E-LEARNING READINESS AMONG PUBLIC PRIMARY TEACHER TRAINING COLLEGES IN KENYA

JOSEPH SOITA MARUTI
E55/7123/02

A THESIS SUBMITTED TO THE SCHOOL OF EDUCATION IN PARTIAL FULFILMENT FOR THE AWARD OF THE DEGREE OF MASTER OF EDUCATION OF KENYATTA UNIVERSITY

NOVEMBER, 2010
DECLARATION

THIS THESIS IS MY ORIGINAL WORK AND HAS NOT BEEN SUBMITTED FOR ANY STUDY PROGRAMME IN ANY UNIVERSITY

JOSEPH SOITA MARUTI

DATE

E55/7123/02

THIS THESIS HAS BEEN SUBMITTED FOR EXAMINATION WITH OUR APPROVAL AS UNIVERSITY SUPERVISORS.

______________________________

DR. NOBERT OGUM OGETA

DATE

LECTURER

DEPARTMENT OF EDUCATIONAL MANAGEMENT, POLICY AND CURRICULUM STUDIES

KENYATTA UNIVERSITY

______________________________

MR GATIMU KIRANGA

DATE

LECTURER

DEPARTMENT OF EDUCATIONAL MANAGEMENT, POLICY AND CURRICULUM STUDIES

KENYATTA UNIVERSITY
DEDICATION

This work is dedicated to my dear wife Milcah and son Derrick. To my dad Jason and mom Florentine.
ACKNOWLEDGEMENTS

First and foremost, I wish to thank the Almighty God for the wisdom that guided me to write this work. Secondly, I acknowledge the wise guidance and input from my dedicated supervisors Dr. Nobert Ogeta, Dr. Wycliffe Otieno and Mr. Kiranga Gatimu. They devoted their precious time in reading my work and making necessary corrections. Thirdly, I wish to convey my sincere gratitude to students and staff of Baringo, Eregi, Kaimosi, Thogoto and Shanzu Teacher Training Colleges for participating in this research. The principals of these colleges were co-operative and they deserve a credit. To my parents Jason and Florentine who not only gave me the moral support but also supported me financially. May the gracious God bless you abundantly. To my comrades, thank you all for encouragement and wise input to this work. Finally, to my wife Milcah and son Derrick who constantly encouraged me even in times of difficulties to continue writing. To all the readers of this document, God bless you.
TABLE OF CONTENTS

Declaration...........................................................................................................ii
Dedication............................................................................................................iii
Acknowledgements.............................................................................................iv
Table of Content .................................................................................................v
List of Tables .......................................................................................................ix
List of Figures ....................................................................................................x
Abbreviations and Acronyms................................................................................xi
Abstract...............................................................................................................xii

CHAPTER ONE: INTRODUCTION

1.1 Introduction.................................................................................................... 1
1.2 Background to the Study................................................................................ 1
1.3 Statement of the Problem............................................................................... 99
1.4 Purpose of the Study.................................................................................... 99
1.5 Objectives of Study..................................................................................... 100
1.6 Research Questions...................................................................................... 10
1.7 Assumptions of the Study........................................................................... 11
1.8 Limitations of the Study............................................................................. 11
1.9 Delimitations of the Study.......................................................................... 11
1.11 Significance of the Study........................................................................... 12
1.12 Theoretical Framework............................................................................. 12
1.13 Conceptual Framework............................................................................. 13
1.14 Operational Definition of Significant terms ............................................ 16
CHAPTER TWO : LITERATURE REVIEW

2.1 Introduction ............................................................................................................. 17
2.2 Global Overview of E-readiness .............................................................................. 17
   2.2.1 E-readiness Rankings of Regions ...................................................................... 17
2.2.2 Global Overview of ICT use in Education ......................................................... 18
2.3 E-readiness in Africa ............................................................................................... 20
   2.3.1 Status of E-readiness in Education in Africa .................................................... 21
2.4 E-Learning Readiness in Kenya .............................................................................. 22
2.5 Impact of Electronic Technology on Learning ....................................................... 25
2.6 Impediments to ICT use in Education in Developing Countries ......................... 25

CHAPTER THREE: RESEARCH METHODOLOGY

3.1 Introduction ............................................................................................................. 27
3.2 Research Design .................................................................................................... 27
3.3 Location of Study .................................................................................................. 27
3.4 Target Population .................................................................................................. 27
3.5 Sample and Sampling Procedures ........................................................................ 28
3.6 Research Instruments ............................................................................................ 29
   3.6.1 Questionnaires ............................................................................................... 29
   3.6.2 Observation Schedule .................................................................................... 30
3.7 Piloting .................................................................................................................. 30
   3.7.1 Reliability of Instruments .............................................................................. 30
   3.7.2 Validity of Instruments .................................................................................. 31
3.8 Data Collection ...................................................................................................... 31
APPENDIX VI: BUDGET.................................................................88

APPENDIX VII: RESEARCH PERMIT......................................................89
LIST OF TABLES

Table 3.1 Population of Sampled Colleges..........................................................28
Table 3.2 Distribution of Study Sample .............................................................28
Table 4.1 Number of Computers and Computer labs........................................34
Table 4.2 Status of Computer Accessories in Colleges.....................................36
Table 4.3 Percentage of Connected Computers.............................................37
Table 4.4 Type of E-learning Applications in Colleges.................................38
Table 4.5 E-content Development by Tutors in Colleges.............................41
Table 4.6 Reasons for lack of E-content Development.................................42
Table 4.7 Use of Internet by Tutors in Colleges............................................44
Table 4.8 Percentage of Tutors using ICT in colleges....................................45
Table 4.9 Different use of Electronic Technology by Tutors.......................46
Table 4.10 Knowledge and Skills in using Electronic Technology..................48
Table 4.11 Uses of Computers by Students...................................................49
Table 4.12 Preparation received in College..................................................50
Table 4.13 Poor Infrastructure ....................................................................52
Table 4.14 Lack of Connection in Colleges...................................................53
Table 4.15 Inadequate personnel in Colleges...............................................54
Table 4.16 Lack of E-learning Software.......................................................55
Table 4.17 Lack of Time .............................................................................55
Table 4.18 Lack of appropriate Skills and Knowledge..................................56
Table 4.19 Suggestions by Students.............................................................57
Table 4.20 Suggestion by Tutors.................................................................58
LIST OF FIGURES

Figure 1.1 Conceptual Framework .........................................................14

Figure 4.1 Student Population and Computers ........................................35

Figure 4.2 Percentages of Tutors with Knowledge in Electronic Technology.....39

Figure 4.3 Tutors Knowledge on use of Internet......................................43

Figure 4.4 Composition of Tutors using ICT..........................................46

Figure 4.5 Preparation to roll out E-learning..........................................51
# ABBREVIATIONS AND ACRONYMS

<table>
<thead>
<tr>
<th>Abbreviation</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>AVU</td>
<td>African Virtual University.</td>
</tr>
<tr>
<td>CEC</td>
<td>Commission of European Communities</td>
</tr>
<tr>
<td>EIU</td>
<td>Economic Intelligence Unit</td>
</tr>
<tr>
<td>EMIS</td>
<td>Education Management Information System</td>
</tr>
<tr>
<td>GDP</td>
<td>Gross Domestic Product</td>
</tr>
<tr>
<td>ICT</td>
<td>Information and Communications Technology</td>
</tr>
<tr>
<td>KENET</td>
<td>Kenya Education Network</td>
</tr>
<tr>
<td>KESSP</td>
<td>Kenya Education Sector Support Program</td>
</tr>
<tr>
<td>MoE</td>
<td>Ministry of Education</td>
</tr>
<tr>
<td>NEPAD</td>
<td>New Partnership for African Development</td>
</tr>
<tr>
<td>OECD</td>
<td>Organization for Economic Corporation and Development</td>
</tr>
<tr>
<td>PC</td>
<td>Personal Computer</td>
</tr>
<tr>
<td>SITE</td>
<td>Society of Information Technology and Education</td>
</tr>
<tr>
<td>SPSS</td>
<td>Statistical Package for Social Sciences</td>
</tr>
<tr>
<td>SSA</td>
<td>Sub Saharan Africa</td>
</tr>
<tr>
<td>SWAp</td>
<td>Sector Wide Approach to planning</td>
</tr>
<tr>
<td>TTCs</td>
<td>Teacher Training Colleges</td>
</tr>
<tr>
<td>UNESCO</td>
<td>United Nations Education Scientific and Cultural Organization</td>
</tr>
</tbody>
</table>
ABSTRACT

This study sought to interrogate the level of preparedness among Public Teacher Training Colleges in Kenya to use electronic technology in learning and produce competent teachers to manage e-learning in Kenyan schools given the policy emphasis by the Ministry of Education on adoption of E-learning in educational institutions. The specific objectives of the study were to: assess the availability of ICT infrastructure in Teacher Training Colleges, analyze the extent to which Teacher Training Colleges use e-learning as a mode of delivery, assess colleges’ connectivity and use of internet in learning and establish the extent of preparedness of tutors and students in using electronic technology in learning. The study adopted a descriptive survey design. The targeted population was five Principals, 311 Tutors and 4,372 students in Baringo, Eregi, Kaimosi, Thogoto and Shanzu Teacher Training Colleges. The population of staff and students in these colleges was 4,678. The researcher obtained 50% of the tutor population and 60% of the student population in each college. Stratified random sampling was used to select tutors and students. Purposive sampling was used to select the principals. This gave a sample size of 2,787 respondents comprising of 155 tutors and 2,632 students. Questionnaires and observation schedules were be used as research instruments to collect data. Data was then arranged and coded for analysis. Percentages, frequency distributions and means were used to analyze the collected data with the aid of the Microsoft Excel and Statistical Package of Social Sciences. Data was presented using tables, histograms and pie charts. Study findings indicated that colleges had inadequate infrastructure and poorly connected to the internet. Tutors and students lacked skills to use technology in learning an indication that they were not ready to roll out E-learning in colleges. Overall, the findings showed that Teacher Training Colleges studied in Kenya were not ready for E-learning. It was recommended that funding for ICT equipments in colleges be increased, tutors be trained on handling E-learning and the E-learning be integrated in Teacher Training curriculum.
CHAPTER ONE
INTRODUCTION

1.1 Introduction
This chapter gives the background to the study, statement of the problem, purpose of the study, study objectives, research questions and significance of the study. It also highlights limitations and delimitations of the study, theoretical and conceptual framework and operational definition of terms.

