20.8%) rated their expertise as poor and 6 tutors (12.5%) rated their expertise as weak. Majority of the tutors (25%) are average in terms of their skills in use of PowerPoint for classroom presentation on a variety of curriculum areas. However, a significant number of tutors (20.8%) rated their expertise as poor indicating the need for training on the area.

**Use of E - Mail for working together with other tutors and teacher trainees on issues related to teaching and learning**

Tutors were also asked to rate their expertise on use of E – Mail for working together with other tutors and teacher trainees on issues related to teaching and learning. Their responses are as indicated in figure 9.

**Figure 9: Tutors expertise in use of E – Mail for working together with other tutors and teacher trainees on issues related to teaching and learning.**



Data in figure 9 indicates that 17 tutors (35.4%) rated their expertise as poor, 9 tutors (18.8%) rated their expertise as weak, 8 tutors (16.7%) rated their expertise as average, 8 tutors (16.7%) rated their expertise as good. 6 tutors (12.5%) rated their expertise as very good. From these findings, a significant number of tutors (35.4%) cannot use E – Mail for working together with other tutors and teacher trainees on issues related to teaching and learning. The implications for these findings is that tutors are not use the internet to network with their colleagues and

share information and ideas that can be used to improve the teaching – learning experiences.

### **Searching the internet for resources that can be used in teaching and learning**

Tutors were also asked to rate their expertise in searching the internet for resources that can be used in teaching and learning. Their responses are as summarized in table 4.6.4

**Table 4.6.4: Tutors expertise in searching the internet**

<b>Rating</b>	<b>Frequency</b>	<b>Percentage (%)</b>
Very Good	8	16.7
Good	7	14.6
Average	10	20.8
Weak	9	18.8
Poor	14	29.2
<b>Total</b>	<b>48</b>	<b>100.0</b>

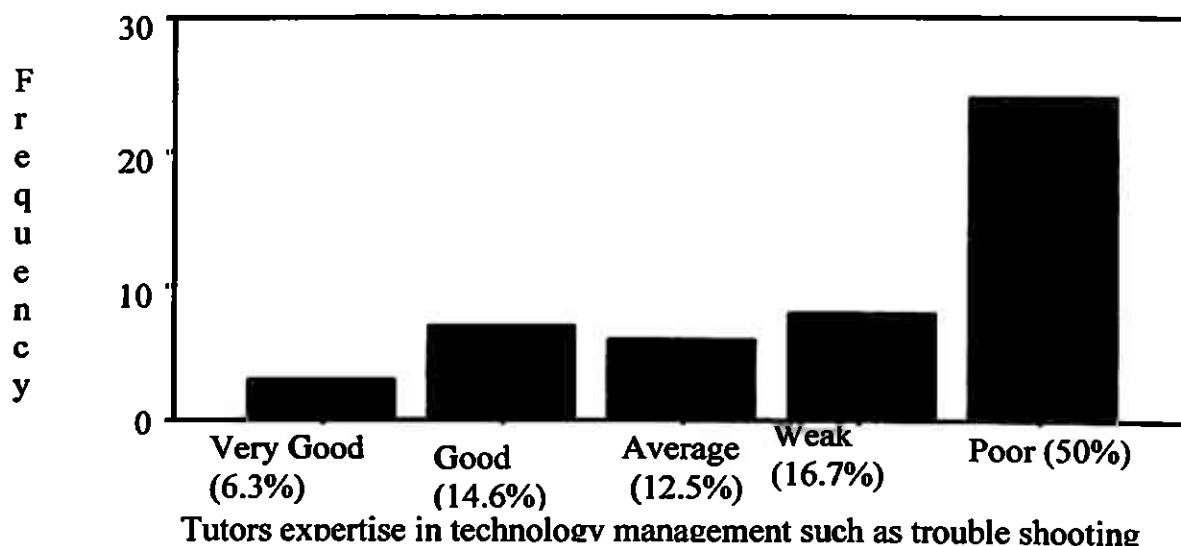
Data in table 4.6.4 indicates that 14 tutors (29.2%) rated their expertise as poor, 10 tutors (20.8%) rated their expertise as average, 9 tutors (18.8%) rated their expertise as weak. 8 tutors (16.7%) rated their expertise as very good and 7 tutors (14.6%) rated their expertise as good. These findings indicate that a significant number of tutors (29.2%) cannot use the internet to search for resources that can be used in the classroom. The implications for these findings is that tutors largely

rely on hardcover books which as noted by G.O.K (2005a) are costly compared to the immediate and up to date resources which are available on the internet.

### **Technology management such as trouble shooting**

Tutors were also asked to rate their expertise in technology management such as trouble shooting. Their responses are as summarized in figure 10.

**Figure 10: Tutors expertise in technology management such as trouble shooting**



Data from figure 10 shows that 24 tutors (50%) rated their expertise as poor, 8 tutors (16.7%) rated their expertise as weak, 7 tutors (14.6%) rated their expertise as good, 6 tutors (12.5%) rated their expertise as average, 3 tutors (6.3%) rated their expertise as very good. This indicates that majority of the tutors (50%) cannot identify faults on ICTs in case of a breakdown when using them for teaching and

learning. This findings also indicate that majority of the teachers cannot use ICTs without being supported by an ICT technician.

Findings on the various skills on use of ICTs in teaching and learning indicate that majority of the tutors are competent with basic computer skills but poor in ICT operations that require advanced skills. This concurs with Russel, Finger and Russel (2000) whose investigation revealed that teachers saw themselves as competent with basic computer skills but were less confident with activities requiring advanced use of computers. The findings indicate that majority of the tutors (50%) did not have technology management skills. This concurs with Hakkarien (2001) who also indicated that only a small percentage of teachers had adequate technical ICT skills.

#### **Teacher trainees' skills on ICT use**

The teacher trainees were asked if they had received training on ICT use. Their responses are as indicated in table 4.6.5

**Table 4.6.5: Teacher trainees who had received training on ICT use**

<b>Training on ICT use</b>	<b>Frequency</b>	<b>Percentage</b>
Yes	341	96.9
No	11	3.1
<b>Total</b>	<b>352</b>	<b>100.0</b>

Data from table 4.6.5 shows that 341 teacher trainees (96.9%) had received training on ICT use.11 teacher trainees (3.1%) indicated that they had not received

training on ICT use. This indicates that majority of the teacher trainees (96.9%) had received training on ICT use and therefore ICT literate.

#### **Place where the teacher trainees had received their ICT training**

The teacher trainees were also asked to indicate where they had received much of the ICT training. Their responses were as follows: 314 teacher trainees (89.2%) indicated that they had received the training in their teacher training colleges, 38 teacher trainees (10.8%) indicated that they had received much of their training from commercial training colleges. These findings indicate that majority of the teacher trainees (89.2%) enter college without any training on ICTs.

#### **Teacher trainees' evaluation of the training they had received**

The teacher trainees were also asked to evaluate the training that they had received in terms of its relevance in preparing them to teach with ICTs. The questions were placed on a five point Likert scale having strongly agree (SA), agree (A), undecided (U), disagree (D) and strongly disagree (SA). The teacher trainees' responses were as follows.

#### **The course provided opportunities for me to improve my knowledge in teaching and learning with ICTs**

129 teacher trainees (36.6%) strongly agreed, 151 teacher trainees (42.9%) agreed, 17 teacher trainees were undecided, 37 teacher trainees (10.5%) disagreed and 18 teacher trainees (5.1%) strongly disagreed. Majority of the teacher trainees

(42.9%) agreed that the course provided opportunity for them to improve their knowledge in teaching and learning with ICTs.

### **I acquired knowledge and skills to prepare me for teaching with ICTs**

79 teacher trainees (22.4%) strongly agreed, 153 teacher trainees (43.5%) agreed, 32 teacher trainees (9.1%) were undecided, 55 teacher trainees (15.6%) disagreed and 33 teacher trainees (9.4%) strongly disagreed. Majority of the teacher trainees (43.3%) agreed that they acquired knowledge and skills to prepare them teach with ICTs.

### **I was taught processes and procedures to follow in using ICT for teaching and learning**

113 teacher trainees (32.1%) strongly disagreed, 101 teacher trainees (28.7%) disagreed, 19 teacher trainees (5.4%) were undecided, 83 teacher trainees (23.6%) agreed, and 36 teacher trainees (10.2%) strongly agreed. Majority of the teacher trainees (32.1%) therefore strongly disagreed that they were taught processes and procedures to follow in using ICTs. These findings indicate that the ICT curriculum in primary teacher training colleges does not adequately equip the learners with knowledge and skills to prepare them as effective and efficient users of ICTs in teaching and learning. The findings are in agreement with School Net Africa (2003) who notes that most newly qualified teachers coming out of African teacher training institutions today have only limited exposure to ICT and almost no actual training in how to incorporate ICT into their teaching practice. The

implication of these findings is that majority of the teacher trainees graduate from college inadequately prepared to use ICTs for purposes of enhancing teaching and learning.

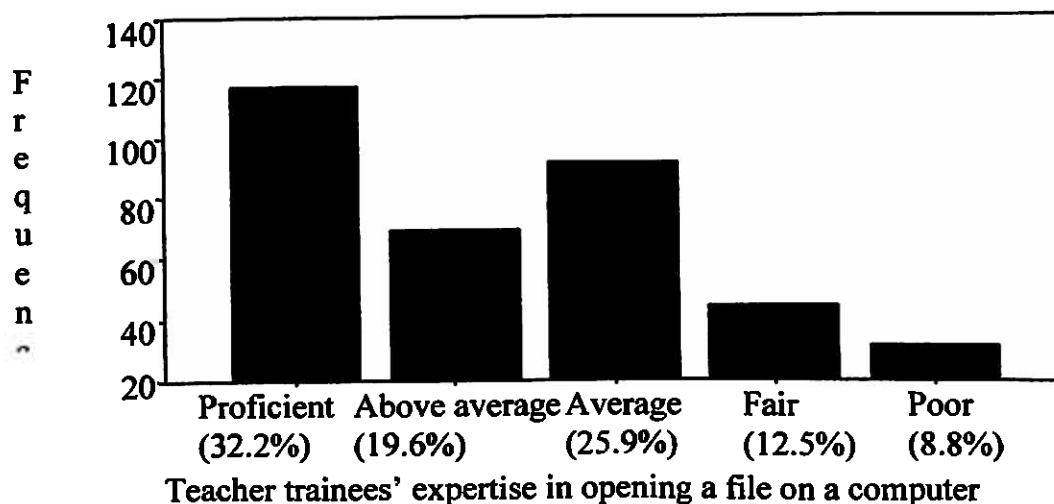
### **Teacher trainees' expertise on various ICT operations**

The teacher trainees were asked to rate their expertise on various operations on a computer. Their responses are as tabulated below.

#### **Opening a file on a computer**

The teacher trainees were asked to rate their expertise in opening a file on a computer. Their responses were summarized in figure 11.

**Figure 11: Teacher trainees' expertise in opening a file on a computer**



Data in figure 10 indicates that 117 teacher trainees (32.2%) were proficient in opening a file on a computer, 69 teacher trainees (19.6 %) were above average, 91 teacher trainees (25.9%) were average, 44 teacher trainees (12.5 %) were fair, 31



teacher trainees(8.8%) were poor in their expertise. Majority of the teacher trainees (32.2%) therefore rated their expertise in opening a file on a computer as proficient.

### **Creating/editing a document on a computer**

The teacher trainees were asked to rate their expertise in creating/editing a document on a computer. The findings were summarized in table 4.6.6.

**Table 4.6.6: Teacher trainees' expertise in creating/editing a document on a computer**

<b>Rating</b>	<b>Frequency</b>	<b>Percentage (%)</b>
Proficient	88	25.0
Above average	77	21.9
Average	85	24.1
Fair	45	12.8
Poor	57	16.2
<b>Total</b>	<b>352</b>	<b>100.0</b>

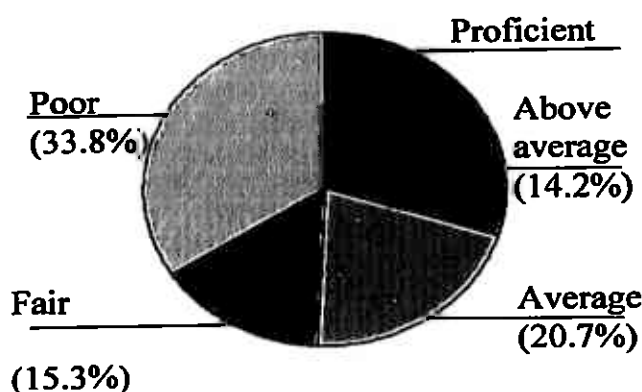
Data from table 4.6.6 indicates that 88 teacher trainees (25.0%) rated their expertise as proficient, 77 teacher trainees (21.9%) rated their expertise above average, 85 teacher trainees (24.1%) indicated average, 45 teacher trainees (12.8%) reported fair, and 57 teacher trainee(16.2%) reported poor in terms of their expertise on creating and editing a document on a computer. Majority of the teacher trainees (25.0%) therefore rated their expertise in creating/editing a

computer document or file as proficient. However, a significant number (16.2%) rated their expertise as poor indicating the need for more training.