1.2 Background to the Study
The role of electronic technology in promoting economic growth and development has gained prominence globally. Economies are transforming from industrial to knowledge based-ones where knowledge is recognized as a driver of productivity and economic growth (OECD 2004, World Bank 2002). Nations that succeed in harnessing the potential of electronic technology can look forward to a greatly expanded economic growth, dramatically improved human welfare and a stronger demographic government (Kammssu, Siekpe, & Euzy, 2004). It reduces transaction costs, increases labor productivity, opens new trade opportunities, better communication and enhancing overall efficiency.

In some countries, notably the United States and Australia, there is evidence that sectors which have invested mostly in Information Communication and Technology (ICT) have experienced an increase in the overall efficiency of using labor and capital (Pilat, 2003). Experience has proved that given proper infrastructure, ICT can be an enabler of socio-economic development. Examples from the developed world where significant investment in ICT had major impacts includes increasing the United States Gross
Domestic Product (GDP) by 7.8%, 8.0 in the United Kingdom (UK), 8.3% in Singapore and 8.4% in Australia, all such developments are linked with improved productivity, competitiveness and citizen engagement (Bhatnagar, 2005).

ICTs have the potential to create job opportunities, improve delivery and access to health and education. They facilitate information sharing and knowledge creation. This increases the transparency, accountability and effectiveness of government, business and non-profit making organizations all of which contribute to an enabling environment of socio-economic development (Morawaczynski & Ngwenyama, 2007).

It has become evident that faster rates of economic growth can be achieved when using ICTs as driving factors of economic policies of worldwide economies. Elements such as rapid diffusion of digital platforms like internet, mobile telephony and broadband networks are all but examples that demonstrate how pervasive ICT has become with various implications on economic growth at the macro and national levels (Morawaczynski & Ngwenyama, 2007).

Education is one of the areas where use of electronic technology provides tangible benefits. Use of technology in and for education is now seen worldwide both as a necessity and an opportunity (UNESCO, 2009). It plays a great role in the three fundamental aspects of education policy that is access, quality and cost.

ICT increase access to education through distance learning. They provide new and innovative means to bring educational opportunities to a greater number of people of all ages, especially those who have historically been excluded such as the population living in rural areas, women facing social barriers and students with disabilities (UNESCO, 2009). The use of ICT in education promotes E-learning. E-learning is learning that is
supported by electronic technology. It involves use of Interactive multimedia, Internet based learning (online), Computer mediated learning and campus portal access to institutional processes and resources (Taylor, 2001). This according to Taylor is the fifth generation of E-learning, which aims to capitalize on features of the internet and the web. E-learning integrates ICTs in the learning process. This gives rise to different modes of learning such as Computer Based Training (CBT), Web Based Training (WBT), Synchronous and Asynchronous learning and Distance Education (DE).

E-learning is a promising tool for expanding and widening access to education especially at advanced levels (Kurt & Larchin, 2005). It allows people to participate in education by increasing flexibility of participation compared to traditional face to face method. It allows working students and adults, people living in remote areas, non-mobile students and even foreign students to participate easily in education (Kurt & Larchin, 2005). In addition; online learning relaxes the constraints of face to face learning such as, size of rooms and student/teacher ratios. E-learning is currently adopted in Kenya’s universities although not at optimal levels. It is practiced in other educational levels at minimal rates. In terms of providing quality education, E-learning has become an integral part in developing highly effective human resource. This is through Network technologies that have the potential to increase the availability of quality education materials (World Bank, 2009). The use of the internet to access different websites promotes customized sharing of knowledge, materials and databases quickly and cheaply over long geographical distances. Furthermore, online resources offers teachers access to a vast and diverse collection of materials enabling them to design curricula that best meet the needs of their students. Commission of European Communities (CEC, 2008) observes that ICT is
fostering a growing internationalization of higher education, where networking is enabling shared courses.

Studies have indicated that use electronic technology in schools has positive impact on student’s performance. British Educational Communications and Technology Agency (BECTA) survey showed that, schools with high level of e-maturity demonstrate a more rapid increase in performance scores than those with low levels (BECTA, 2007). The report further indicates that the digital generation is learning more by using ICT in everyday life. Teachers need to be part of this and educational institutions need to take it fully on board

Teachers who are key players in the education system need to have knowledge and skills in the utilization of ICT and E-learning as mode of education delivery. This study sought to establish how Teacher training colleges in Kenya are prepared to benefit from the utilization of E-learning and in preparing teachers who are competent to use technology to support learning. As UNESCO (2008) observes, the outcome of ICT projects in education depends on those at the heart of education that is teachers.

Teachers in the 21st century are faced with the challenge of having to update their knowledge to make appropriate use of ICT either as a tool to be used in the classroom or as a moderator of E-learning. In order to function in the new world economy, students and teachers have to learn to navigate large amounts of information, analyze and make decisions in order to master new knowledge and accomplish complex tasks collaboratively (Anouk, Bart & Nyaga, 2005). Technological advancements have brought about significant changes in societies and labor markets. Companies are now seeking employees who have the skills to maximize the potential of ICT to enhance productivity
in the work place. Schools are therefore under pressure to prepare students for these changes in society and in the work place (UNESCO, 2008). However preparing students for such a world requires teachers to acquire the new skills first. Teacher training institutions are in turn under pressure to adequately train and prepare teachers. These institutions should incorporate ICT in their programs and embrace e-learning as a method of education delivery to be cost effective. It is paramount that technology should be infused in the entire teacher training program for trainees to learn about, to learn with and learn to incorporate technology in their teaching career when they are employed (Society of Information Technology and Education, 2002). Teachers should be equipped with skills of using ICT in teaching and in material preparation. UNESCO (2008) further observes that currently teachers not only require subject expertise and effective teaching methodologies, but have the capacity to assist students fit to the emerging knowledge society.

Countries view the integration of ICT in education systems as an impetus to attaining the education Millennium Development Goals (MDGs) and Education For All (EFA).

There are global and regional initiatives to promote ICT in education. The initiatives are spearheaded by global organizations such as the United Nations Educational Scientific and Cultural Organization (UNESCO). UNESCO is giving high priority to the use of ICT for more equitable and pluralistic development in education.

Given the benefits of ICT investment, Kenya drafted an ICT policy in 2006, with a vision of creating an e-driven and knowledge based society by the year 2015. The policy objectives aim at;
(i) Improving the social welfare of the population, improving the quality of teaching and learning, improving health care and empowering women, youth, rural communities and the illiterate and disadvantaged groups

(ii) Improve the efficiency and quality of public service delivery, provide adequate infrastructure and facilitate the development of sectoral ICT policies and strategies. (Republic of Kenya, 2006)

Kenya’s capacity to take advantage of the knowledge economy depends on how effective it becomes a “learning economy”. This requires a drastic shift from the formal education system where learning has to take place in classroom scenario to a system where learning takes place anywhere and anytime without restriction of distance. Learning should not be limited to a formal setup but be dynamic so as to reach even those barred to access education through formal system. These include the out of school youths, students who lack admission to pursue higher education due to lack of space in colleges and adults who lack time to attend formal classes. E-learning provides a medium for this cadre of people to access education.

Kenya has reiterated the importance of building 21st century schools that will prepare learners who will fit in the global knowledge economy. Kenya’s ICT policy on education articulates the use of ICT in schools, colleges, universities and other educational institutions so as to improve the quality of teaching and learning, promote distance and virtual education, integrate e-learning resources and exploit learning opportunities to offer Kenya’s educational programs for export. The Ministry of Education (MoE) in collaboration with development partners developed a Sector Wide Approach to planning (SWAp), the Kenya Education Sector Support Program (KESSP) in which ICT features
as one of the investment programs (out of 23), demonstrating the importance that the
government attaches to the role of ICT in education (Republic of Kenya, 2005). KESSP
comprises of 23 investment programs on education sector. Within KESSP E-learning is
identified in the following investment programs:

(i) Primary Teacher In-service Training_ The program aims at in-servicing pre-
service teacher trainers on e-learning methodologies so that teachers have the
skills on how to integrate ICT in education.

(ii) ICT investment program_ this outlines the strategy and policies that will that will
foster e-learning delivery systems, build the necessary capacity and promote the
development of required ICT infrastructure and institutional management
systems(Republic of Kenya, 2005)

KESSP provides a roadmap for investment in e-learning and suggests provisional budgets
to support educational activities. There are several initiatives by both by the government
and Non-governmental organizations (NGOs) in promoting integration of electronic
technology in Kenya’s educational institutions. These initiatives include:

(i) The establishment of the Kenya ICT Trust Fund, which is a partnership between
public and private enterprises. It solicits for funds to equip Kenya’s schools with
ICT equipments.

(ii) Support from the World Bank towards Education Management and Information
System (EMIS)

(iii) Launch of New Partnership for Africa’s Development (NEPAD) e-schools
program through consortia lead by Microsoft
(iv) Efforts towards digitalization of the curriculum by the Ministry of Education through Kenya Institute of Education (KIE)

(v) The government has rolled out efforts to purchase ICT equipments for 142 schools as model institutions for e-learning.

The use of technology in education will help attain the one of the education goals in the Country’s vision 2030, which is to provide globally competitive education, training and research for development. This is to be achieved through reducing literacy rates, increasing access to education and raising the quality of education.

Most of the Kenyan universities have began embracing use of e-learning as strategy to enhance access to education, offer low cost education and adapt to the changing trends to university education in the world. To implement use of ICT in institutions, the MoE laid down a National ICT strategy for Education and Training that gives a blueprint of harnessing ICT use in Education (Republic of Kenya, 2004). The strategy for TTCs is to equip them with networked computers and laboratories for tutors and students. Granted the benefits of ICT investment in education, educational institutions should have proper ICT infrastructure, good internet connectivity and utilize e-learning as a mode of delivery for them to benefit from the electronic technology, this is referred to as E-learning readiness. Kenya has 18 public teacher training colleges, having an estimated enrollment of 15,782 students. In addition there are two diploma colleges and eight private primary teacher training colleges. They should be prepared to fully utilize e-learning in the provision of education. This is an emphasis that MoE is putting on the primary, secondary and higher learning institutions so as to lower the cost of education enhance access to educational opportunities and provide quality education in tandem with the
ministry’s vision. Teacher training colleges need to be prepared to harness use of electronic technologies to operate optimally and prepare teachers who are relevant in the global knowledge world and who will positively impact the education system with the new technologies.

1.3 Statement of the Problem

The use of electronic technology has been recognized as a key strategy in improving the efficiency, cost effectiveness and relevance of a sector. Its success in education sector is hinged not only on financing but also the preparation of adequate human resource. Teacher Training colleges in Kenya are expected to produce competent teachers who are relevant in the current knowledge economy. Because of the current revolution and impact of electronic technology, the Ministry of Education has been emphasizing the adoption of E-learning in educational institutions so as to lower the cost of education, increase access to educational opportunities and improve on the quality of education provided. Despite the strong emphasis given to E-learning in education, little has been done to evaluate how prepared these educational institutions are to roll out E-learning. It is in this context that this study sought to investigate the question: how prepared are Teacher Training Colleges in implementing E-learning and producing teachers who will implement E-learning in schools?

1.4 Purpose of the Study

The study investigated the extent to which teacher training colleges in Kenya are prepared in rolling out e-learning as part of efforts to institutionalize ICT in education provision and producing teachers who will impact positively the education system with e-technology.
1.5 Objectives of Study

The specific objectives to this study were to:

(i) assess availability of ICT infrastructure, that is Personal Computers (PCs), computer labs, computer accessories and connectivity in Teacher Training Colleges and there accessibility by students and tutors.

(ii) analyze the extent which Teacher Training Colleges are using E-learning and components of ICT mostly utilized by tutors and students.

(iii) assess the extent which tutors are prepared to use electronic technology in teaching, determine their skills and training received in using electronic technology in learning.

(iv) find out how students are prepared for E-learning in colleges and in schools once they are deployed.

(v) assess hindrances to use of E-learning in colleges and document measures that can hasten the rolling out of E-learning in colleges.

1.6 Research Questions

The study sought to answer the questions:

(i) What is the status of ICT infrastructure and equipment in Teacher Training Colleges?

(ii) To what extent are tutors and students in Teacher Training Colleges utilizing electronic technology in learning?

(iii) How are tutors in colleges prepared to use electronic technology in teaching?
(iv) How prepared are students to adopt E-learning in colleges and once they are deployed in schools?

(v) What are the hindrances to rolling out of E-learning in colleges?

(vi) Which measures can be taken to hasten the rolling out of E-learning in Teacher Training Colleges?

1.7 Assumptions of the Study

The following were the assumptions of this study:

(i) Teacher training colleges in Kenya are currently utilizing ICT in their teaching and learning process even though at different levels.

(ii) Tutors are using ICT in the teaching and learning process in colleges.

(iii) Teacher Training Colleges use E-learning as mode of education delivery even if on a limited scale.

1.8 Limitations of the Study

(i) The study was limited to use of E-learning and training of teachers while they are in colleges. The study did not ascertain the impact of trained teachers once deployed in schools. This is due financial and time limitations.

(ii) The study did not cover all the colleges due to financial limitations.

1.9 Delimitations of the Study

(i) This study focused on E-learning readiness in five Public Teacher Training Colleges. There are other Teacher Training Colleges in Kenya which the study did not cover.

(ii) The study considered only Public Teacher Training Colleges, private colleges were not considered in the study.
1.10 Significance of the Study

(i) The findings from this study would help the government establish the status of TTCs preparedness to use E-learning and prepare teachers who will employ the skills to promote E-learning. This can help the MoE to speed up implementation of E-learning in Teacher Training colleges.

(ii) The government can use this study findings to harness its quest for a knowledge based society and preparing an E-literate workforce and society who can fit in the global economy.

(iii) Given the current emphasis on ICT use in different sectors of the economy to improve on efficiency and quality of service delivery, the findings from this study can help the MoE be efficient in its service delivery and provide quality education in Teacher Training Colleges.

1.11 Theoretical Framework

The study was guided by the endogenous growth theory also referred to as new growth theory. The theory underscores the central role played by knowledge as a factor of production. The role played by ICT in enhancing creation, storage and distribution of knowledge is emphasized. This theory developed by Stanford economist Paul Romer in the late 1980s and early 1990s views knowledge as an additional factor of production (Romer 1994). The crucial source of economic growth that is highlighted by endogenous growth theory is skills and accumulation of knowledge. According to this theory a country’s capacity to take advantage of knowledge economy depends on how quickly it becomes a learning economy. The use of ICT enhances lifelong learning. Imparting of IT skills through formal (schools, universities, private institutions) and informal sources
(learning by internet, NGOs, online etc) becomes vital. The theory gives an explanation for technological advancement in promoting economic growth. It incorporates the concept of human capital, the skills and knowledge that make workers productive. Knowledge is regarded as a basic form of capital. Knowledge is subject to increasing returns because it’s a non-rival good. It can be shared and has positive externalities (Cortright, 2001). Use of ICT in educational institutions will promote the acquisition of knowledge and skills. It promotes the development of IT skilled economy and will therefore enhance economic growth. ICT increases teacher’s access to information from different sources across the globe. There is exchange of information via the web and thus enhancing globalization. Use of e-learning will promote virtual learning which enhances the interaction of teachers and students without necessarily meeting face to face. This promotes access to quality education even to those in far and inaccessible areas. Its worth to note that, use of the internet and global exchange of ideas updates workers with current skills and relevant knowledge. When Teacher training colleges are equipped with good ICT infrastructure and embrace the use of e-learning, the output from these colleges will be teachers who are e-literate and will impart the same knowledge to students. As a result the education sector will be producing students who can properly fit in the global knowledge economy.

1.12 Conceptual Framework

The impact of global knowledge economy has made many countries to spearhead ICT reforms in their systems including education. This necessitates the design of policies that are to be implemented at macro level with demands on sectors and specialized agencies to conform. Education being one large system with sub-systems should embrace the use
of ICT at institution/micro level. This requires that teachers are adequately prepared in terms of attitude, skills and knowledge. It is the responsibility of pre-service teacher training colleges to do this.

ICT infrastructure in TTCs, connectivity to the internet and preparedness of tutors and students are the independent variables. The uses of E-learning in TTCs, production of E-learning compliant teachers are dependent variables since they depend on level of ICT infrastructure and connectivity in colleges and preparedness of tutors and students in TTCs.