### **Print a computer document or file**

The teacher trainees were asked to rate their expertise in printing a computer document or file. The findings were summarized in figure 12.

**Figure 12: Teacher trainees expertise in printing a computer document or file**



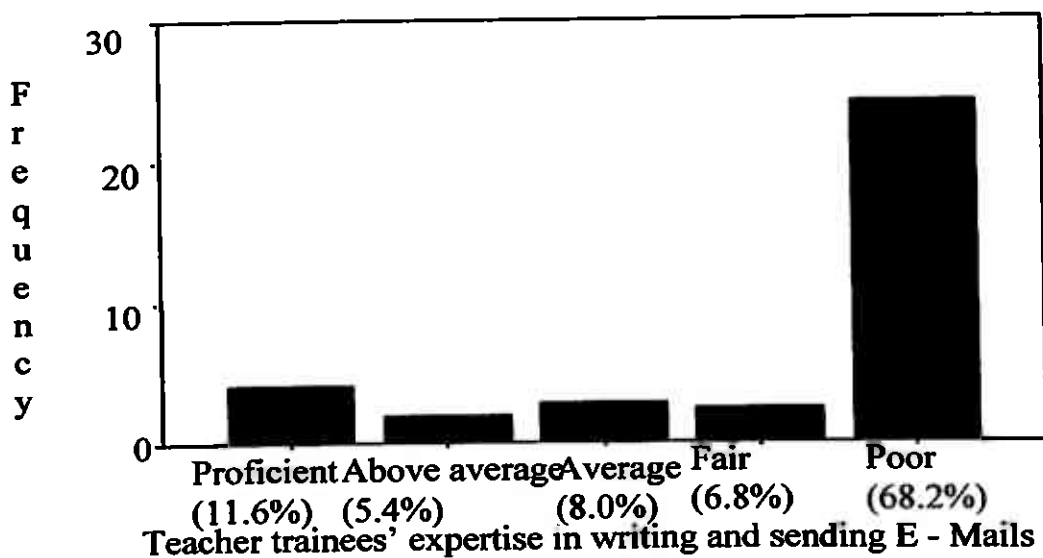
Findings from figure 12 reveal that 119 teacher trainees (33.8%) rated their expertise in printing a computer document or file as poor, 73 teacher trainees (20.7%) rated their expertise as average, 54 teacher trainees (15.9%) rated their expertise as proficient, 54 teacher trainees (15.3%) rated their expertise as fair, and 50 teacher trainees (14.2%) rated their expertise as above average. Majority of the teacher trainees (33.8%) were therefore poor in printing a computer document or file. These findings indicate that majority of the teacher trainees cannot print documents or files which can latter be used in teaching and learning. The

implications for these findings is that most of the teacher trainees need technical support to print any teaching/learning resources hence the need to have functioning printers available in the computer labs so that they can practice on the skill.

### Writing and sending E – Mail

The teacher trainees were asked to rate their expertise in writing and sending e – mails. Their responses were summarized in figure 13.

**Figure 13: Teacher trainees’ expertise in writing and sending E –Mails.**



Findings from figure 13 reveal that 41 teacher trainees (11.6%) rated their expertise in writing and sending E – Mails as proficient, 19 teacher trainees (5.4%) rated their expertise as above average, 28 teacher trainees (8.0%) rated their expertise as average, 24 teacher trainees (6.8%) rated their expertise as fair, and 240 teacher trainees (68.3%) rated their expertise as poor. The data shows that

most of the teacher trainees (68.2%) were poor in terms of their expertise in writing and sending E – Mails. These findings indicate that majority of the teacher trainees (68.2%) cannot use the internet to share information and educational resources with peers and tutors. The findings can be attributed to the fact that majority of the teacher training colleges did not have internet services hence the teacher trainees were not able to practice on the skill.

### **Attaching a file to an E – Mail**

The teacher trainees were asked to rate their expertise in attaching a file to an e – mail. Their responses were summarized in table 4.6.7.

**Table 4.6.7: Teacher trainees’ expertise in attaching files to an E -Mail**

<b>Rating</b>	<b>Frequency</b>	<b>Percentage (%)</b>
Proficient	24	6.8
Above average	15	4.3
Average	30	8.5
Fair	50	14.2
Poor	233	66.2
<b>Total</b>	<b>352</b>	<b>100.0</b>

Data from table 4.6.7 indicates that 24 teacher trainees (6.8%) rated their expertise as proficient, 15 teacher trainees (4.3%) rated their expertise as above average, 30 teacher trainees (8.5%) rated their expertise as average, 50 teacher trainees (14.2%) rated their expertise as fair, and 233 teacher trainees (66.2%) rated their expertise as poor. The data shows that most of the teacher trainees were not able to

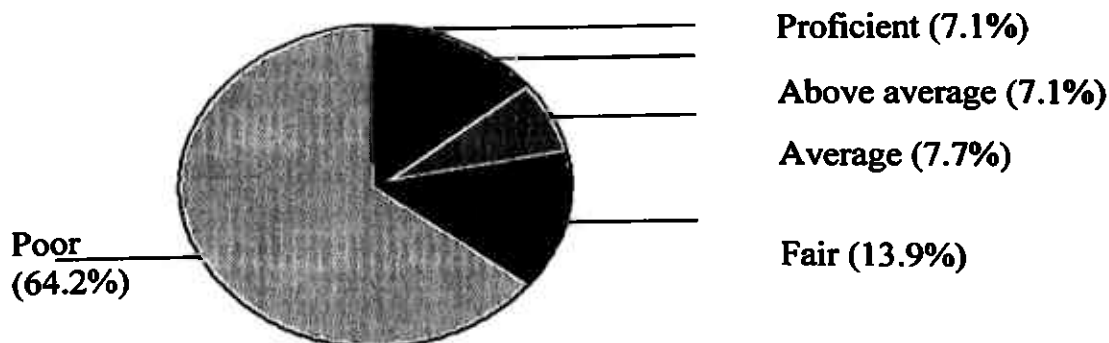
attach a file or a document to an E – Mail. These findings indicate that majority of the teacher trainees (66.2%) cannot use E –Mail for collaboration with other peers or tutors or transferring information that can be used in the classroom from one remote location to the other.

### **Create a presentation using power point**

44 teacher trainees (12.5%) rated their expertise in creating a presentation using PowerPoint as proficient, 33 teacher trainees (9.4%) rated their expertise as above average, 42 teacher trainees (11.9%) rated their expertise as average, 42 teacher trainees (11.9%) rated their expertise as fair, 191 teacher trainees (54.3%) rated their expertise as poor. The data shows that majority of the teacher trainees (54.3%) were not able to create a presentation using PowerPoint.

### **Copying or downloading files and documents from the internet**

**Figure 14: Teacher trainees' expertise in copying/downloading files from the internet**



Findings from figure 14 reveal that 25 teacher trainees (7.1%) rated their expertise in downloading files and documents from the internet as proficient, 25 teacher trainees (7.1%) rated their expertise as above average, 27 teacher trainees (7.7%) rated their expertise as average, 49 teacher trainees (13.9%) rated their expertise as fair, 226 teacher trainees (64.2%) rated their expertise as poor. The data shows that most of the teacher trainees (64.2%) are not able to download files and documents from the internet. The implications for these findings are that majority of the teacher trainees are not able to use the vast educational resources available on the internet and therefore continue relying on the hardcopy textbooks available in the libraries.

#### **4.7 The extent to which tutors and teacher trainees have integrated ICTs in teaching and learning.**

This part of analysis tried to establish the extent to which tutors and teacher trainees have integrated ICTs in teaching and learning. Relevant questions from the tutors' and teacher trainee questionnaire were sought and analyzed.

#### **The extent to which tutors have integrated ICTs in enhancing teaching and learning**

The tutors were asked to rate the frequency at which they applied ICT for general applications in teaching and learning and the frequency at which they engaged the teacher trainees in various ICT applications. The findings were as follows:

### **General use of ICTs by tutors**

Tutors were asked to indicate the frequency at which they used ICTs for various general applications. Their responses in various applications were sought and analyzed.

### **Use of MS Word or desktop publishing to produce task sheets, tests, and handouts**

The tutors were asked to indicate the frequency at which they used MS Word or desktop publishing to produce task sheets, tests, and handouts. The findings were as tabulated in table 4.7.1

**Table 4.7.1: Use of MS Word or desktop publishing by tutors**

<b>Rating</b>	<b>Frequency</b>	<b>Percentage (%)</b>
Always	6	12.6
Often	9	18.8
Sometimes	13	27.0
Never	20	41.6
<b>Total</b>	<b>48</b>	<b>100</b>

Data from table 4.7.1 shows that 20 tutors (41.6%) had never used MS Word or desktop publishing to produce task sheets, tests, and handouts, 13 tutors (27.0%) indicated sometimes, 9 tutors (18.8%) reported often, and 6 tutors (12.6%) indicated always. These findings indicate that majority of the tutors (41.6%) did not use MS Word or desktop publishing to produce teaching and learning resources. Initial findings had indicated that majority of the tutors (37.8%) had rated their expertise in software applications such as MS Word as average.

However, majority of the colleges (75%) did not avail computers in the tutors' offices. This accounts for low use of MS Word or desktop publishing to produce task sheets, tests and handouts. The implications of these findings is that majority of the tutors rely on handwritten teaching resources or usually seek assistance from the college secretaries to produce the teaching resources from the computers reserved for administrative purposes.

#### **Recording or calculating marks, grades and other assessments**

The tutors were asked to indicate the frequency at which they used computers to record or calculate marks, grades and other assessments. The findings were summarized in table 4.7.2.

**Table 4.7.2: Use of computers to record or calculate marks, grades and other assessments**

<b>Rating</b>	<b>Frequency</b>	<b>Percentage (%)</b>
Always	8	16.6
Often	6	12.5
Sometimes	13	27.1
Never	21	43.8
<b>Total</b>	<b>48</b>	<b>100</b>

Data from table 4.7.2 indicates that 21 tutors (43.8%) did not use computers to record or calculate marks, grades and other assessments. 13 tutors (27.1%) indicated sometimes, 6 tutors (12.5%) indicated often, 8 tutors (16.6%) reported always. These findings indicate that majority of the tutors (43.8%) did not use



computers to record or calculate marks, grades, and other assignments. Majority of the tutors therefore did not use computers to improve the efficiency and effectiveness of their administrative activities related to teaching and learning. This is explained by the fact that majority of the tutors did not have computers in their offices.

### **Monitoring of teacher trainees enrolment and achievement in subjects**

**Table 4.7.3: Tutors use of computers to monitor teacher trainees' enrolment/achievement in subjects**

<b>Rating</b>	<b>Frequency</b>	<b>Percentage (%)</b>
Always	3	6.3
Often	5	10.4
Sometimes	11	22.9
Never	29	60.4
<b>Total</b>	<b>48</b>	<b>100</b>

Data from table 4.7.3 indicates that 29 tutors (60.4%) did not use computers to monitor teacher trainees' enrolment and achievement in subjects. 11 tutors (22.9%) indicated sometimes, 5 tutors (10.4%) reported often, and 3 tutors (6.3%) indicated always. These findings indicate that majority of the tutors (66.6%) did not use computers to monitor teacher trainees enrolment and achievement in subjects. This is explained by the fact that majority of the tutors did not have skills on advanced skills on use of ICT to support teaching and learning activities and also the unavailability of computers in the tutors' offices.

## **Accessing the internet to find and collect lesson ideas**

**Table 4.7.4: Tutors accessing the internet to find and collect lesson ideas**

<b>Rating</b>	<b>Frequency</b>	<b>Percentage (%)</b>
Always	3	6.3
Often	4	8.3
Sometimes	9	18.8
Never	32	66.6
<b>Total</b>	<b>48</b>	<b>100</b>

Data from table 4.7.4 indicates that 32 tutors (66.7%) did not use the internet to find and collect lesson ideas, 9 tutors (18.8%) indicated sometimes, 4 tutors (8.3%) reported often, and 3 tutors (6.3%) indicated always. These findings indicate that majority of the tutors (66.6%) did not use the internet to access information and ideas that can be used to enrich the teaching and learning experiences. Initial findings had indicated that majority of the tutors (29.2%) rated their expertise as poor and a significant number of tutors (18.8%) rated their expertise as weak. Majority of the colleges did not have internet facilities and even those that had internet facilities it was used only by the teacher trainees. This explains why majority of the tutors were not using the internet facility to find and collect lesson ideas. These findings concur with Waite (2004) who indicates that although teachers in schools show great interest and motivation to learn about the potential of ICT, in practice the use of ICT in initial teacher training is relatively low and is

focused on a narrow range of applications, with e – mail and internet being rarely used.