**Fig 1.1 Impact of E-learning in Teacher in Teacher Training Colleges**

<table>
<thead>
<tr>
<th>ICT infrastructure in colleges</th>
<th>Preparedness of tutors</th>
<th>Preparedness of students</th>
</tr>
</thead>
<tbody>
<tr>
<td>Personal Computers (PCs)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Computer accessories</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Connectivity to the internet</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>E-learning in colleges</th>
<th>E-learning prepared teachers</th>
</tr>
</thead>
<tbody>
<tr>
<td>Online learning</td>
<td></td>
</tr>
<tr>
<td>Computer based learning</td>
<td></td>
</tr>
<tr>
<td>Virtual classrooms</td>
<td></td>
</tr>
<tr>
<td>Digital collaborations</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Increased access to education</th>
<th>E-learning in schools</th>
</tr>
</thead>
<tbody>
<tr>
<td>Low cost of education</td>
<td></td>
</tr>
<tr>
<td>Quality education provided</td>
<td></td>
</tr>
<tr>
<td>Global knowledge economy</td>
<td></td>
</tr>
</tbody>
</table>

**Source:** (Researcher, 2010)
From the above framework, the availability of ICT infrastructure, accessibility to ICT facilities in the colleges, there connectivity to the internet and preparedness of tutors and students will lead to E-learning in colleges. This will in turn lead to E-learning preparedness teachers, low cost of education, high quality of education and increased educational output since many people would have easy access to education.
1.13 Operational Definition of Significant Terms

**Asynchronous learning** - Learning in which students learn at their own pace with aid of electronic technology without presence of a teacher

**Computer Based Training** - Learning through use of computer with aid of CD ROMs, DVDs and other accessories without hooking up to the internet

**Distance Education** - Accessing education via electronic technology without necessary meeting the teacher face to face

**E-learning** - Learning that is supported by use of electronic technology aided by computers

**E-maturity** - The capacity of a learning institution to make strategic and effective use of ICT to promote educational outcome

**E-literate** - Having knowledge in the application of electronic technology

**E-readiness** - The state in which an institution is prepared to benefit from IT

**In-service teachers** - Teachers who are working and get training to upgrade their skills

**Lifelong learning** - Learning that is not bound by age or lifetime learning

**Networked technology** - Connection of technology devices such as computers via a given Network

**Online learning** - Learning through which instructors and learners interact through the internet i.e. a two way communication between the learners and teachers

**Pre-service teachers’** - Students training to be professional teachers

**Web Based Learning** - Learning where students access their training course via an internet connection on the world wide web.
CHAPTER TWO

LITERATURE REVIEW

2.1 Introduction

This chapter reviews literature on global overview of e-readiness, e-learning readiness in Africa, e-learning readiness in Kenya, impact of electronic technology on learning, and Impediments to ICT use in education in developing countries.

2.2 Global Overview of E-readiness

This section reviews literature on e-readiness from a global perspective. It highlights the global e-readiness rankings of regions and global overview of ICT use in education.

2.2.1 E-readiness Rankings of Regions

E-readiness rankings are released annually by the Economic Intelligence Unit (EIU). The EIU is the world’s foremost provider of country, industry, and management analysis in terms of use of electronic technology. The results released in 2008 show a digital divide between developed countries and developing countries (EIU, 2008). The rankings show the level of preparedness of countries to benefit from use of electronic technology. The 2008 regional ranking indicates that North America and Western Europe are more ready than other regions of the world. They therefore benefit more from use of ICT than countries in the developing world. The e-rankings allow a country to gauge the success of its ICT strategies against those of other countries. The success of North America to its current level is attributed to good e-strategy, developed infrastructure and large investments in the ICT sector.
These rankings however consider E-readiness of the whole economy and not education specifically. There is need for e-readiness survey in education globally considering the role that education plays in development.

### 2.2.2 Global Overview of ICT use in Education

In education there are efforts both at national and regional levels to harness the use of ICT in education. European member states meeting in Lisbon identified ICT as a core component of the knowledge society and a necessary instrument for adapting education to it. As a result e-learning initiatives and programs were adopted with specific funding and strong support of stakeholders (Commission of European Communities, 2008). All member states have programs and actions to integrate ICT in education. This translated into intensive efforts to provide equipment and train teachers in ICT skills. This has led to wider use of ICT in schools in Europe. The European Union aims at promoting digital literacy, setting up European virtual campuses and e-twinning of schools. E-twinning of schools refers to partnering schools where students and teachers share academic and social knowledge with their counterparts in other countries. ICT use in Europe is widespread in higher education, nearly all universities have websites and nine out ten have intranets.

However like other regions, reports indicate a digital gap among member countries (Commission of European Commission report, 2008). Nordic countries and the UK took an early lead in using ICT in education. To address the digital gap, European countries developed an e-European information strategy with focus on digital literacy. The 2006 Riga declaration gave this objective a specific target of halving the gap in internet usage
by 2010 for groups under risk of exclusion, such as older people, people with disabilities and unemployed persons.

A survey by Programme for International Students Assessment (PISA) revealed that ICT use in education in OECD countries is positively correlated with student’s performance. Schools with better ICT resources achieve better academic results than those that are poorly equipped. (PISA, 2005). This can be justified by the fact that students have wide access to information. This perhaps explains the reason why education in the West is of high quality.

In Romania a study carried out between August 2007 and May 2008 to investigate ICT use in education revealed that seven out of ten teachers preferred to teach using computers. The teachers observed a positive performance in their discipline as a result of using ICT (Elina, 2008). This study indicated that students considered most important effect of using ICT for school lessons is a simplified learning process followed closely by easier understanding of the content.

An examination of countries in the Asian-Pacific has shown that ICT is not being used to its full potential in enhancing quality of teaching and learning (UNESCO, 2008). There are both technical and capacity related barriers that have to be overcome. The report indicates infrastructure, equipments and connectivity as impediments to utilization of ICT in their education systems. These are setbacks that affect use of ICT in Africa. UNESCO has initiated projects such as UNESCO school Net which aims at strengthening ICTs in schools in the region.
2.3 E-readiness in Africa

Most studies on ICT in Africa have focused on constraints and benefits of ICT in a macro perspective. There is need for more studies on Africa’s readiness to benefit from use of ICT especially in education. A study by Infinedo (2005) revealed that Africa has long been disadvantaged by lack of fast and affordable connectivity with the rest of the globe. African countries are not prepared or compare poorly with other economies on the global networked economy. Infinedo (2005) classified the level of readiness in Africa in three regions; North Africa, sub-Saharan Africa (south) and sub-Saharan Africa (East and west). South Africa has higher attainment of e-readiness than other parts of Africa. Miller (1999) attributes this leadership to well nurtured policies. Variations in level of readiness can be attributed to different levels of economic development and geographical locations .North African countries have high speed internet connectivity with Europe. East and Southern Africa is the only region that is not connected to the global broadband infrastructure and accounts for less than 1% of the world’s international bandwidth, as a result of this missing link, the region relies on satellite connectivity which costs the highest in the world (Farrell, Glen and Shafika, 2007). East African region is however moving fast to address this shortage and the commissioning of the fiber optic from Fujairah in the United Arab Emirates (UAE) in Mombassa , under the TEAMS project will lower the cost of connectivity and enhance access to information (Gitonga, 2009).

Infinedo (2005) suggests that Africa should come up with policies that help them get integrated in global networked economy. The developed world should increase direct investment in ICT especially in sub-Saharan Africa. However, the designing of policies
without implementation may not connect Africa to the global economy. Africa should move towards e-actions and cooperate in their efforts of digitalizing the continent.

### 2.3.1 Status of E-readiness in Education in Africa

African countries have realized the role of ICT in education. Education ministers meeting at first African ministerial roundtable on ICT for education, training and development in Nairobi June 2007 emphasized the role of ICT in promoting development especially in rural areas (Farrell et al, 2007)

Farrell (2007) summed the state of infrastructure in Africa regarding to access to ICT infrastructure as too little, too expensive and poorly managed. His study revealed the average of African University has bandwidth capacity equivalents to a broadband residential connection available in Europe and pay 50 times more for their bandwidth than their educational counterparts in the rest of the world. The survey revealed that access to ICT in schools is poor; computer laboratories are ill equipped with an average of computer to student ratio as 1:40 and low internet connectivity. In particular Sub-Saharan Africa is missing out of the boons of ICT and therefore its population is missing out on better education. (Shafika, Irene and Thomas, 2006).

There are several initiatives in Africa to promote use of electronic technology in education. One of the initiatives is Nepad’s E-schools project, a multicountry, multistakeholders continental initiative to impart ICT skills to Young Africans and improve the provision of education in schools. The goal of Nepads E-initiative is to have all schools implementing use of ICT in 10 years.

The other initiative is African Virtual University (AVU) which is one of the first e-learning projects to be implemented in Africa’s institutions of higher learning. AVU seeks
to increase access to tertiary and continuing education in African universities by tapping global academic resources and by offering training to academicians in African universities to prepare materials for development (Nafukho 2005).

A study by Awoleye and Siyanbola (2007) to assess the readiness of students in Nigerian universities for E-learning adoption revealed that about 80% of students have access to computer systems, 91% have access to internet and communicate via the Email while 96.6% of the teachers have access to computers and use internet.

These studies have mostly considered universities with little attention on other education sub-systems. This study seeks to fill the gap by looking at e-readiness in teacher training colleges.

In Zimbabwe, lecturers in universities have slow take up of E-learning partly due to lack of awareness of E-learning facilities and reported lack of preparedness (Lockias and Daga, 2008). The results also showed that insufficient infrastructure in universities hampered the preparedness of universities to use E-learning.

2.4 E-Learning Readiness in Kenya

Most studies on ICT in Kenya have focused benefits and constraints to use of ICT. There are few studies on e-learning readiness. One comprehensive study on e-readiness in education in Kenya was done by Kenya Education Network (KENET) in 2007, which focused on e-readiness in higher learning institutions. There are few studies done on other sub-systems such as middle level colleges, primary schools and secondary schools. This study will seek to examine e-learning readiness in teacher training colleges.