#### **Use of ICT with the teacher trainees**

Tutors were asked to indicate the frequency that they performed various ICT operations with students. Their responses were as summarized below.

#### **Having teacher trainees watch movies, videos, or television to obtain information that can be used in the class.**

The tutors were asked to indicate the frequency at which they had teacher trainees watch movies, videos, or television to obtain information that can be used in class.

The findings were tabulated in table 4.7.5.

**Table 4.7.5: Tutors rating on the frequency at which they had teacher trainees watch movies, videos, or television to obtain information that can be used in the class.**

<b>Rating</b>	<b>Frequency</b>	<b>Percentage (%)</b>
Everyday	5	10.4
Once or twice a week	9	18.8
Once or twice a month	11	22.9
Never	23	47.9
<b>Total</b>	<b>48</b>	<b>100.0</b>

Data from table 4.7.5 shows that 23 tutors (47.9%) indicated that they have never had teacher trainees watch movies, videos, or television to obtain information that can be used in class. 11 tutors (22.9%) indicated that they made students watch movies, videos, or television once or twice a month, 9 tutors (18.8%) indicated

that they had teacher trainees watch movies, videos and television once or twice a week, 5 tutors (10.4%) indicated that they had students watch movies, videos, or television to obtain information that can be used in class everyday. These findings indicate that majority of the tutors (47.9%) did not use videos, movies or even television to enrich their teaching experiences. This is because majority of the tutors (79.2%) had not attended any course or training related to ICT use in teaching and learning apart from basic computer literacy and another 12.5% had not attended any form of training. The implications of this findings is that the available ICT infrastructure such as television which were reported to be available and adequate in all colleges were only used for purposes of entertainment and watching news bulletin.

**Having teacher trainees use computers to write assignments or other texts.**

The tutors were also asked to indicate the frequency at which they had teacher trainees use computers to write assignments or other texts. Their responses were tabulated in table 4.7.6.

**Table 4.7.6: The extent to which tutors have teacher trainees use computer to write assignments or other texts**

<b>Rating</b>	<b>Frequency</b>	<b>Percentage (%)</b>
Everyday	2	4.2
Once or twice a week	7	14.6
Once or twice a month	8	16.7
Never	31	64.6
<b>Total</b>	<b>48</b>	<b>100.0</b>

Data from table 4.7.6 indicate that 31 tutors (64.6%) have never had teacher trainees use computers to write assignments or other texts, 8 tutors (16.7%) reported that they had teacher trainees use computers to write assignments and other texts once or twice a month, 7 tutors (14.6%) indicated once or twice a month, 2 tutors (4.2%) indicated everyday. These findings indicate majority of tutors (64.6%) did not have teacher trainees use computer to write their assignments or other texts. Majority of the tutors still hold to the handwritten form of presenting assignments.

**Having teacher trainees use computer to process and analyze data**

The tutors were also asked to indicate the frequency at which they had teacher trainees use computers to process and analyze data. Their responses were tabulated in table 4.7.7.

**Table 4.7.7: The extent to which tutors have teacher trainees use computers to process and analyze data**

<b>Rating</b>	<b>Frequency</b>	<b>Percentage (%)</b>
Everyday	1	2.1
Once or twice a week	11	22.9
Once or twice a month	10	20.8
Never	26	54.2
<b>Total</b>	<b>48</b>	<b>100.0</b>

Data from table 4.7.7 indicate that 26 tutors (54.2%) indicated never, 10 tutors (22.9%) reported once or twice a week, 11 tutors (22.9%) indicated once or twice a week, 1 tutor (2.1%) reported everyday. These findings indicate that majority of tutors (54.2%) did not have students use computers to process and analyze data.

**Use of different ICTs to deliver educational resources to teacher trainees**

The tutors were also asked to indicate the frequency at which they used different ICTs to deliver educational resources to the teacher trainees. Their responses were tabulated in table 4.7.8.

**Table 4.7.8: The extent to which tutors use different ICTs to deliver educational resources to teacher trainees**

<b>Rating</b>	<b>Frequency</b>	<b>Percentage (%)</b>
Everyday	2	4.2
Once or twice a week	9	18.8
Once or twice a month	10	20.8
Never	27	56.3
<b>Total</b>	<b>48</b>	<b>100.0</b>

Data from table 4.7.8 indicate that 27 tutors (56.3%) have never used different ICTs to deliver educational resources to teacher trainees, 10 tutors (20.8%) used once or twice a month, 9 tutors used once or twice a week, 2 tutors (4.2%) used different ICTs to deliver educational resources to teacher trainees. These findings indicate that majority of tutors (56.3%) did not use different ICTs to deliver

educational resources to teacher trainees. The implications of this findings is that majority of the tutors still rely on face to face mode of delivery of learning content in lecture halls and reference to the hard cover texts in the libraries. The findings are in line with Midoro (2005) who observes that teachers continue to rely on lectures, textbooks, reading, and fill – in – the worksheets practices that reduce students to passive recipients of information and fail to develop their thinking skills.

**Use of different ICTs for entertainment to engage and motivate the teacher trainees**

The tutors were also asked to indicate the frequency at which they used different ICTs to engage and motivate the teacher trainees. Their responses were tabulated in table 4.7.9.

**Table 4.7.9: The extent to which tutors use different ICTs to engage and motivate the teacher trainees**

<b>Rating</b>	<b>Frequency</b>	<b>Percentage (%)</b>
Everyday	3	6.3
Once or twice a week	7	14.6
Once or twice a month	11	22.9
Never	27	56.3
<b>Total</b>	<b>48</b>	<b>100.0</b>

Data from table 4.7.9 indicate that 27 tutors (56.3%) have never used different ICTs to engage and motivate the teacher trainees, 11 tutors (22.9%) used once or twice a month, 7 tutors (14.6%) used once or twice a week, 3 tutors (6.3%) used different ICTs for entertainment to engage and motivate the teacher trainees on a daily basis. These findings indicate that majority of the tutors (56.3%) did not use different ICTs do engage and motivate the teacher trainees.

**Having teacher trainees record their class presentations for discussion with peers or other tutors**

**Table 4.7.10: Extent to which tutors have teacher trainees record their class presentations for discussion with peers and other tutors**

<b>Rating</b>	<b>Frequency</b>	<b>Percentage (%)</b>
Once or twice a week	6	12.5
Once or twice a month	13	27.1
Never	29	60.4
<b>Total</b>	<b>48</b>	<b>100.0</b>

Data from table 4.7.10 indicated that 29 tutors (60.4%) had never had teacher trainees record their class presentations for discussion with peers and other tutors, 13 tutors (27.1%) reported once or twice a month, 6 tutors (12.5%) reported once or twice a week. These findings indicate that majority of the tutors (60.4%) did not have teacher trainees record their class presentations for discussion with peers or other tutors. This is explained by the tutors' lack of knowledge and skills on used different ICTs can be used to support teaching and learning.



## **The extent to which teacher trainees have integrated ICTs in enhancing teaching and learning**

The teacher trainees were asked to indicate the frequency that they performed various ICT operations in order to enhance their learning through ICTs. Their responses were as summarized below.

### **Acquisition of basic ICT skills**

**Table 4.7.11: Extent to which teacher trainees use ICTs for acquisition of basic ICT skills**

<b>Rating</b>	<b>Frequency</b>	<b>Percentage (%)</b>
Everyday	88	25.0
Once or twice a week	235	66.8
Once or twice a month	16	4.5
Never	13	3.7
<b>Total</b>	<b>352</b>	<b>100.0</b>

Data from table 4.7.11 indicate that 235 teacher trainees (66.8%) used ICTs for acquisition of basic ICT skills once or twice in a week, 88 teacher trainees (25.0%) used on a daily basis, 16 teacher trainees (4.5%) indicated that they use once or twice a month, 13 teacher trainees (3.7 %) indicated that they had never used ICTs for acquisition of basic ICT skills. These findings indicate that majority of the teacher trainees (66.8%) used ICTs for acquisition of basic ICT skills once or

twice a week. These findings therefore indicate that majority of the teacher trainees are using ICTs to acquire basic ICT skills. However initial findings indicated that majority of the teacher trainees (32.1%) strongly disagreed and a significant number of teacher trainees (28.7%) disagreed that the training equipped them with processes and procedures to follow in using ICTs. These findings concur with Goveia and Soule (2003) who notes that many of initial teacher ICT preparation programmes concentrate almost exclusively on giving teachers ICT skills or competencies in ICT use, and do not take into consideration the more fundamental need of increasing teachers' conceptual knowledge in practice. The implication of these findings is that majority of the teacher trainees graduate from primary teacher training colleges without adequate knowledge on the pedagogical value of ICTs. This means that despite the costly ICT initiatives at the teacher training colleges, the government will spend more resources for in – service training for the same graduates. There is therefore an urgent need to revise the ICT curriculum to ensure that it prepares future teachers to teach with ICTs. There is no need training teachers about a pencil if the pencil will not add value to the teaching and learning processes.

#### **Accessing information that can be used in the classroom**

The teacher trainees were asked indicate the frequency at which they used ICTs to access information that can be used in the classroom. Their responses are as indicated in table4.7.12

**Table 4.7.12: Extent to which teacher trainees use ICTs to access information that can be used in the classroom**

<b>Rating</b>	<b>Frequency</b>	<b>Percentage (%)</b>
Everyday	39	11.1
Once or twice a week	52	14.8
Once or twice a month	98	27.8
Never	163	46.3
<b>Total</b>	<b>352</b>	<b>100.0</b>

Data from table 4.7.12 indicates that 163 teacher trainees (46.3%) never used ICTs to access information that can be used in the classroom. 98 teacher trainees (27.8%) reported once or twice a month, 52 teacher trainees (14.8%) indicated once or twice a week, while 39 teacher trainees (11.1%) reported everyday. The findings indicate that majority of the teacher trainees never used ICTs to access information that can be used in the classroom. Earlier findings indicated that majority of the teachers (56.3%) did not use different ICTs to deliver educational resources to teacher trainees; this explains why majority of the teacher trainees are not using ICTs to access information that can be used in the classroom. The implications of these findings is that if teachers are not using ICTs in teaching and learning, majority of the teacher trainees will not take advantage of all the available benefits on their own. There is therefore a need to train the tutors and also motivate them to use ICTs so that the teacher trainees can have hands – on

experience on how ICTs can be used to deliver and access information that can be used in the classroom.

**Composing, editing and presenting project work or learning assignments**

**Table 4.7.13: Extent to which teacher trainees use computer software for composing, editing and presenting project work or learning assignments**

<b>Rating</b>	<b>Frequency</b>	<b>Percentage (%)</b>
Everyday	39	11.1
Once or twice a week	76	21.6
Once or twice a month	102	29.0
Never	135	38.4
<b>Total</b>	<b>352</b>	<b>100.0</b>

Data from table 4.7.13 indicate that 135 teacher trainees (38.4%) had never, 102 teacher trainees (29.0%) indicated once or twice a month, 76 teacher trainees (21.6%) indicated once or twice a week, 39 teacher trainees indicated everyday. These findings show that majority of the teacher trainees (38.4%) had never used ICTs for composing, editing and presenting project work or learning assignments. These findings suggest that majority of the teacher trainees present their work in the traditional hand written form. Earlier findings indicated that majority of the tutors did not have the teacher trainees use computers to write assignments and other texts. The implications of these findings is that the tutors need to be

encouraged to use ICTs so that the teacher trainees can learn from them on how ICTs can be used to improve teaching and learning.

**Group discussion of audio/video training materials available on videos, CDs and DVDs**

The teacher trainees were asked to indicate the frequency at which they had group discussion of audio and video training materials available on videos, CDs or DVDs. Their responses were tabulated in table 4.7.14.

**Table 4.7.14: Extent to which teacher trainees have group discussion of audio and video training materials available on videos, CDs or DVDs**

<b>Rating</b>	<b>Frequency</b>	<b>Percentage (%)</b>
Everyday	40	11.4
Once or twice a week	76	21.6
Once or twice a month	59	16.8
Never	177	50.3
<b>Total</b>	<b>352</b>	<b>100.0</b>

Data from table 4.7.14 indicate that 177 teacher trainees (50.3%) had never had group discussions of audio and video training materials available on videos, CDs, or DVDs, 59 teacher trainees (16.8%) responded once or twice a month, 76 teacher trainees (21.6%) indicated once or twice a week, 40 teacher trainees (11.4%) indicated everyday. These findings indicate that most of the teacher trainees (50.3%) had never had a group discussion of audio and video training materials

available on videos, CDs or DVDs. Initial findings on tutors use of ICTs with students indicated that majority of the tutors (47.9%) did not use videos, movies or even television to enrich their teaching experiences together with the teacher trainees. This explains why the teacher trainees were not using the videos, DVDs and CDs.