KENET assessed the level of preparedness of higher education institutions to use ICT in teaching, learning, research and management and the capacity of readiness of the
institutions to use electronic learning to improve the quality of education (Kashorda, Waema, Omosa and Kyalo, 2007). The findings from this survey indicated that most institutions are not ready to use ICT for e-learning and allocation of budget to ICT is minimal. The findings also revealed that higher learning institutions in Kenya have inadequate bandwidth, low access to networked PC by staff and students, low quality of campus network infrastructure and limited campus access to Library resources (Kashorda et al, 2007).

2.4.1 ICT and Education in Kenya

The MoE policy on ICT is to integrate it into education and training systems in Kenya in order to prepare learners and staff for Kenyan economy and enhance national ICT skills. The policy looks towards providing sufficient and affordable internet infrastructure capacity to all secondary schools and tertiary institutions by the year 2010. It encourages the use of IT and promoting the growth and development of e-learning at all levels of education in order to improve quality of teaching and learning (Republic of Kenya, 2005).

Farallel (2007) observes that education sector in Kenya lacks adequate connectivity and network infrastructure although a small number of schools have direct access to high speed connectivity through internet service providers.

The ministry observes that all teacher training colleges in Kenya are working towards implementing ICT in their operations. Each college has a computer laboratory. The policy presupposes need to upgrade computer labs and building ICT capacity in TTCs which will yield high returns. It highlights challenges facing implementation of ICT in TTCs as poor access to computers by students, computers lack basic standards and lack
of qualified teachers. A study by Ndiku (2003) on problems encountered in implementation of educational ICT projects found that insufficient number of computers and peripherals devices, teacher’s lack of knowledge and inadequate soft wares for instructions as impediments to integration of ICT in Kenya.

Kenya has become the third African country to launch e-learning facilities in secondary schools after South Africa and Nigeria (Check point, 2008). The program sponsored by Intel, aims at equipping schools to use computers and wireless connectivity for all types of class work. The new program aims to replace the blackboard with a touch screen and students to send their work to teachers through wireless connectivity. However rolling of this program may not be effective in rural areas since they lack the basic infrastructure to enhance this type of learning.

Kenya School Net (2003) found that although schools are aware of benefits of computers, few had them and only one school had a website. It also found that there was a close association between students studying mathematics or sciences and computer studies.

Ford (2007) reports that Kenya has approximately 19890 primary schools, many of which are in rural areas, of these schools only 15% have electricity and only 500 have computers albeit with limited internet access. He further observes that in the teacher training colleges ICT curriculum is taught but internet connectivity is limited and most available through dial up.

In an effort to promote knowledge in use of computers, the Ministry of Youth Affairs (MYA) through the Youth Enterprise Fund (YEF) started a digital village project to connect rural and urban areas with ICT. The project which is to be funded through government and private sector aims at providing each constituency with eight computer
work stations and training in entrepreneurship (Wanjiku, 2008). Education system will benefit through increase of online courses and improving management systems. The digital project aims to integrate ICT in formal education and Non-Formal education and training.

2.5 Impact of Electronic Technology on Learning.

E-learning embraces the use of computer based technology to support learning. It involves the use of internet and other electronic devices such as CD ROMS and mobile phones to provide instruction. With use of electronic technology in learning, we have diversified forms of learning such as online learning, blended learning, and open learning. The use of electronic devices in education has positively revolutionized the education sector. E-learning reduces the overall cost of education such as traveling, accommodation and other hidden costs. Students can get access to resources, meet with their tutors and sit for exams without being present at university or college. Nafukho (2005) highlights that use of ICTs by universities especially in Africa should aim at ensuring access and lowering the direct and indirect cost of education. E-learning overcomes the barrier of access to education. Students who lack access to education through barriers such as geographical distance, work, time, family responsibilities and lack of money can get access through online learning.

E-learning will make learners to learn at their own pace. Employees can update their skills and upgrade their qualifications at their own pace through e-learning.

2.6 Impediments to ICT use in Education in Developing Countries

Kessy, Kaemba and Gachoka (2006) highlight that the cost of acquiring ICT hardware and software, setting up telecommunication authority and the maintenance and repair of
ICT as prohibitive factors to ICT use in education. They observe that African countries have poor infrastructure, unreliable transportation and limited supply of telecommunication facilities.

The other inhibition is cultural context of ICT adoption, language barriers and attitudes towards ICT which affects the rate at which it is adopted (Fourier and Alt, 2002). The perceived difficulty in the integration of ICT in education is based on believe that technology is challenging and its implementation requires extra time.

Limited skilled human resource and students limited computer knowledge which is precipitated by lack of reluctance or inability for schools to introduce ICT often results in limited use of resources. This is more pronounced with the humanities teachers who are most resistant to use computers (Ford, 2007). In some instances teachers believe that using computers deprives students the time needed to study for their national examinations.
CHAPTER THREE
RESEARCH METHODOLOGY

3.1 Introduction

This chapter details research design, target population, location of the study, sample and sampling procedure, research instruments, data collection procedure and data analysis.

3.2 Research Design

This study employed a descriptive survey design. The design is suited for this study since a survey design secures evidence of the existing situation and identifies standards or norms to compare with the present conditions in order to plan the next step (Good, 1992). This study surveyed a sample of the colleges to describe the state of e-learning readiness among public primary teacher training colleges.

3.3 Location of Study

The study considered five Primary Teacher Training Colleges in Kenya. The colleges were Baringo TTC in Rift valley province, Eregi and Kaimosi in Western province, Shanzu in Coast province and Thogoto TTC in central province. The colleges are located in different provinces of the country. The different geographical locations were considered for this study since it gives the national outlook of preparedness of teacher training colleges to use E-learning.

3.4 Target Population

The study targeted five principals, 311 tutors and 4,372 students in the Baringo, Eregi, Kaimosi, Shanzu and Thogoto Teachers Training Colleges in Kenya. This gave an approximate target population of 4,678 respondents. Principals gave the progress of e-learning readiness in colleges, level of ICT investment in colleges and plans to enhance e-learning in colleges. Tutors and students who participate in the learning process were targeted to give
information on their preparedness, how they utilize electronic technology in learning and challenges faced in using e-learning.

3.5 Sample and Sampling Procedures

The colleges had a population size of 4,678 respondents. The distribution of the population in the colleges was as shown in table 3.1 below

Table 3.1 Population in sampled colleges

<table>
<thead>
<tr>
<th>College</th>
<th>Staff population</th>
<th>Student population</th>
<th>Total staff and student population</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Male</td>
<td>Female</td>
<td>Total</td>
</tr>
<tr>
<td>Baringo</td>
<td>31</td>
<td>8</td>
<td>39</td>
</tr>
<tr>
<td>Eregi</td>
<td>41</td>
<td>22</td>
<td>63</td>
</tr>
<tr>
<td>Kaimosi</td>
<td>28</td>
<td>37</td>
<td>65</td>
</tr>
<tr>
<td>Thogoto</td>
<td>39</td>
<td>31</td>
<td>70</td>
</tr>
<tr>
<td>Shanzu</td>
<td>34</td>
<td>35</td>
<td>69</td>
</tr>
<tr>
<td>Total</td>
<td>173</td>
<td>123</td>
<td>306</td>
</tr>
</tbody>
</table>

From the above population, the researcher used stratified random sampling to obtain 50% of the tutor population and 60% of the student population in each college. Gay (1992) observes that a sample of 10% is considered minimum for a small population and 20% for a large population. From the tutor population, purposive sampling was used to select the principals. The final distribution of the studied sample is represented in table 3.2 below.
Table 3.2 Distribution of Study Sample

<table>
<thead>
<tr>
<th>College</th>
<th>Sample of staff</th>
<th></th>
<th>Sample of students</th>
<th></th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Male</td>
<td>Female</td>
<td>Total</td>
<td>Male</td>
<td>Female</td>
</tr>
<tr>
<td>Baringo</td>
<td>15</td>
<td>5</td>
<td>20</td>
<td>218</td>
<td>215</td>
</tr>
<tr>
<td>Eregi</td>
<td>18</td>
<td>14</td>
<td>32</td>
<td>350</td>
<td>250</td>
</tr>
<tr>
<td>Kaimosi</td>
<td>16</td>
<td>17</td>
<td>33</td>
<td>355</td>
<td>278</td>
</tr>
<tr>
<td>Thogoto</td>
<td>18</td>
<td>17</td>
<td>35</td>
<td>212</td>
<td>178</td>
</tr>
<tr>
<td>Shanzu</td>
<td>20</td>
<td>15</td>
<td>35</td>
<td>309</td>
<td>217</td>
</tr>
<tr>
<td>Total</td>
<td>87</td>
<td>68</td>
<td>155</td>
<td>651</td>
<td>660</td>
</tr>
<tr>
<td></td>
<td>453</td>
<td>682</td>
<td>666</td>
<td>682</td>
<td>666</td>
</tr>
</tbody>
</table>

From the above table, the study sample comprised of 155 members of teaching staff and 2,632 students. This gave a total sample size of 2,787 respondents. Five Principals were purposively selected from the staff sampled.

3.6 Research Instruments

The researcher used questionnaires and observation schedule as research instruments.