**Use of E – Mail to share lesson plans, information, ideas and content with peers in your college or other colleges.**

The teacher trainees were asked to indicate the frequency at which they used e – mail to share lesson plans, information, ideas and content with peers in their college or other colleges. Their responses were reported in table 4.7.15.

**Table 4.7.15: The frequency at which teacher trainees use E – Mail**

<b>Rating</b>	<b>Frequency</b>	<b>Percentage (%)</b>
Everyday	45	12.8
Once or twice a week	58	16.5
Once or twice a month	61	17.3
Never	188	53.4
<b>Total</b>	<b>352</b>	<b>100.0</b>

Data from table 4.7.15 indicate that 188 teacher trainees (53.4%) responded never, 61 teacher trainees (17.3%) indicated once or twice a month, 58 teacher trainees (16.5%) indicated once or twice a week, and 45 teacher trainees (12.8%) indicated everyday. These findings indicate that majority of the teacher trainees (53.4%) do

not use E – Mail to share information with peers in their colleges or other colleges. These findings concur with earlier findings that majority of the teacher trainees rated their expertise in use of E –Mail as poor. Majority of the teacher training colleges had also indicated that they did not have the internet facilities.

#### **4.8 Challenges affecting the use of ICTs in enhancing teaching and learning in teacher training colleges**

This part of analysis tried to establish the challenges affecting the use of ICTs in enhancing teaching and learning in teacher training colleges. Relevant questions from the principals', tutors' and teacher trainees' questionnaire were sought and analyzed.

##### **Availability of sufficient number of computers**

The principals, tutors and teacher trainees were asked to indicate whether availability of sufficient number of computers was a major, minor or not a challenge. 1 principal (25%) indicated that it was a minor challenge, 3 principals (75%) indicated that it was a major challenge. 7 tutors (14.6%) indicated that it was not a challenge, 8 tutors (16.7%) indicated that it was a minor challenge, 33 tutors (68.8%) indicated that it was a major challenge. 10 teacher trainees (2.8%) indicated that it was not a challenge, 31 teacher trainees (8.8%) indicated that it was a minor challenge, and 311 teacher trainees (88.4%) indicated that it was a major challenge. These findings indicate that majority of the principals (75%),

tutors (68.8%) and teacher trainees (88.4%) identified availability of sufficient number of computers as a major challenge.

**Available ICTs are not easily accessible.**

7 tutors (14.6%) reported that it was not a challenge, 10 tutors, (28.8%) indicated that it was a minor challenge, 31 tutors (64.6%) indicated that it was a major challenge. 56 teacher trainees (15.9%) indicated that it was not a challenge, 101 teacher trainees (28.7%) indicated that it was a minor challenge, and 195 teacher trainees (55.4%) indicated that it was a major challenge. Majority of tutors (64.6%) and teacher trainees (55.4%) identified accessibility of available ICTs as a major challenge. These findings are in line with School Net Africa (2004) who notes that the biggest challenge with encouraging African teachers to use ICT in their teaching is the lack of sustainable access to ICT. Many African teachers complain that, even where their schools do have computer rooms, their access is restricted to certain times which are frequently inconvenient. This is as a result of having to share access to a limited number of computers with students, administrators, and other teachers. SAIDE (2003) report also indicates that the key problem in use of ICT in teaching and learning is not that teachers did not want to use ICTs but the research found out that teachers did not use computers for a range of reasons including: ICT resource provision was poor, and arrangements were not made to ensure sufficient access to school computers for either teachers or their learners.



### **Lack of internet connection in the college**

The principals, tutors and teacher trainees were asked to indicate whether lack of internet connection was a major, minor or not a challenge. 1 principal (25%) indicated that it was not a challenge, 1 principal (25%) indicated that it was a minor challenge, and 3 principals (50%) indicated that it was a major challenge. 13 tutors (27.1%) indicated that it was not a challenge, 12 tutors (25.0%) indicated that it was a minor challenge, and 23 tutors (47.9%) indicated that it was a major challenge. 25 teacher trainees (7.1%) indicated that it was not a challenge, 104 teacher trainees (29.5%) indicated that it was a minor challenge, and 223 teacher trainees (63.4%) indicated that it was a major challenge. These data indicates that majority of the principals (50%), tutors (47.9%) and teacher trainees (63.4%) identified lack of internet connection in their colleges as a major challenge. These findings concur with a survey carried out by AAU (2000) which revealed that internet connectivity in African tertiary institutions is inadequate and expensive to install.

### **Lack of sufficient time to explore and integrate computers into teaching and learning**

1 principal (25%) indicated that it was not a challenge, 3 principals (75%) indicated that it was a minor challenge. 3 tutors (6.3%) indicated that it was not a challenge, 20 tutors (41.7%) indicated that it was a minor challenge, 25 tutors (52.1%) indicated that it was a major challenge. 33 teacher trainees (9.4%)

reported that it was not a challenge, 87 teacher trainees (24.7%) reported that it was a minor challenge, and 232 teacher trainees (65.9%) reported that it was a major challenge. From these findings, majority of the principals (75%) identified lack of sufficient time to explore and integrate computers into teaching and learning as a minor challenge. Majority of the tutors (52.1%) and teacher trainees (65.9%) identified lack of sufficient time to explore and integrate computers into teaching and learning as a major challenge. The findings are in line with Rosen and Weil (1995) report that lack of time required to successfully integrate ICT into the curriculum is a major obstacle in the integration of ICT in teaching and learning.

#### **Lack of technical assistance**

2 principals (50%) indicated that lack of technical assistance was a minor challenge , 2 principals (50%) reported that it was a major challenge. 4 tutors (8.3%) indicated that it was not a challenge, 20 tutors (41.7%) reported that it was a minor challenge, 24 tutors (50.0 %) reported that it was a major challenge. 29 teacher trainees (8.2%) indicated that it was not a challenge, 119 teacher trainees (33.8%) reported that it was a minor challenge, and 204 teacher trainees (58.0%) reported that it was a major challenge. These findings indicate that majority of the principals (50%), tutors 50%) and teacher trainees (58.0%) identified lack of technical assistance as major challenge.

The college principals were also asked to indicate the availability or unavailability of various personnel in the ICT department. Their responses are as indicated in table 4.8.1

**Table 4.8.1: Availability of personnel in the ICT department**

<b>ICT personnel</b>	<b>Availability/unavailability</b>	<b>Frequency/percent age (%)</b>
ICT coordinator who has no other responsibility	- Available sometimes	1 (25 %)
	-Not available	3 (75%)
A tutor who serves as an ICT coordinator	-Available	4 (100%)
A computer specialist who is consulted	- Available sometimes	1 (25%)
	- Not available	3 (75%)
A tutor who assists students in using ICTs	- Available	4 (100%)

Data in table 4.8.1 indicates that 3 colleges (75%) did not have an ICT coordinator who had no other responsibility, 1 college (25%) had an ICT coordinator who was available sometimes. Majority of the colleges (75%) therefore did not have an ICT coordinator with no other responsibility.

The four colleges (100) had a tutor who serves as an ICT coordinator. In the four colleges (100%) the tutors were the ones assisting students in using the ICTs. 3 colleges (75%) did not have a computer specialist who is consulted, and 1 college (25%) had a computer specialist available sometimes. From these findings, majority of the colleges relied on the ICT tutors posted by the government. The tutors have a second teaching subject and therefore were not always available to

assist either the teacher trainees or the tutors. This confirms initial findings that lack of technical assistance is a major challenge identified by principals, tutors and the teacher trainees.

These findings concur with Rosen and Weil (1995), Hadley and Sheingold (1993) who investigated a list of inhibitors in the uptake of ICT in teaching and learning. Among the inhibitors they identified include lack of on site technical support for teachers using technology and lack of ICT specialist teachers to teach students computer skills.

#### **Lack of knowledge about ways to integrate ICT to enhance curriculum**

1 principal (25%) reported teachers' lack of knowledge as a minor challenge, 1 principal (25%) reported that it was not a challenge, 2 principals (50%) indicated that it was a major challenge. 8 tutors (16.7%) reported lack of knowledge as not a challenge, 15 tutors (31.3%) indicated that it was a minor challenge, 25 tutors (52.1%) indicated that it was a major challenge. 20 teacher trainees (5.7%) indicate that it was not a challenge, 89 teacher trainees (25.3%) indicated that it was a minor challenge, and 243 teacher trainees (69.0%) indicated that it was a major challenge. These findings indicate that majority of the principals (50%), tutors (52.1%) and teacher trainees (69.0%) identified lack of knowledge about ways to integrate ICT into the curriculum as a major challenge. These findings are in agreement with Pelgrum (2001) report on an international survey of teachers' perceived obstacles to using ICTs. The report identifies lack of knowledge and

skills and pedagogical difficulties to integrate technology in instruction as key challenges in the integration of ICT in teaching and learning. The findings are further supported by Olumbe (2006) who also notes that teachers are not well trained in using ICTs in teaching as a means for educational sustainability. The implication of these findings is that tutors must be trained on ICT use if full adoption of ICT in teaching and learning will be achieved.

#### **Lack of awareness on the potential offered by ICTs in the education context**

6 tutors (12.5%) indicated that it was not a challenge, 21 tutors (43.8%) reported that it was a minor challenge, 21 tutors (43.8%) reported that it was a major challenge. These findings indicate that there was some level of awareness among tutors on the potential offered by ICTs in the educational context. However 43.8% of the tutors lacked awareness on the potential offered by ICTs in the education context.

31 teacher trainees (8.8%) identified lack of awareness on the potential offered by ICTs in the education context as not a challenge, 96 teacher trainees (27.3%) indicated that it was a minor challenge, and 225 teacher trainees (63.9%) indicated that it was a major challenge. These findings indicate that majority of the teacher trainees (63.9%) identified lack awareness on the potential offered by ICTs in the education context as a major challenge. These findings concur with Tusubira and Mulira (2004) who invariably identify as a barrier to success, the inability of teachers and other staff on how they can use ICTs to help them work better.

## **Other challenges**

The principals, tutors and teacher trainees were asked to list other challenges apart from those indicated on the questionnaire. The findings are as follows.

Majority of the principals (75%) indicated lack of space for computer laboratories as another challenge. 1 principal (25%) did not respond.

Majority of the tutors (60%) identified lack of funds to purchase a personal computer for use at home or at school, 6 % of the tutors cited failure of Kenya National Examinations Council to examine ICT in teacher training colleges hence the teacher trainees did not take it seriously. 34% of the tutors did not respond.

103 teacher trainees (29.3%) identified inadequate tutors for ICT, 47 teacher trainees (13.4%) identified limited time allocated for ICT lessons, 46 teacher trainees(13.1%) identified poor teaching methods, 24 teacher trainees (6.8%) identified inadequate supply of electricity , 28 teacher trainees (8.0%) identified negative attitude towards ICTs, 4 teacher trainees (1,1%) identified limited reading materials on ICT, and 39 teacher trainees (11.1%) identified inadequate rooms for computer training.

### **4.9 Factors that would enhance the use of ICTs in supporting teaching and learning in teacher training institutions**

This part of analysis tried to establish the factors that would enhance use of ICTs in supporting teaching and learning in teacher training colleges. Relevant

questions from the principals', tutors' and teacher trainees' questionnaire were sought and analyzed.

3 principals (75%) suggested availing more computers to both tutors and teacher trainees. 2 principals (50%) indicated compulsory in-service training for all teachers on how ICTs can be used to enhance teaching and learning.

27 tutors (56.3%) identified availability of more computers for both tutors and teacher trainees as factors that would enhance the use of ICTs in supporting teaching and learning. 18 tutors (37.5%) indicated that ICT should be incorporated in the curriculum and be examinable to ensure that it was taken seriously. 3 tutors (6%) indicated training more teachers from other departments on use of ICTs in teaching and learning.

155 teacher trainees (44.0%) indicated availability of more computers as a factor that would enhance the use of ICTs in supporting teaching and learning. 93 teacher trainees indicated posting of more ICT teachers. 7 teacher trainees (2.0%) indicated that tutors in ICT must be qualified teachers. 88 teacher trainees (25.0%) suggested that ICT should be allocated more time and enough learning resources such as ICT related texts. 9 teacher trainees (2.6%) indicated that tutors and teacher trainees should be more committed in terms of attending ICT courses and being available during ICT lessons.

## **CHAPTER FIVE**

### **SUMMARY, CONCLUSIONS AND RECOMMENDATIONS**

#### **5.1 Introduction.**

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

#### **5.2 Summary**

The purpose of this study was to investigate the use of Information Communication Technologies (ICTs) in enhancing teaching and learning in public primary teacher training colleges in Kenya. Six research questions were formulated to guide in the study. Research question one aimed at investigating the extent to which public primary teacher training colleges have established ICT infrastructure for use in teaching and learning. Research question two aimed at investigating the extent to which tutors and teacher trainees in public primary teacher training colleges are endowed with skills on ICT use in enhancing teaching and learning. Research question three aimed at establishing the attitudes of the principals, tutors and teacher trainees towards the use of computers in teaching and learning. Research question four aimed at establishing the extent to which tutors and teacher trainees have integrated the use of ICTs in enhancing teaching and learning. Research question five sought to establish the challenges affecting the use of ICTs in enhancing teaching and learning. Research question six sought to



identify factors that would enhance the use of ICTs in teaching and learning in teacher training colleges.

Literature was reviewed on what ICTs in education entails, theoretical background on use of ICTs in teaching and learning, global context on ICT use in education, use of ICTs in education in Kenya and In teacher training colleges, skills and competencies required for use of ICTs in teaching and learning, benefits of using ICTs in education, and uses of ICTs in teacher training colleges. Attention was also given to challenges affecting the use of ICTs in teaching and learning.

The study applied a descriptive survey design. The target population was all the principals, tutors and teacher trainees from the public primary teacher training colleges in Kenya. The sample consisted of 4 principals, 56 tutors and 377 teacher trainees from public teacher training colleges. Data was collected through the use of questionnaires for principals, tutor and teacher trainees, and an observation schedule.

The findings revealed that;

1. Primary teacher training institutions had to some extent established ICT infrastructure for use in teaching and learning at varying degrees. For instance, 4 principals (100%) indicated that they had computer laboratories in their colleges. The number of functioning computers varied from one college to the other. From the observation schedules, only two colleges (50%) could offer computer lessons to a class of 40 teacher trainees at a computer to student ratio

of 1:1. Only one college (25%) had available and adequate internet facilities. All the four principals (100%) reported that most of the ICTs were inadequate for their needs. The teacher trainees had greater access to the available ICTs than the tutors. For instance 93.8% of the teacher trainees reported access to computers during classes and 54 % after classes. Only one college (25%) that provided tutors with computers in their offices.

2. The principals, tutors and majority of the teacher trainees had a positive attitude towards the use of computers in enhancing teaching and learning. 100% of the principals, 100% of the tutors and 99.1% of the teacher trainees obtained 37 points and above out of the maximum 60 points in the attitude test. The mean scores for the three groups of respondents were also high at 46.8 for principals, 48.3 for tutors and 50.9 for the teacher trainees. This shows that they all had a very positive attitude towards the use computers in teaching and learning.
3. Majority of the tutors had basic computer skills but did not have skills that required advanced use of ICTs in enhancing teaching and learning. For instance, 79.2% indicated they had attended a course on basic computer literacy. 39.6% of the tutors rated their expertise as good and another 39.6% rated their expertise in basic computer parts and functions as very good. A majority 37.8 % of the tutors rated their expertise in software applications as average. However, majority of the tutors (35.4%) rated their expertise in use of E – Mail for working together with other tutors and teacher trainees on issues

related to teaching and learning as poor. Majority of the tutors (50%) rated their expertise in technology management such as trouble shooting as poor. The same trend is also identified amongst the teacher trainees. Majority of the teacher trainees (32.2%) rated their expertise in opening a file on a computer as proficient. Majority of the teacher trainees (25%) rated their expertise in creating/editing a document on a computer as proficient. However, 68% of the teacher trainees rated their expertise in writing and sending E – Mails as poor, 64.2% also rated their expertise in downloading files and documents from the internet as poor.

4. There was relatively little use of the ICTs in enhancing teaching and learning. The available ICTs are to a large extent used by the teacher trainees to acquire basic ICT skills. For instance, 43.8% of the tutors reported they never used computers to record or calculate marks, grades and assessments, 66.7 % of the tutors indicated that they never accesses the internet to collect lesson ideas, 47.9% of the tutors reported that they have never had teacher trainees watch movies, videos or television to obtain information that can be used in class. 64.6% indicated that they have never had teacher trainees use computers to write assignments or other texts. 54.2% have never had teacher trainees use computers to process and analyze data. 66.8% of the teacher trainees reported that they used ICTs to acquire basic ICT skills once or twice in a week. Majority of the teacher trainees (31.3%) reported that they used ICTs for accessing information that can be used in the classroom. However, 50.3% of

the teacher trainees have never had a discussion of audio and video materials on CDs, videos or DVDs. 53.4% have never used E – Mail to share lesson plans, information, or ideas that can be used in the classrooms.

5. Use of ICTs in teaching and learning in teacher training is faced with many challenges. ICT infrastructure was identified as one of the major challenge.75%of the principals, 68%Of the tutors, and 88.4% of the teacher trainees identified inadequate computers as a major challenge.50 % of the principals, 47.9% of the tutors, and 63.4% of the teacher trainees identified lack of internet facilities as a major barrier. 75% of the principals identified inadequate space for computers and other related ICTs. Insufficient time for the integration of ICT into teaching and learning was also identified as a major challenge. 75 % of the principals, 52.1% of the tutors, and 65.9% of the teacher trainees identified lack of time to integrate ICTs in teaching and learning as a major barrier. Lack of technical assistance was also identified as a major challenge.50 % of the principals, 50 %of the tutors, and 58% of the teacher trainees identified lack of technical assistance as a major challenge.
6. Several factors that would enhance the use of ICTs in teaching and learning in teacher training colleges were identified. The factors include: Availing more computers.75% of the principals, 56.3% of the tutors, and 44.0% of the teacher trainees identified availability of more computers as a factor that would enhance the use of ICTs in teaching and learning. Training more personnel: 37.5% of the tutors indicated that more tutors should be trained on use of ICTs

to enhance teaching and learning. 26.4% of the teacher trainees suggested that more ICT tutors who are trained teachers should be posted. 25% of the teacher trainees suggested that more time should be allocated for ICTs in the timetable. 6.3% of the tutors suggested that use of ICTs in teaching and learning should be incorporated in the overall curriculum.

### **5.3 Conclusions**

ICTs in education have radical implications for conventional teaching and learning. It predicts transformation of the teaching – learning process and the way teachers and learners gain access to knowledge and information. For education to reap the full benefits of ICTs in teaching and learning, it's imperative that teacher trainees and tutors are able to effectively use these new tools for learning. The findings in this study has provided evidence that the potential of ICTs in improving the quality of teaching and learning in primary teacher training colleges is yet to be fully exploited.

The government's effort in ensuring that public primary teacher training institutions have at least some ICT infrastructure is noticeable. However, there are major variations from one college to the other. The absence of ICT infrastructure in the classrooms where teaching and learning is taking place, and the centralization of ICTs into the laboratories where the tutors and the teacher trainees compete for the same facility, and the absence of computers in tutors offices means that the ICT infrastructure will remain an object of curiosity, fear,

uncertainty, or mystery, rather than being seen as useful enabling tools as they are. The tutors and teacher trainees' use of ICT will largely depend on the extent to which they are in control of the technology. This is because the more they access the ICTs regularly, the more they use them and they appreciate the usefulness.

The principals, tutors and teacher trainees have a positive attitude towards the use of computers in teaching and learning. A positive attitude implies the acceptance that computers can be used to enhance teaching and learning. However, the low uptake of ICTs in enhancing teaching and learning means that there must be other contributing factors affecting the use of ICTs to support teaching and learning beyond attitude.

Majority of the tutors have basic ICT skills and competencies. However, there appears to be no effort to adopt these skills for purposes of using the available ICT infrastructure to actually deliver instructional content or illustrate concepts being taught in lessons. The tutors indicated that they lacked time, technical know-how on how ICTs can be used to enhance teaching and learning, and inaccessibility of the ICT infrastructure.

The findings of this study also indicated that both tutors and teacher trainees lack skills in use of the internet. This implies that they cannot benefit from the new types of learning environments provided by a networked global economy and the wealth of new educational resources available on the World Wide Web.

Use of the various ICTs is largely limited to the acquisition of basic ICT skills by the teacher trainees. However, more effort should focus on preparing the teacher trainees to use the ICTs as instructional tools. Teacher training on ICT should focus more on exposure to the way ICT can be used to enhance teaching and learning rather than the basic computer skills which are taught in commercial computer training colleges.

Among the key challenges identified as affecting the use of ICTs in supporting teaching and learning include availability of ICT infrastructure, lack of skills on how to integrate ICTs in teaching and learning, lack of technical assistance, time to explore and adapt the various ICTs to teaching and learning, and lack of internet connections in the colleges.

The study also identified various enabling factors towards the use of ICTs in teaching and learning in teacher training institutions. Among the enabling factors include posting of more ICT tutors to teacher training colleges. The tutors recruited to teach ICTs must also be competent and experienced teachers. Access to the various ICTs must extend to the tutors. Majority of the tutors did not have access to the various ICTs in their offices and this means that tutors have no time to prepare and teach with ICTs. The ICTs available to the teacher trainees must also be adequate. More practicing tutors should be trained on how ICTs can be used to enhance teaching and learning in specific subjects. ICT as a subject should be included in the final primary teacher examinations so that both the tutors and teacher trainees can take it more seriously.

#### **5.4 Recommendations.**

In light of the research findings, the researcher wishes to make the following recommendations.

1. The government should ensure that teacher training institutions focus on upgrading their ICT infrastructure. Computer laboratories with internet connectivity should be installed. A programme to ensure that all teacher training institutions have ICT infrastructure that commensurate the needs of the needs of the tutors and teacher training population should be put in place.
2. Additionally, teacher educators and the teacher trainees should be provided with technical assistance to use and maintain technology. When technology does not function well, a learning opportunity is lost and frustration grows. Timely technical assistance is imperative for tutors and teacher trainees to feel confident that they can use technology in their teaching and learning.
3. Teacher trainers are the key change agents behind the adoption and use of ICT in pre – service teacher training. Based on the findings of this research, there is an urgent need to provide a variety of formal and informal teacher – trainer training so that tutors can access those methods that best suits them. The MOE can also provide incentives such as workload reduction, recognition and reward in teacher trainer evaluations, increased research allocations to encourage the use of ICT in teaching and, compensation for those providing educational ICT support and assistance to others.



4. The government should encourage teacher training institutions to make decisions based on the cost – effectiveness of ICT projects. While acknowledging that cost is a major impediment in the overall uptake of ICT in education, teacher training institutions should adopt cost – saving strategies which could include:
- Maximizing the use of computer facilities in the colleges through efficient scheduling. This could include opening computer laboratories to the public for a small fee outside of training hours.
  - Forming partnerships across public and private sectors to share the costs of innovation, infrastructure, hardware and software systems, and recruiting technical support.
5. The current ICT curriculum for pre – service teachers must be revised. The training is largely inclined to ensuring that the teacher trainees are conversant with Microsoft Office applications such as MS Word, MS Access, and Excel. The curriculum must focus on the pedagogical value and application of ICT to support basic teaching and learning if we are to exploit the value of ICTs in supporting the implementation of Free Primary Education.
6. The current ICT curriculum must also be made compulsory and examined by the Kenya National Examination Council to ensure that it is taken seriously by the tutors and the teacher trainees.

7. Use of ICT in teaching and learning is a largely practical subject. The government must therefore post more ICT tutors and increase the number of ICT lessons allocated. Due to lack of enough ICT tutors and few numbers of lessons, much of the time is allocated for theory with little time for practicals. The teachers recruited to handle ICT in teacher training colleges must also be trained and qualified teachers who can relate ICTs to the larger educational goals and objectives.
8. The government must consider digitalizing the curriculum and provide some teaching and learning materials in digital form so that tutors and teacher trainees have an experience of an ICT supported curriculum.
9. The government must also identify a lead teacher training college where ICT infrastructure is well established and develop the college as a model college for ICT use in supporting teacher training. The college can be used to offer in – service training for tutors on use of ICTs to support teaching and learning.

### **5.5 Policy implications**

Positive ICT for education policy statements from the government will go some way towards encouraging non-governmental donors to assist in the development of ICT – related projects in teacher training colleges. The government should adopt a liberal outlook with respect to import costs and taxation of ICT components.

Regardless of the extent of the government's direct financial involvement in teacher training in ICT, the Ministry of Education should none the less be working in consultation with teacher training institutions and course developers to set

standards and criteria for ICT integration. Teacher training curricular should always be in harmony with the government's ICT policy and plans.

The government should formulate a policy with specific relevance to teacher capacity –building in ICT. The policy must take into consideration such aspects as ICT standards and performance measurement criteria for individuals and institutions, as well as issues related to accreditation and related financial implications. International practice could provide useful insight into how to tackle the issue of accreditations of ICT courses for teachers. A policy decision must be made at the Ministry of Education level as to whether basic computer literacy courses of the International Computer Driving License (ICDL) variety are warranted in the Kenyan initial teacher training context or the accreditation of pedagogically focused courses should be the focus.