3.6.1 Questionnaires

Questionnaires were suited for this since they facilitate collection of information from a large sample and diverse regions (Kombo, 2006). They collect information that is directly observable and inquire about accomplishments. Three sets of questionnaires were used.

i. Questionnaires to the principals which sought to establish status of ICT infrastructure in colleges, connectivity of colleges to the internet, accessibility of ICT equipments to staff and students and level of preparedness of colleges to roll out e-learning.
ii. Questionnaires to tutors established their level of preparedness to use ICT and their hindrances in utilizing ICT in colleges.

iii. Questionnaires to students that established their preparedness to use ICT in colleges, whether they are adequately prepared to utilize ICT in schools once they are deployed and how use of ICT and the internet is adapting them to the knowledge economy.

3.6.2 Observation Schedule

The observation schedule was used to verify the data collected from the questionnaires. The observation schedule verified the information collected on number of computer laboratories, Personal computers (PCs), connectivity to the internet, and how colleges are using technology in learning. Kombo (2006) observes that Observation schedule is used as a checklist to record what the researcher observes during data collection.

3.7 Piloting

When piloting, the researcher sought to verify the reliability and validity of the research instruments. Orodho(2005) observes that, piloting helps to detect deficiencies in research instruments. Piloting was done in Kilimambogo Teachers Training College which was not part of the sampled colleges.

3.7.1 Reliability of Instruments

The researcher used Test-retest method to check the reliability of instruments. The researcher piloted the instruments in Kilimambogo TTC which was not part of the study sample. Questionnaires were given out to respective respondents in the pilot college. The answered questionnaires were scored. The same questionnaires were administered to the same group after a period of two weeks.
The questionnaires were then scored, a comparison of the first and second score was made using Pearson’s coefficient of correlation to determine the reliability of instruments. A correlation coefficient of 0.75 was obtained for Principals questionnaire, 0.76 for tutor’s questionnaire and 0.75 for student’s questionnaire. The research instruments were accepted as being reliable.

3.7.2 Validity of Instruments

The researcher developed the research instruments. The researcher thereafter discussed with his supervisors and authorities in E-learning field about content validity of the instruments. The researcher incorporated the recommendations and inputs made to improve on validity of the instruments. In checking the validity of instruments the researcher sought to determine the degree to which the results from the collected data actually represent the phenomenon under investigation (Orodho, 2005)

3.8 Data Collection Procedure

The researcher obtained a letter of introduction from the graduate school, Kenyatta University and took to the National Council of Science and Technology (NCST) to obtain a research permit. The researcher reported to college principals for permission after which he administered the questionnaires to the principals, tutors and students. The researcher used the observation schedule to observe the status of E-learning readiness in colleges.

3.9 Methods of Data Analysis

After the researcher had collected data, the questionnaires were arranged and coded. The researcher analyzed data using descriptive statistics such as frequencies and percentages to determine the establishment of ICT infrastructure in TTCs, TTCs that use e-learning as mode of delivery and e-preparedness of tutors and students. Measures of central tendency
especially the mean was used to determine on average how colleges were prepared to use ICT in teaching and learning, how they are preparing e-literate teachers, their connectivity to the internet. Percentages were used to determine the fraction of tutors and students with skills in using technology in learning. Analyzed data was presented using tables, bar graphs, histograms and pie charts. This was done with aid of the Microsoft office package and Statistical Package of Social Sciences (SPSS).
CHAPTER FOUR
DATA PRESENTATION, ANALYSIS AND DISCUSSION

4.1 Introduction
This chapter presents the study findings. The purpose of this study was to investigate the extent to which teacher training colleges are prepared to utilize E-learning and prepare students who will roll out E-learning in schools. The findings are presented as; ICT infrastructure and connectivity in colleges, status and utilization of E-learning in colleges, E-learning preparedness of tutors, E-learning preparedness of students and hindrances to use of E-learning in colleges. The findings are discussed according to the study objectives. The study objectives were;

(i) To assess availability and access to ICT infrastructure i.e. Personal Computers (PCs), computer labs and computer accessories in teacher training colleges and determine colleges connectivity to the internet.

(ii) To establish the extent which teacher training colleges are using e-learning, that is how tutors and students are integrating technology in learning and components of ICT mostly utilized by tutors and students.

(iii) To establish the extent which tutors are prepared to use electronic technology in teaching, determine their skills and training received in using electronic technology in learning.

(iv) To establish how students are prepared for e-learning in colleges and in schools once they are deployed.

(v) To establish hindrances to use of E-learning and in colleges and document measures that can hasten the rolling out of E-learning in colleges
4.2 ICT Infrastructure, Personnel and Connectivity in Colleges.

This study investigated the available ICT infrastructure in the colleges, their accessibility to students and staff, connectivity of colleges to the internet and availability of E-learning software in colleges.

4.2.1 ICT Infrastructure and Personnel in Colleges

Data from sampled colleges indicates ICT infrastructure and personnel within teacher training colleges is not adequate. This is as shown in Table 4.1 below which gives the number of computer laboratories, number of Personal computers and computer technicians in the teacher training colleges.

<table>
<thead>
<tr>
<th>College</th>
<th>Number of computer laboratories</th>
<th>Total number of personal computers</th>
<th>Number of computer technicians</th>
</tr>
</thead>
<tbody>
<tr>
<td>Baringo</td>
<td>2</td>
<td>60</td>
<td>0</td>
</tr>
<tr>
<td>Eregi</td>
<td>2</td>
<td>60</td>
<td>0</td>
</tr>
<tr>
<td>Kaimosi</td>
<td>2</td>
<td>50</td>
<td>1</td>
</tr>
<tr>
<td>Thogoto</td>
<td>2</td>
<td>70</td>
<td>0</td>
</tr>
<tr>
<td>Shanzu</td>
<td>3</td>
<td>80</td>
<td>0</td>
</tr>
</tbody>
</table>

From the above table, colleges in Kenya have 64 computers on average and two computer laboratories. Only kaimosi has employed a qualified computer technician while the rest have not employed technicians. This shows lack of preparation in ICT hardware and personnel for E-learning. The available computers versus student population transcends into poor student per computer ratio.
From the above figure, there is a great disparity between the students’ population and the available computers. In Baringo, the student per computer ratio is eleven students per computer, in Eregi its 16 students per computer, 20 students per computer in Kaimosi, nine students per computer in Thogoto while in Shanzu it is eleven students per computer. On average, the student per computer ratio from the colleges is 13 students per computer which is a poor ratio for efficient adoption of E-learning in colleges.

**Discussion**

This is a major hindrance to E-learning since the available computers cannot meet the student population. This concurs with a study by Olaniyi (2006) that lack of computers in educational institutions is one of the factors that hinder E-learning preparedness in LDCs. The same was observed in Nigeria schools where the population of students was enormous while ICT facilities are inadequate.

Most of the computers in the colleges are of low speed with a clock speed of 0.733GHz, hard disk memory of less than 10GB and RAM of 256MB.
The TTCs do not have software which are suited for E-learning development such as Modular Object Oriented-Dynamic learning (MOODLE), Virtual Learning Environment (VLE), Blackboard, Shared Content Object Reference Model (SCORM) etc. The colleges offer basic Microsoft office packages which give students basic skills in computers.

In terms of computer accessories, two colleges indicated that they are moderately equipped while three colleges indicated that they are ill equipped.

**Table 4.2 Status of Computer Accessories in Colleges**

<table>
<thead>
<tr>
<th>College</th>
<th>Computer accessories</th>
</tr>
</thead>
<tbody>
<tr>
<td>Baringo</td>
<td>Moderate</td>
</tr>
<tr>
<td>Eregi</td>
<td>Poorly equipped</td>
</tr>
<tr>
<td>Kaimosi</td>
<td>Poorly equipped</td>
</tr>
<tr>
<td>Thogoto</td>
<td>Poorly equipped</td>
</tr>
<tr>
<td>Shanzu</td>
<td>Moderate</td>
</tr>
</tbody>
</table>

The computer accessories in colleges hinders the rolling out of E-learning in colleges.

In addition to poor equipment of computers and accessories, the allocation to maintenance of the computers is low. Findings from the study revealed that, on average, colleges spend Ksh. 10,000 (USD 131.1) per year on computer maintenance. This value is not adequate to maintain ICT facilities in colleges.

**4.2.2 Accessibility to ICT Facilities in Colleges**

From collected data, the computer laboratories in the five colleges are accessed by students during the ICT lessons. The ICT lessons are two hours per week. Students indicated that this does not give them ample time to interact with computers or use them...
for studies. From the data collected, 80% of the tutors from the sampled colleges indicated that access to the computers in the colleges is poor. They cannot use the computers to prepare for studies since the computers are programmed for ICT lessons. In addition there are no computers in their respective departments. Apart from the computer laboratories, the only place with computers is the principal’s office with a computer used for typing.

4.2.3 Connectivity to the Internet

Internet connection is vital in promoting E-learning. This is especially with Web-based (online) learning. The internet avails academic materials across the globe. Teacher training colleges in Kenya have poor internet connectivity. Table 4.3 gives percentage of computers which are connected to the internet in the sampled colleges.