### **5.6 Suggestions for further research**

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

1. The perceptions of tutors on the potential of ICT in supporting teaching and learning.
2. What are the most successful and relevant strategies for using ICT to change teaching and learning practices.

## BIBLIOGRAPHY

- Association of African Universities Report (2000). *Technical Experts Meeting on the Use of ICT in Higher Education Institutions in Africa*. 17-19 May, 2000. University of Dar-es-Salam, Tanzania.
- Abdulrazak, S.A. (2005). "Emerging Academic and Research Agenda". In, Reinvigorating the University Mandate in a Globalizing Environment: Challenges, Obstacles and Way Forward. 26-27<sup>th</sup> May 2005 Conference Proceedings. Nairobi: Birds Printers Ltd.
- Adam, L. (2003). Regional Information Infrastructure Development in Africa: Opportunities and Challenges for the Health Sector: Economic Commission for Africa. <http://www.uneca.org/org/aisi/health1.htm>. Accessed July, 2007.
- Anderson, R.E., and Dexter, S.L. (2000). School Technology Leadership: Incidence and Impact. Centre for Research on Information Technology and Organization. University of California. <http://repositories.cdlib.org> Accessed August, 2007.
- Ary, D. J., and Razariah, A. (1972). Introduction to Research in Education. New York: Rhinehart.
- Baylor, A., Ritchie, D. (2002). What Factors Facilitate Teacher Skill, Teacher Morale and Perceived Student Learning in Technology Using Classroom? *Computer and Education*, 39(11), 395-424.
- Blurton, C. (1999). New Directions in Education. In, UNESCO's World Communication and Information 1999-2000. Paris: UNESCO.
- Borg, W.R. and Gall.M. D. (1989). Educational Research: An Introduction (3<sup>rd</sup> Edition). New York: Longman.

- Bransford, J.D., Brown, A.L., and Cocking, R.C. (Eds.) (1999). "How People Learn: Brain, Mind, Experience and School". Committee on Developments in Science of Learning, National Research Council, National Academic Press.
- Brooks, D.W. (1997). Web-Teaching: A Guide to Designing Interactive Teaching for the World Wide Web. New York: Plenum.
- Chisenga, J. (2006). Key Paper Presented at the Standing Conference of African National and University Libraries of Eastern, Central and Southern Africa at the Crawford Hotel, Tanzania on 9-10<sup>th</sup> July, 2006. <http://eprints.rclis.org/archive/200.pdf>. Accessed September, 2007.
- Coral, T. (2001). A Delicate Balance. *Curriculum Administration*, 36(11), 64-65.
- Cox, M., Preston, C., and Cox, K. (1999). What Factors support or Prevent Teachers from Using Technology in Their Classrooms? Paper Presented at the British Educational Research Association Annual Conference, University of Sussex, Brighton.
- Crystal, J. (2001). Running a Successful Technology Campaign: A Potential Primer. *Technology and Learning*, 21(11), 35-42.
- Cuban, L. (1993). Computers Meet Classroom: Classroom Wins. *Teachers College Record*, Vol. 95, 185-210.
- Dearing, R. (1997). Report of the National Committee of Inquiry into Higher Education, London: Her Majesty Stationery Office. <http://www.leeds.ac.uk/edncol/ncihe>. Accessed December, 2008.
- DFID (2001). Imfundo: Partnership for ICT in Education Inception Report. London: DFID.
- Digital Links International (2004). ICT Scoping Study: Ministry of Education Science and Technology, Kenya. Primary Schools Empowerment Programme. <http://www.proffactory.com>. Accessed January 2008.

- Duffy, T.M., Lowyck, J. and Jonassen, D.H. (Eds.) (1993). Designing Environment for Constructivism Learning. New York: Springer-Verlag.
- Ertmer, P.A., Bai, H., Dong, C., Khalil, M., Park, S.H., and Wang, L. (2002). Online Professional Development: Building Administrators Capacity for Technology Leadership. *Journal of Computing in Teacher Education*, 19 (1), 5-11.
- Faggiano, E. and Fasano, M.( ). Teachers Perceptions and Usage of ICT: An Issue for Educators to Deal with. <http://www.tsqicmell.org/documents/get/229> Accessed January 2008.
- Fisher, M. (1996). Integrating Information Technology: Competency Recommendations by Teachers for Teacher Training. *Journal of Information Technology for Teacher Education*, 5(3), 233-238.
- G. O. K (2006a).The National Information and Communication Technology Policy. Nairobi: Government Printers.
- G.O.K (2003). Report of the Task Force on Implementation of Free Primary Education. Nairobi: The Jomo Kenyatta Foundation.
- G.O.K (2005b). 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.
- G.O.K (2006b). Draft Information and Communication Strategy for Education and Training. Nairobi: MOEST.
- G.O.K: MOEST (2005a). ICT in Education Options Paper. Nairobi: MOEST.
- G.O.K: MOEST (2005c). Kenya Education Sector Support Programme: 2005-20210: Delivering Quality, Equitable Education and Training to all Kenyans. 9<sup>th</sup> May 2005 Draft.

- Galagan, P. (2000). The Learning Revolution. In Woods, J.A. and Cortada, J.W. (Eds.) (2002). *The 2002 Training and Performance Year Book*, 75-82. New York: McGraw-Hill.
- Gay, L.R. (1987). *Educational Research: Competence for Analysis and Application*. Ohio: Meril Publishing Company.
- Glabawa, C. J. (2003). *The Status and Related Aspects of Lead Primary Teachers Training Colleges in Kenya*.
- Gregoire, R., Bracewell, R. Laferriere, T. (1996). *Lapport des nouvelles technologies de information et da la Comm a l'apprentissage des eleves on primaire et du secondaire*. Revue documentaire. Ottawa: Rescol, SchoolNet.
- Gunter, T. (2001). " Making a Difference: Using Emerging Technologies and Teaching Strategies to Restructure an Undergraduate Technology Course for Pre – Service Teachers". *Educational Media International* (March, 1). Vol 38, no. 1, 13-20.
- Haddad, W.D and Jurich, S. (2005). *ICT for Education: Potential and Potency*. [http://cbdd.wsu.edu/eDev/NigeriaToT/tr510/documents/ICT for education potential. PDF](http://cbdd.wsu.edu/eDev/NigeriaToT/tr510/documents/ICT_for_education_potential.PDF). SchoolNet Africa. Accessed November, 2007
- Haddad, W.D. and Draxler, A. (2005). *The Dynamics of Technologies for Education*. SchoolNet Africa. 2007.
- Hadley, M. and Sheingold, K. (1993). *Commonalities and Distinctive Patterns in Teacher Integration of Computers*. *American Journal of Education*, 101, 261-315.
- Hakkarinen, K. (2001). *Teachers Information Communication Technology Skills and Practices of Using ICT*. *Journal of Technology and Teacher Education*, 9(2), 181-197.
- Hawkins R.J. (2004). *Ten Lessons for ICT and Education in the Developing World*. Washington D.C: The World Bank Institute.

- Hung, D. (2001). 'Design Principles for Web-Based Learning: Implications for Vygotskian Thought'. *Educational Technology*, 41(3).
- IEC (2001). Imfundo: A Review of Experience with ICT in Education Projects. Cambridge: IEC.
- IPS (2003). Teacher Training on ICT use in Education in Asia and the Pacific: Overview from Selected Countries. Bangkok: UNESCO.
- Isaaczs, S., Broekman, I. and Mogale, T. (2003). Africa and the Information Age. Chapter 1. Contextualizing Education in Africa: The Role of ICTs. Information and Communication Technologies in Africa: Vol 3 IDRC Publications. [http://web.idrc.la/en/eve-71268-201-1-DO\\_Topic.html](http://web.idrc.la/en/eve-71268-201-1-DO_Topic.html). Accessed October 2007.
- James, T., Hesselmark, O., Akoh, B. and Mware, L. (June, 2003). Final Report: Review of Basic ICT Skills and Training Software for Educators in Africa.
- Juma, M.N. (2004). 'African Virtual University (AVU): Challenges and Prospects', In, M.A Beebe, K.M. Kouakou, B.O. Oyeyinka and M. Roa (eds.). Africa Dot Edu. New Delhi: Tata McGraw-Hill Publishing Company Limited.
- Karani, F. A. (2004). Conceptual Understanding and Current Policies and Practices in Open Learning and Distance Education, Sep 2004.
- Kargiorgi, Y., and Symeon, L. (2005). Translating Constructivism Into Instructional Design: Potential and Limitations, Education technology and society.
- Kenya School Net (2003). Preparing a Work force for the evolving Information Economy: A survey of ICT Access and Use in Kenya secondary Schools. Nairobi: Summit strategies Ltd.
- Khine, S.M. (2003). Creating a technology Rich Constructivist Environment in a Classroom Management Module. In Khine, S.M. and Fisher, D. (Eds.) Technology Rich Learning Environment. New Jersey: World Scientific.



- Kirkpatrick, H. and Cuban, L. (1998). What the research says about gender differences in access, use, attitudes and achievement with computers. *Educational Technology*, 38, 56-61.
- Laborde C. (2002), Integration of Technology in the Design of Geometry tasks with Cabri-Geometry, *International Journal of Computers for Mathematical Learning* 6(3), Springer Netherlands, pp. 283-317.
- Laferriere, T., Breuleux, A., and Bracewell, R. (1999). Benefits of Using Information and Communication Technologies (ICTs) for Teaching and Learning in K-12/13 Classrooms. Canada: SchoolNet.
- Leach, J. and Moon, B. (2002). Globalization, Digital Societies and School Reform: Realizing the Potential of New Technology to Enable the Knowledge, Understanding and Dignity of Teachers. Paper Presented to the 2<sup>nd</sup> European Conference on IT in Education and Citizenship, Barcelona, June 2002.
- Lelliot, A., Pendlebury, s. and Enslin, S. (2001). Education in Africa- Promises andPitfalls.
- Lou, D. (2005). Using Constructivism as a Teaching Model for Computer Science. People Republic of China. Information Technology Institute.
- Mattson, E. (2006). Field-Based Models of Primary Teacher Training: Case Studies of Student Support Systems from Sub Saharan Africa. United Kingdom: International Research Foundation for Open Learning.
- Midoro, V. (ed) (2005). European Teachers Towards the Knowledge Society. Cortana, Italy: Menabo.
- Mishra, S. (2002). 'A Design Framework for online Learning Environments', In *British Journal of Educational Technology*, 33(4).
- Moon, B. (2004). Open Learning and ICTs: A radical Solution to Preparing Teachers to Meet the Universal Basic Education (UBE). United Kingdom: The

- Open University. [http://www.col.org/pcf3/papers/PDFs/moom\\_Bob.pdf](http://www.col.org/pcf3/papers/PDFs/moom_Bob.pdf). Accessed July 2007.
- Moon, B. and Leach, J. (2002). Building Teachers Professional Knowledge through ICT: Experience and Analysis across the 'Digital Divide.' Paper Presented to the European Conference on Educational Research, University of Lisbon.
- Mugenda, M. (2006). University Roles in Meeting Aspirations for ICT and Economic Development Frontiers of Knowledge. University Leaders Forum. Cape Town, November 19-26<sup>th</sup> 2006.
- Mulusa, T. (1988). Evaluating Education and Community Development Programmes. Deutsche Stiftung fur Internationale entwicklung and College of Adult and Distance Education, University of Nairobi.
- Muriithi, P. (2005) "A framework for integrating ICT in the teaching and Learning process in secondary schools in Kenya". M.Sc. thesis submitted at the University of Nairobi, School of Computing and Informatics.
- Murphy, C. and Greenwood, L. (1998). Effective Integration of Information and Communication Technologies in Teacher Education. *Journal of Information and Technology for Teacher Education*, 7(3) 413-492.
- Ndiku, L. (2003). "The Problems Encountered by School Personnel in the Implementation of Computer Use in Secondary Schools in Uasin Gishu District". Unpublished M.Ed. Thesis. Moi University
- Nyaga, G. (1997). "Pupils Performance and Attitudes Towards Art and Craft in Kenya's 8-4-4 Education system in Embu District". Unpublished Doctorial Thesis, University of Nairobi.
- Oliver, R. (1993). A Comparison of Students Information Technology Skills in 1985 and 1991. *British Journal of Educational Technology*, Vol.24, 52-56.

- Ololumbe, N.P. (2006). "Teachers Instructional Material Utilization Competencies In Secondary Schools in Sub-Saharan Africa: Professional and Non Professional Teachers" In Conference Proceedings of the International Educational Technology Conference. 19-21st April 2006, North Cyprus.
- Papert, S. (1980). Children, Computers and Powerful Ideas. New York: Basic Books.
- Pascopella, A. (2001). Laptop or Textbook? *District Administrator*, 37(11), 54-56.
- Pelgrum, W.J (2001). Obstacles in the Integration of ICT in Education: Results from Worldwide Education Assessments. *Computers and Education*, 37, 163-178.
- Pelgrum, L., and Law, N. (2003). ICT in Education around the World: Trends, Problems and Prospects. Paris: UNESCO, IIEP.
- Potosky, D., and Bobko, Ph. (2001). A Model for Predicting Computer Experience from Attitudes towards Computers. *Journal of Business and Psychology*, 15(3), 391-404.
- Poole, B. J. (1998). Education for an Information Age: Teaching in the Computerized Classroom. Boston: McGraw-Hill.
- Privateer, P.M.(1999). Academic Technology and the Failure of Higher Education. *The Journal of Higher Education*, 70(1), 60-79.
- Quellmalz, E. and Zales, D. (2000). World Links for Development: Students Assessment Uganda Field Test. Menlo Park: SRI International.
- Rickards, T. (2003). Technology- Rich Learning Environments and the role of Effective Teaching. In Khine, S.M. and Fisher, D. (Eds.). Technology Rich Learning Environment. New Jersey: World Scientific.
- Robertson, S.I. (1996). Pupils, Teachers and Computers. *Journal of Computer Assisted Learning*, 12(4), 199-204.

- Rosen, L.D. and Weil, M.W. (1995). Computer Availability, Computer Experience and Technophobia Among Public School Teachers. *Computers in Human Behavior* 11, 9-31.
- Russel, L.D., and Schneiderheinze, A. (2005). Understanding Innovation in Education Using Activity Theory. *Education Technology and Society*, 8 (1).
- Russell, G., Finger, G., and Russel, N. (2000). Information Technology Skills of Australian Teachers: Implications for Teacher Education. *Journal of Information Technology for Teacher Education*, 9 (2), 149-166.
- SAIDE (2003). The Use of Computers in Schools: Report on Research into the Use of Computers for Teaching and Learning in Twenty One Schools in South Africa . Johannesburg: SAIDE. <http://196.35.72.162/saide/ur/{152E5859-BE40-4684-83DO-B4A3E7D95D5A}.pdf>. Accessed February 2008.
- Sanyal, B.C. (2001).New Functions of Higher Education and ICT to Achieve Education for All. Paris: UNESCO.
- School Net Africa (2004). Towards a Strategy on Developing African Teacher Capabilities in Use of ICT.
- Sheingold, K. and Hadley, M. (1990). Accomplished Teachers: Integrating Computers into Classroom Practice: New York: Centre for Technology in Education.
- Tusubira, F. and Mulira, N. (2004). “Integration of ICT in Organizations: Challenges and Best Practice Recommendations Based on the Experience of Makerere University and other Organizations.” Paper Presented at the International ICT Conference held at the International ICT Conference held at Hotel Africana, Kampala, Uganda on 5-8<sup>th</sup> September 2004.
- UN (2004). United Nations Millennium Development Goals.
- UNESCO (2002 b).EFA Global Monitoring Report 2002: Is the World on Track? Paris: UNESCO.

- UNESCO (2002a). Information and Communication Technology in Teacher Education: A Planning Guide. <http://www.unesco.org>. Accessed August 2007.
- UNESCO (2003). Developing and Using ICT indicators in Education: Bangkok: UNESCO.
- UNESCO (2004). Information and Communication Technology Usage in Distance Education in Sub-Saharan Africa: National and Regional State-of-the-Art Perspectives. Moscow: UNESCO Institute for Information Technology in Education.
- Unwin, T. (2004). Towards a Framework for Teacher Training in Africa. University of London: Royal Holloway.
- Van Braak, J. (2001). Factors Influencing the Use of Computer Mediated Communication by Teachers in Secondary Schools. *Computers and Education*, Vol.2, 139-153.
- Veen. W. (1993). The Role of Beliefs in the Use of Information Technology: Implications for Teacher Education, or Teaching the Right Thing at the Right Time. *Journal of Information Technology in Teacher Education*, 11(3), 21-23.
- Villalba, C. and Romiszowski, A.J (2001). 'Current and Ideal Practice in Designing, Developing and delivering web-based Training'. Englewood Cliff, NJ: ETP.
- Vygotsky, L.S. (1978). Mind in society: The Development of Higher Psychological Processes. Cambridge, M.A: Harvard University Press.
- Waema, T.M. (2002). ICT Human Resources Development in Africa: Challenges and Strategies. In, Africa Technology Policy Studies Network, Nairobi, Kenya.
- Waite, S. (2004). Tools for The Job: A Report of Two Surveys of ICT Training and Use For Literacy in Primary Schools in the West of England. *Journal of Computer Assisted Learning*, 20(1), 11-21.

- Waugh, M.L., and Handler, M. (1997). Preparing Teachers to Teach With Technology: The Costs and Benefits of Developing and Electronic Community of Learners. In Westbrook, K.C. (Eds.). (1997). Technology and the Education Workplace. Corwin: Thousand Oaks.
- Webb, E., Jones, A., Barker, P. and Schaik, P. (2004). Using e-Learning Dialogues in Higher Education. *Innovations in Education and Teaching International*, 41(1), 93-103.
- Wild, M. (1996). Technology Refusal: Rationalizing the Failure of Student and Beginning Teachers to Use Computers. *British Journal of Educational Technology*, Vol27, 134-143.
- Wilson, B. (Eds.) (1996). Constructivists Learning Environments: Case Studies in Instructional Design. Englewood Cliffs: Educational Technology Publications.
- Wims, P. and Lawler, M. (2007). Investing in Educational Institutions in Developing Countries: An Evaluation of their Impact in Kenya. University College of Dublin: Ireland.
- World Bank (2004). Contribution of ICTs to Economic Growth. Washington D.C.: The World Bank Institute.
- World Bank (2006). Information and Communication for Development: Global Trends and Policies. Washington, D.C.: The World Bank Institute.
- World Education Forum (2000). The Dakar Framework of Action. Paris: UNESCO.

**APPENDICES:**

**APPENDIX A:**

**TRANSMITTAL LETTER:**

Kara Augustine Muchiri,  
University of Nairobi,  
Kikuyu Campus,  
P.O 92 Kikuyu

Dear respondent,

**REF: REQUEST TO FILL THE QUESTIONNAIRE FOR RESEARCH PURPOSE**

I am a postgraduate student at the University of Nairobi and I request you kindly to fill the attached questionnaires as sincerely as possible.

The research topic focuses on the investigation on use of information and communication technology (ICTs) in enhancing teaching and learning in primary teacher training colleges in Kenya. You are assured that, the information you give will be treated with utmost confidence and will be used only for the purpose of research.

Thank you very much for your co-operation.

Yours Sincerely,

Kara Augustine Muchiri

## APPENDIX B

### QUESTIONNAIRE FOR THE PRINCIPALS

**Dear respondent,**

This questionnaire is designed to investigate the use of Information Communication Technologies (ICTs) in enhancing teaching and learning in primary teacher training colleges in Kenya. The information you give will be treated with absolute confidentiality. Do not indicate your name or the name of your college. Please respond to all items in the questionnaire as honestly and correctly as possible.

#### Section A: Demographic Information

1. Please indicate your gender

(a) Male  (b) Female

2. Indicate your age by placing a tick

26 – 30 years  31 – 35 years  36 – 40 years

46 – 50 years  51 – 55 years  56 years and above

3. Indicate your highest professional qualification?

PhD  M.A  M.Ed  B.Ed

B.A/ B.Sc with PGDE  EACE/ KACE (A- level with Diploma)

Any other please specify \_\_\_\_\_

4. Indicate your experience as a college principal in the whole of your career

Below 1 year  1-5 years  6-10 years

11-15 year  16-20 years  Over 20 years



5. Indicate your experience as a college principal in this college

Below 1 year [ ] 1-5 years [ ] 6-10 years [ ]  
 11-15 year [ ] 16-20 years [ ] Over 20 years [ ]

6. Please indicate the number of students currently enrolled in your college

Below 200 [ ] 201 – 360 [ ] 361 – 540 [ ]  
 541 – 720 [ ] 721 – 1100 [ ] 1100 [ ]

7. Are you trained in ICT?

Yes [ ] No [ ]

8. If yes above, please indicate the core theme of the training by ticking (✓) the appropriate response

Basic computer literacy, not necessarily linked to teaching	
Use of ICT hardware and software but linked to teaching and learning	
Use of ICT for improving pedagogy in teaching different subject areas and classroom management	

9. The table below is designed to measure attitudes towards the use of computers in teaching and learning. Please indicate your level of agreement or disagreement by ticking (✓) the appropriate response using the following key.

SA -Strongly Agree A - Agree U - Undecided D -Disagree SD- Strongly Disagree

Statement	SA	A	U	D	SD
1. Computers can help me to learn things more easily					
2. Computers are difficult to understand					
3. Knowing how to use computers will help me do well in my career					
4. Working with computer means working on your own, without contact with others					
5. All students and teachers should have an opportunity to learn about computers at school					
6. Anything that a computer can be used for, I can do just as well in another way					

7. Computers will improve education					
8. The challenge of solving problems with computers does not appeal to me					
9. ICT should be withdrawn from college timetable					
10. Using a computer would encourage me to be creative					
11. Having a computer available to me would improve my general satisfaction					
12. Computers will relieve teachers of routine duties					

**Section B: Condition of ICT in the college**

10. Do you have ICT department in your college?

Yes [ ] No [ ]

11. When was the ICT department introduced in your college

\_\_\_\_\_

12. Do the tutors have in-service training opportunities in order to equip themselves with skills on how ICTs can be used to enhance teaching and learning?

Yes [ ] No [ ] Some [ ]

13. Are the teacher trainees trained on how ICTs can be used to enhance teaching and learning?

Yes [ ] No [ ]

14. Do you have internet facilities in your college?

Yes [ ] No [ ]

15. Are tutors able to access the internet?

Yes [ ] No [ ]

16. Are teacher trainees able to access the internet?

Yes [ ] No [ ]

17. What is the adequacy of computers on your college?

Adequate [ ] Not adequate [ ]

18. Are tutors able to use ICT for teaching?

Yes [ ] No [ ] Some [ ]

19. Are students able to use ICT in learning process?

Yes [ ] No [ ] Some [ ]

20. Is anyone available to help your teachers/ students in use of ICT in teaching and learning?

Yes [ ] No [ ]

21. Indicate the availability of the following personnel in the ICT department

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

**Section c: ICT infrastructure and access**

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

Item	Available Adequate	and	Available and inadequate	Not available
Internet facilities				
Radio				
Computer				
Telephone				
Tape recorder				
Overhead projector				

Film projector			
Video cassette recorder			
Printer			
T.V set			
Microphone for audio-recording			

23. (i) Do you have computer laboratory in the college

Yes [ ] No [ ]

(ii) If Yes above, how many computer laboratories are there in the college?

.....

(iii) How many functioning computers are there in each laboratory?

.....

(iv) Are all the functioning computers in each laboratory connected to the internet?

Yes [ ] No [ ]

24. (i) Do the teacher trainees access the computers during classes?

Yes [ ] No [ ]

(ii) Are the teacher trainees allowed to access computers for some time after classes?

Yes [ ] No [ ]

25. Do teachers have access to computers in their offices?

Yes [ ] No [ ]

**Section E: Challenges affecting the use of ICT in enhancing teaching and learning**

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

Potential challenge	Not a challenge	A minor challenge	A major challenge
Insufficient number of computers			
Teachers lack knowledge			
Difficult to integrate in instruction			
Scheduling computer time			
Insufficient peripherals such as printers and scanners			
Lack of internet connection in the college			
Lack of technical assistance			
WWW: slow network performance			
Lack of interest by teachers			
Telecomm infrastructure weak			
WWW: difficult finding information			
WWW: no time for teachers to explore			
Lack of information about software			
WWW: not enough connections			
WWW: insufficient technical support			
Lack of support from school board			
Software too complicated to use			
Running cost too prohibitive			

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

.....

29. What factors would enhance the use of ICTs in teaching and learning in your institution?.....

30. What possible recommendations would you make towards increasing the use of ICTs in enhancing teaching and learning in teacher training colleges in Kenya?

.....

**Thank you for your cooperation**

## APPENDIX C

### QUESTIONNAIRE FOR THE TUTORS

**Dear respondent,**

This questionnaire is designed to investigate the use of information technology (ICTs) in enhancing teaching and learning in primary teacher training colleges in Kenya. The information you give will be treated with absolute confidentiality. Do not indicate your name or the name of your college. Please respond to all items in the questionnaire as honestly and correctly as possible.