<table>
<thead>
<tr>
<th>College</th>
<th>Total no. of computers</th>
<th>Number of computers connected</th>
<th>Percentage of computers connected</th>
</tr>
</thead>
<tbody>
<tr>
<td>Baringo</td>
<td>60</td>
<td>12</td>
<td>5%</td>
</tr>
<tr>
<td>Eregi</td>
<td>60</td>
<td>0</td>
<td>0%</td>
</tr>
<tr>
<td>Kaimosi</td>
<td>50</td>
<td>5</td>
<td>10%</td>
</tr>
<tr>
<td>Thogoto</td>
<td>70</td>
<td>0</td>
<td>0%</td>
</tr>
<tr>
<td>Shanzu</td>
<td>80</td>
<td>8</td>
<td>10%</td>
</tr>
</tbody>
</table>

From table 4.3, Kaimosi and Shanzu have 10% of the computers connected to the internet. Baringo has five percent connected while the rest have no connected computers. The reasons highlighted for lack of connectivity in colleges include high cost of network connection and limited funds.
No college has a website and none uses web-based learning. This means colleges are not prepared to benefit from the emerging technology to harness quality learning. However with the emerging of Modems to provide access to the internet by telecommunication service providers, 10% of the tutors in colleges had bought them to assist them in connecting to the internet. The other percentage of the tutors normally access to the internet in cybercafés.

4.3 Current Status of E-learning in Colleges

One of the objectives of this study was to investigate the extent to which teacher training colleges are using E-learning and determine the aspects and components of ICT mostly utilized by tutors and students. The survey shows that most of the colleges practice E-learning at low levels. E-learning can be described to be a toddler or pre-take off stage.

Table 4.4 gives the type of E-learning applications in different colleges.

<table>
<thead>
<tr>
<th>Type of learning application</th>
<th>Web-based (Online)</th>
<th>Computer-based</th>
<th>Virtual classrooms</th>
<th>Digital collaborations</th>
</tr>
</thead>
<tbody>
<tr>
<td>Baringo</td>
<td>No</td>
<td>Yes</td>
<td>No</td>
<td>No</td>
</tr>
<tr>
<td>Eregi</td>
<td>No</td>
<td>Yes</td>
<td>No</td>
<td>No</td>
</tr>
<tr>
<td>Kaimosi</td>
<td>No</td>
<td>Yes</td>
<td>No</td>
<td>No</td>
</tr>
<tr>
<td>Thogoto</td>
<td>No</td>
<td>Yes</td>
<td>No</td>
<td>No</td>
</tr>
<tr>
<td>Shanzu</td>
<td>No</td>
<td>Yes</td>
<td>No</td>
<td>No</td>
</tr>
</tbody>
</table>
The table above presents interesting results of E-learning applications in colleges. Colleges only use computer based learning although at minimum levels. The other E-learning applications are not used at all.

In terms of having knowledge in using electronic technology in teaching, figure 4.2 below gives the percentage of tutors with skills and knowledge in using electronic technology in teaching and learning.

**Figure 4.2 Percentage of Tutors with Knowledge in Using Electronic Technology in Teaching**

![Bar Chart](chart.png)

Eregi teachers college has highest percentage of tutors with skills in using electronic content. This is because the college trained tutors on using technology courtesy of USAID. The figures above show that tutors therefore find it difficult to harness the use of E-learning in colleges.

No college has digital content in the library. This means students mostly rely on books which are predominant in the library. In addition, due to poor internet connectivity and
access to connected computers, colleges do not subscribe to online journals. This means that students in the colleges cannot access to current materials across the globe.

Lack of connectivity also hinders the sharing of information via internet with colleagues in other colleges.

All tutors in the colleges admitted that students do not submit their assignment to them through E-mails. 38(32.76%) of tutors in the study sample have skills in E-content preparation, of these 6(15.79%) percent of the tutors admitted to be preparing electronic content for their students. This is illustrated in the subsequent section. They prepare content on the CD-ROMs to be used in class. Three percent of the tutors revealed that they use power point presentations in their course delivery. In general, 10% of the tutors admitted that they are ready to roll out E-learning in colleges.

Students from this colleges admitted that they can not learn effectively through use of electronic technology. Computer illiteracy accounts for their failure to use E-learning in colleges.

4.4 E-Learning Preparedness of Tutors

To determine the extent which tutors in teacher training colleges are prepared to roll out E-learning in colleges was one of the objectives of this study. The study sought to find out their preparedness to make digital content, their knowledge on internet use and how they use it to source for academic material, how they utilize ICT in classrooms and the measures the colleges are making in preparing them for E-learning.

4.4.1 Preparedness in E-content Development

The study investigated the percentage of tutors with skills in the preparation of electronics content for students and those without. From those with skills the study
further investigated those who actually prepare the electronic content for students. The findings of the study are represented in Table 4.5 below.

Table 4.5 E-content development by tutors in colleges

<table>
<thead>
<tr>
<th>College</th>
<th>Skilled in E-content development %</th>
<th>Without skills in E-content development %</th>
<th>With skills and Prepare content students %</th>
<th>With but do not prepare content students %</th>
<th>skills not for</th>
</tr>
</thead>
<tbody>
<tr>
<td>Baringo</td>
<td>12.5</td>
<td>87.50</td>
<td>50</td>
<td>50</td>
<td></td>
</tr>
<tr>
<td>Eregi</td>
<td>41.67</td>
<td>58.33</td>
<td>20</td>
<td>80</td>
<td></td>
</tr>
<tr>
<td>Kaimosi</td>
<td>46.15</td>
<td>53.85</td>
<td>16.67</td>
<td>83.33</td>
<td></td>
</tr>
<tr>
<td>Thogoto</td>
<td>11.54</td>
<td>88.46</td>
<td>0</td>
<td>100</td>
<td></td>
</tr>
<tr>
<td>Shanzu</td>
<td>45.83</td>
<td>54.17</td>
<td>19.09</td>
<td>90.91</td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>32.76</td>
<td>67.24</td>
<td>15.79</td>
<td>84.21</td>
<td></td>
</tr>
</tbody>
</table>

From the table 4.5, on average, 32.76% of the tutors have skills and knowledge in E-content development, while 67.24% did not know how to prepare electronic content. Of those with skills and knowledge, only a small percentage (15.79%) prepares electronic content. Kaimosi TTC has the highest percentage of tutors with skills although a smaller percentage prepares electronic content. This is attributed to courses organized for the tutors. Thogoto Teachers Training College presents interesting results with no tutor preparing electronic content for students.

Some of the reasons highlighted for lack of preparation of electronic content by tutors are summarized in table 4.6
Table 4.6 Reasons for Lack of E-content Development

<table>
<thead>
<tr>
<th>Causal factors of lack of preparation</th>
<th>Frequency</th>
<th></th>
<th></th>
<th></th>
<th></th>
<th>Percentag</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Baringo</td>
<td>Eregi</td>
<td>Kaimosi</td>
<td>Thogoto</td>
<td>Shanzu</td>
<td></td>
</tr>
<tr>
<td>Lack of skills</td>
<td>22</td>
<td>22</td>
<td>20</td>
<td>26</td>
<td>14</td>
<td>67.24</td>
</tr>
<tr>
<td>Lack of supportive software</td>
<td>21</td>
<td>22</td>
<td>26</td>
<td>31</td>
<td>26</td>
<td>81.90</td>
</tr>
<tr>
<td>Lack of enough facilities</td>
<td>22</td>
<td>22</td>
<td>24</td>
<td>27</td>
<td>21</td>
<td>75</td>
</tr>
<tr>
<td>Time constraint</td>
<td>20</td>
<td>26</td>
<td>25</td>
<td>24</td>
<td>21</td>
<td>75</td>
</tr>
<tr>
<td>Lack of support from the administration</td>
<td>17</td>
<td>19</td>
<td>21</td>
<td>19</td>
<td>20</td>
<td>62.07</td>
</tr>
</tbody>
</table>

From the table 4.6, lack of supportive software accounts for largest percentage (81.9%) for failure to prepare electronic content. This is closely followed with lack of skills and time constraint (75%). 67.24% of the respondents indicated lack of skills in e-content preparation as the reason why they do not prepare while 72% indicated that they lack support from the colleges.

The study revealed that Kaimosi TTC had set up some measures to train more tutors on E-content development, while in Baringo TTC, donors were stepping in to train more tutors. There were no immediate plans revealed in the other three colleges on measures taken to sharpen tutors skills on E-content development.
4.4.2 Preparedness to use Internet by Tutors

Knowledge on use of the internet and how tutors used the internet in teaching and learning process was investigated. This is because internet forms an integral part in E-learning especially web-based learning. The objective was to know the extent which tutors were prepared in using the internet as a learning resource. Figure 4.3 gives the percentage of tutors with knowledge on the internet use.

**Figure 4.3 Tutors Knowledge in use of Internet**

Shanzu teachers college has the highest percentage of tutors with 54% while Thogoto teachers training college has the lowest percentage (21%) of tutors with knowledge on using the internet.

Despite their knowledge on internet use, few tutors indicated that they use the internet for academic purposes while majority of them use it for their personal studies and communicating with friends.

Table 4.7 gives number of tutors and the various uses of the internet mentioned by tutors.
Table 4.7 Uses of Internet by Tutors in Colleges

<table>
<thead>
<tr>
<th>Uses of the internet</th>
<th>Frequency</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Source of academic material for teaching</strong></td>
<td>Baringo</td>
<td>Eregi</td>
</tr>
<tr>
<td>Personal research</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>Communication via Email</td>
<td>5</td>
<td>5</td>
</tr>
<tr>
<td>Entertainment</td>
<td>8</td>
<td>16</td>
</tr>
<tr>
<td>Posting Information on the Web For students</td>
<td>6</td>
<td>10</td>
</tr>
<tr>
<td>Exchange academic content with colleagues</td>
<td>0</td>
<td>0</td>
</tr>
</tbody>
</table>

From the above table, 9.5% of the tutors in the sample study indicated that they use the internet for academic purpose while majority of them (41.38%) use it for communication. No tutor posts the academic content on websites for access by students. Tutors do not exchange with their colleagues academic materials via the internet.