#### Section A: Demographic information

Please indicate by use of a tick (✓) as appropriate

1. Please indicate your gender

(a) Male  (b) Female

2. Indicate your age by placing a tick

Below 26 years  26 – 30 years  31 – 35 years   
36 – 40 years  41 – 45 years  46 – 50 years   
51 – 55 years  56 years and above

3. Indicate your highest academic qualification?

PhD  M.A  M.Ed  B.Ed   
B.A/ B.Sc with PGDE  EACE/ KACE (A- level with Diploma)   
Any other please specify \_\_\_\_\_

4. Indicate your experience as a tutor in the whole of your career

Below 1 year  1-5 years  6-10 years   
11-15 year  16-20 years  Over 20 years

5. Indicate your experience as a tutor in this college

Below 1 year [ ]      1-5 years [ ]                      6-10 years [ ]  
 11-15 year [ ]      16-20 years [ ]                      Over 20 years [ ]

**Section B: Attitude, Knowledge and skills in ICT**

6. Have you attended an ICT course or training?

Yes [ ]      No [ ]

7. If yes above, please indicate the core theme of the training by ticking (✓) the appropriate response

Basic computer literacy, not necessarily linked to teaching	
Use of ICT hardware and software but linked to teaching and learning	
Use of ICT for improving pedagogy in teaching different subject areas and classroom management	

8. The table below is designed to measure attitudes towards the use of computers in teaching and learning. Please indicate your level of agreement or disagreement by ticking (✓) the appropriate response using the following key.

SA -Strongly Agree    A - Agree    U - Undecided    D -Disagree                      SD- Strongly Disagree

Statement	SA	A	U	D	SD
1. Computers will improve teaching and learning					
2. Anything that a computer can be used for, I can do just as well in another way					
3. Computers can be used to support teaching and learning in any subject					
4. I have avoided computers because they are unfamiliar and somewhat intimidating to me					
5. Computers would stimulate creativity in students					
6. Computers can be used successfully with courses which demand creative activities					
7. Use of computers almost always reduces personal treatment of students					
8. Teacher training should include instructional application of computers					
9. Working with computers makes me feel isolated from other people					
10. Computers will relieve teachers of routine duties					
11. If there was a computer in my classroom, it					

would help me become a better teacher					
12. I sometimes feel intimidated when I have to use a computer					

**9. Please rate your expertise in the use of the following**

<b>ICT Competencies</b>	<b>Very Good</b>	<b>Good</b>	<b>Average</b>	<b>Weak</b>	<b>poor</b>
Basic computer parts and functions (opening, closing and saving files, opening and renaming files, etc.)					
Operating systems (Windows Operating System and others)					
Software applications-MS Office, MS Word, Excel, PowerPoint, Internet and E-Mail, Graphics and drawing, Databases and data entry, Desktop publishing, Video production and editing					
Creating student reports using software applications such as MS Word					
Using PowerPoint for presentations in the classroom for a variety of curriculum areas					
Using and producing video for classroom presentation					
File management for teachers for creating folders, moving files, renaming files for classroom assignments and documents					
Using Publisher software to create a class newsletter or teachers newsletter and students publications					
Use of Internet for teaching and learning					
Use of E-Mail for working together with other tutors and teacher trainees on issues related to teaching and learning					
Developing productivity tools such as tests and mark sheets					
Searching the Internet for good multimedia lessons, activities and resources as well as pedagogical issues					
Technology management such as trouble shooting					



**10. General use of ICTs**

Use of word processors or a desktop publishing package to produce task sheets,

tests, handouts Always [ ] Often [ ] Sometimes [ ] Never [ ]

Accessing the internet in order to find and collect lesson ideas

Always [ ] Often [ ] Sometimes [ ] Never [ ]

Monitoring of student enrolment and achievement in subjects

Always [ ] Often [ ] Sometimes [ ] Never [ ]

Recording or calculating assessments, marks and grades

Always [ ] Often [ ] Sometimes [ ] Never [ ]

**Section C: Use of ICTs in enhancing teaching and learning with students**

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

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

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

**Section D: Challenges faced by teachers in the use of ICT in enhancing teaching and learning**

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

Potential challenge	Not a challenge	A minor challenge	A major challenge
Not enough access or limited access to computers			
Lack of adequate technical support for ICT projects			
Not enough teacher training opportunities for ICT projects			
Lack of knowledge about ways to integrate ICT to enhance curriculum			
Teachers do not have access to the necessary technology at home			
Lack of internet connection in the college			
Lack of exposure to other colleges where ICTs are integrated in teaching and learning			
Lack of awareness on the potential offered by ICTs in the education context			

Lack of sufficient time to integrate computers into teaching and learning			
Centralization of computers in a laboratory			
WWW: Difficult finding information			
Lack of assistance and motivation from the college administration			
The available ICTs are not accessible			
Lack of technical assistance			

b. Please list any other challenges experienced apart from those mentioned above

.....  
 .....

13. What factors would enhance the use of ICTs in teaching and learning in your institution?.....

.....  
 .....

14. What possible recommendations would you make towards increasing the use of ICTs in enhancing teaching and learning in teacher training colleges in Kenya?

.....  
 .....  
 .....

**Thank you for your cooperation**

## APPENDIX D

### QUESTIONNAIRE FOR THE TEACHER TRAINEES

**Dear respondent,**

This questionnaire is designed to investigate the use of information technology (ICTs) in enhancing teaching and learning in primary teacher training colleges in Kenya. The information you give will be treated with absolute confidentiality. Do not indicate your name or the name of your college. Please respond to all items in the questionnaire as honestly and correctly as possible.

#### Section A: Demographics

1. Indicate your year of study by inserting a tick (✓) in the appropriate response

First Year                Second year           

2. What is your gender?

Male                        Female                   

3. Indicate your age

18 – 20 years     21 – 23 years     24 – 26 years     27 – 28 years

29 – 31 years     32 – 34 years     35 years and above

4. If you are in second year which cluster are you taking?

Arts                        Sciences                   

#### Section B: Training in ICT use

5. In the course of your studies, have you received training on ICT use?

Yes                        No

6. Do you have ICT on the college time table?

Yes  No

7. Are you able to access computers during classes?

Yes  No

8. Are you able to access computers after classes?

Yes  No

9. Are the computers that you have adequate for all students?

Yes  No

10. For the training that you have received on ICT use, please indicate to what extent you agree with the following statements using the following key.

SA = Strongly Agree A = Agree D= Disagree SD=Strongly Disagree

U=Undecided

Statement	SA	A	U	D	SD
The content of the coursework was empowering to me.					
Many of the ICT teacher preparation courses integrated examples and experiences I can relate to.					
The course provided opportunities for me to improve my knowledge in teaching and learning with ICTs					
I acquired knowledge and skills to prepare me for teaching with ICT					
I was inspired to find creative ways to work with the computer					
I was taught processes and procedures to follow in using ICT for teaching and learning					

### Section C: ICT skills and knowledge

11. How well can you do each of these tasks on a computer

Task	Proficient	Above average	Average	Fair	Poor
Open a file on a computer					
Create/edit a document on a computer					
Save a computer document or file					
Print a computer document or file					
Copy or download files from the internet					
Attach file to an email address					
Use spreadsheet to plot a graph					
Create a presentation e.g. using power point					
Create a multi-media presentation (with sound, pictures, video)					
Write and send e-mails					

12. Where did you learn most of the skills you have indicated above from your college of from some other sources?

\_\_\_\_\_

Others (Please specify) \_\_\_\_\_

13. The table below is designed to measure attitudes towards the use of computers in teaching and learning. Please indicate your level of agreement or disagreement by ticking (✓) the appropriate response using the following key.

SA -Strongly Agree A - Agree U - Undecided D -Disagree SD- Strongly Disagree

Statement	SA	A	U	D	SD
1. I enjoy doing things on a computer					
2. I think it takes a long time to finish when I use a computer					
3. I will use a computer in my future occupation					
4. I think that the more often teachers use computers , the more I will enjoy school					
5. I sometimes feel intimidated when I have to use computers					

6. I think working with computer would be more enjoyable and stimulating					
7. I learn more from books than from a computer					
8. All teacher trainees should have an opportunity to learn about computers in their colleges					
9. Use of computers in education almost always reduces the personal treatment of students					
10. ICT should be withdrawn from the college timetable					
11. Computers can be useful instructional tool in almost all subject areas					
12. I have avoided computers because they are unfamiliar and somewhat intimidating to me					

14. In the table below, a list of various applications of ICT in enhancing learning is provided; respond by ticking (✓) the appropriate response

Application	Everyday	Once or twice a week	Once or twice a month	Never
Acquisition of basic ICT skills e.g. computer literacy				
Self-paced learning through access to resources on servers, CDs, or where available online				
Group discussion of audio and video training materials available on videos, CDs, DVDs or even online				
Self-paced formative and summative assessment				
Use of e-mail to share lesson plans, information, ideas and content with peers in other colleges				
Building familiarity with approaches to teaching and learning				
Accessing information that can be used in the classroom				
Composing, editing and presenting project work or learning assignments				
Building literacy and numeracy skills including spoken language				

**Section D: Challenges faced by teachers in the use of ICT in enhancing teaching and learning**

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

Potential challenge	Not a challenge	A minor challenge	A major challenge
Insufficient number of computers			
Insufficient peripherals such as printers and scanners			
Lack of internet facilities in the college			
WWW: slow network performance			
WWW: difficult finding information			
Lack of skills on how ICTs can be used in learning			
Lack of integration into existing curriculum and textbooks			
The available ICTs are not easily accessible to students			
Lack of technical assistance			
Lack of time to explore on how ICTs can be used in teaching and learning			
Lack of awareness on the potential offered by ICTs in supporting teaching and learning			
Availability of computer software that can be used to enhance teaching and learning			

b. Please indicate any other challenges encountered apart from the ones listed above.....

16. What factors would enhance the use of ICTs in supporting teaching and learning in your institution?.....

17. What possible recommendations would you make towards increasing the use of ICTs in enhancing teaching and learning in teacher training colleges in Kenya?

.....

**Thank you for your cooperation**



## APPENDIX E

### OBSERVATION SCHEDULE

Unit of Observation	Comments
<b>ICT infrastructure put in place</b> -ICT infrastructure at the learning resource center -Computer laboratory	
<b>Access to ICT infrastructure</b> -Access of ICT infrastructure to tutors -Access of ICT infrastructure to teacher trainees	
<b>Technical support</b> -Availability of technical personnel to help teacher trainee use ICTs -Availability of technical personnel to help tutors use ICTs	
<b>Use of ICTs to enhance teaching and learning</b> -Tutors use of ICTs -Teacher trainee use of ICTs	

## APPENDIX F

### Public Primary Teacher Training Colleges Teacher trainee Enrolment in January 2007

College	1 <sup>st</sup> years			2 <sup>nd</sup> years			Grand
	Male	Female	Total	Male	Female	Total	Total
Asumbi	144	131	275	217	234	451	726
Baringo	177	163	340	169	205	374	714
Bondo	185	203	388	176	165	341	729
Egoji	377	300	677	334	269	603	1280
Eregi	274	275	549	269	271	540	1089
Garissa	196	188	384	116	127	243	627
Kaimosi	282	286	568	280	247	527	1095
Kamwenja	228	176	404	272	220	492	896
Kericho	203	203	406	300	300	600	1006
Kigari	212	335	547	280	367	647	1194
Kilimambogo	148	336	484	228	228	456	940
Machakos	195	282	477	296	167	463	940
Meru	175	317	492	170	287	457	949
Migori	235	213	448	240	217	457	905
Mosoriot	249	214	463	267	196	463	926
Muranga	153	157	310	209	202	411	721
Narok	176	271	447	158	139	297	744
Shanzu	226	183	409	186	167	353	762
Tambach	220	214	434	226	166	392	826
Thogoto	146	142	288	196	160	356	644
<b>Total</b>	<b>4201</b>	<b>4589</b>	<b>8790</b>	<b>4589</b>	<b>4334</b>	<b>8923</b>	<b>17713</b>



REPUBLIC OF KENYA

## MINISTRY OF SCIENCE & TECHNOLOGY

Telegrams: "SCIENCE TEC", Nairobi  
Telephone: 02-318581  
E-Mail: ps@scienceandtechnology.go.ke

JOGOO HOUSE "B"  
HARAMBEE AVENUE,  
P.O. Box 9583-00200  
NAIROBI

When Replying please quote

Ref. MOST 13/001/ 38C 97/2

27<sup>th</sup> March 2008

Kara Augustine Muchiri  
University of Nairobi  
P.O. Box 30197  
NAIROBI

### RE: RESEARCH AUTHORIZATION

Following your application for authority to carry out research on, *'The use of Information and Communication Technologies (ICT'S) in Enhancing Teaching and Learning in Public Primary Teacher Training Colleges in Kenya'*

I am pleased to inform you that you have been authorized to carry out research in Teacher Training Colleges in Kenya for a period ending 30<sup>th</sup> July, 2008.

You are advised to report to the Provincial Technical Training Officers and the Principals of the Colleges you will visit before embarking on your research project.

On completion of your research, you are expected to submit two copies of your research report to this office.

**M. GATOBU**  
**FOR: PERMANENT SECRETARY**

Copy to:

The Provincial Technical Training Officers

The Principals  
Primary Teacher Training Colleges