4.4.3 Utilization of Electronic Technology in Teaching in Colleges

This study investigated the extent to which tutors in the teacher training colleges utilized electronic technology in teaching and different ways they use it. Table 4.8 gives the percentage of tutors who used ICT in teaching.
It can be observed that 19.83% of the tutors surveyed use electronic technology in teaching. 23.07% of tutors in Shanzu TTC use electronic technology while Thogoto and Baringo TTCs have the lowest percentage of their tutors who use electronic technology in teaching.

An analysis of percentages from the sampled tutors showed that of the 23 tutors that use electronic technology in teaching, a larger fraction are found in Eregi. Figure 4.4 below shows the percentage contribution of tutors in each college.
From the figure, of the tutors who used technology in teaching 35% are from Eregi TTC, 26% from Shanzu, 17% from Kaimosi. Thogoto and Baringo had the lowest percentage with the former having 13% and the later 9%.

Tutors used computers for different purposes in the process of teaching. Table 4.9 gives some of the common uses mentioned by tutors in different college

**Table 4.9 Different use of Electronic technology by Tutors**

<table>
<thead>
<tr>
<th>Use</th>
<th>Baringo</th>
<th>Eregi</th>
<th>Kaimosi</th>
<th>Thogoto</th>
<th>Shanzu</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Preparing content on CD ROMs</td>
<td>1</td>
<td>3</td>
<td>3</td>
<td>0</td>
<td>1</td>
<td>5</td>
</tr>
<tr>
<td>Source information from internet</td>
<td>2</td>
<td>4</td>
<td>4</td>
<td>2</td>
<td>4</td>
<td>10</td>
</tr>
<tr>
<td>Typing of notes</td>
<td>3</td>
<td>5</td>
<td>5</td>
<td>2</td>
<td>4</td>
<td>12</td>
</tr>
<tr>
<td>PowerPoint presentations</td>
<td>0</td>
<td>1</td>
<td>1</td>
<td>0</td>
<td>1</td>
<td>2</td>
</tr>
</tbody>
</table>
Data from sampled tutors indicates that tutors mostly used computers for typing and photocopying notes. 10% indicated that they used computers to source for academic material while five percent indicated that they prepared content on CD ROMS. Three percent use power point presentation

**4.4.4 Measures in Preparing Tutors to use Electronic Technology**

In an attempt to prepare tutors to E-learning several measures were mentioned by the college principals. In Kaimosi, for example tutors were organized for a seminar to introduce them to use of computers. Tutors were taught basic computer literacy skills since most of them are not familiar with computers.

In Thogoto teachers college, it was reported that 36 tutors attended a seminar organized by the Ministry of Education on integration of ICT in teaching and learning. There were also periodical courses organized for tutors who need skills in ICT.

Eregi TTC had a fraction of the tutors organized for courses by USAID, where they were inducted on use of computers for teaching. No measures were mentioned in Shanzu and Baringo to prepare tutors for E-learning.

Overall, colleges have not put in place sufficient measures that can quickly propel faster adoption of E-learning in colleges.

**4.5 E-learning Preparedness of Students**

The study investigated how students are ready for E-learning in college and whether they are well prepared to utilize electronic technology in teaching and learning once deployed in schools.
4.5.1 Students Knowledge and Skills in using Electronic Technology

Knowledge and skills on use of technology by students was investigated. Majority of the students have basic skills in using computers, a few know how to access information on the internet. Table 4.10 below shows the percentage of students with various skills in electronic technology.

Table 4.10 Percentage of student’s with skills in using electronic technology

<table>
<thead>
<tr>
<th></th>
<th>Baringo</th>
<th>Eregi</th>
<th>Kaimosi</th>
<th>Thogoto</th>
<th>Shanzu</th>
</tr>
</thead>
<tbody>
<tr>
<td>Basic computer skills</td>
<td>57</td>
<td>60</td>
<td>62</td>
<td>55</td>
<td>69</td>
</tr>
<tr>
<td>Knowledge on use of internet</td>
<td>23</td>
<td>46</td>
<td>47</td>
<td>39</td>
<td>41</td>
</tr>
<tr>
<td>Advanced knowledge in use of computers</td>
<td>12</td>
<td>11</td>
<td>14</td>
<td>12</td>
<td>13</td>
</tr>
</tbody>
</table>

From the table above, it can be observed that, in all colleges, student’s posses’ basic skills in computer use with Shanzu TTC, having the highest percentage. However, they do not have advanced skills in using computers. This is an indication that they are not ready to roll out E-learning in colleges.

4.5.2 Preparedness in Using Computers for Learning

An investigation on students use computers for studies was made. This revealed how the students are utilizing available technology in colleges. Table 4.11 below gives different uses of computers and respective percentages in each college.
Table 4.11 Percentage of students using of Computers

<table>
<thead>
<tr>
<th>Purpose</th>
<th>Baringo</th>
<th>Eregi</th>
<th>Kaimosi</th>
<th>Thogoto</th>
<th>Shanzu</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Searching for academic material on the internet</td>
<td>2</td>
<td>5</td>
<td>14</td>
<td>6</td>
<td>4</td>
<td>0.04</td>
</tr>
<tr>
<td>Typing of notes and assignments</td>
<td>0</td>
<td>0.9</td>
<td>0</td>
<td>1</td>
<td>0</td>
<td>0.00</td>
</tr>
<tr>
<td>Accessing journals</td>
<td>0.9</td>
<td>2</td>
<td>0</td>
<td>1</td>
<td>1</td>
<td>0.0</td>
</tr>
<tr>
<td>Using prepared content on the CD ROMs</td>
<td>0.5</td>
<td>0.9</td>
<td>1</td>
<td>0</td>
<td>0.5</td>
<td>0.00</td>
</tr>
<tr>
<td>Sharing information with others on the Web</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Learning during ICT lessons</td>
<td>100</td>
<td>100</td>
<td>100</td>
<td>100</td>
<td>100</td>
<td>100</td>
</tr>
</tbody>
</table>

From the table above, all students indicated that they use computers for lessons in ICT. 53(0.04%) of the students, use computers to search for information on the internet. Since colleges are not connected, they access to the internet through cybercafés. A few though indicated that they access the internet through mobile phones. 14(0.01%) of the students, access to journals through connected computers mostly outside college. A very small percentage of them access use content prepared on CD ROMs. None of the students share exchange information with colleagues on the internet.

4.5.3 Preparation Received by Students in College

Data from the five colleges studied indicated that students are taught ICT during their first year of study. The subject is taught in one term and is not examined by Kenya
National Examination Council (KNEC), the examining body that awards certificates to successful students. Due to lack of national examination of the subject, most students do not study the subject with the seriousness it deserves. Students also revealed that they are only taught introduction to computers, where the knowledge acquired helps them to perform basic operations on a computer. This can be good stride towards the right direction however a lot needs to be done if Kenya has to build the 21st century schools, since the teachers from colleges are not well prepared to handle technology in learning. Students indicated that, they are neither taught how to integrate technology in learning nor how to teach using the same. Because of lack of time for practice and inaccessibility to computers, majority of the students indicated that they cannot effectively perform even the basic computer operations. Students were asked to evaluate the preparation received from colleges and table 4.12 below gives the responses obtained.

**Table 4.12 Preparation Received in College**

<table>
<thead>
<tr>
<th>College</th>
<th>Adequate</th>
<th>Average</th>
<th>Not adequate</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Baringo</td>
<td>10</td>
<td>46</td>
<td>377</td>
<td>433</td>
</tr>
<tr>
<td>Eregi</td>
<td>16</td>
<td>191</td>
<td>443</td>
<td>650</td>
</tr>
<tr>
<td>Kaimosi</td>
<td>28</td>
<td>160</td>
<td>445</td>
<td>633</td>
</tr>
<tr>
<td>Thogoto</td>
<td>19</td>
<td>124</td>
<td>247</td>
<td>390</td>
</tr>
<tr>
<td>Shanzu</td>
<td>29</td>
<td>152</td>
<td>345</td>
<td>526</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>102(3.88%)</td>
<td>673(25.57%)</td>
<td>1857(70.55%)</td>
<td>2632</td>
</tr>
</tbody>
</table>

Majority of the students indicated that preparation received in colleges is not adequate enough to for them to adopt E-learning either in colleges or once deployed in schools. A
minority (3.88%) admitted the preparation to be adequate, 25.57% said the preparation is average while the majority 70.55% indicated that the preparation is not adequate

4.5.4 Preparedness to Roll out E-learning in Schools

From data collected, majority of the students indicated that they are not prepared to roll out E-learning in colleges. Figure 4.5 below shows the preparedness students to roll out E-learning in schools once they are deployed.

**Figure 4.5 Preparedness to rollout E-learning in schools**

![Graph showing preparedness to roll out E-learning in schools.](image)

From the figure above, majority of the students indicated that they are not prepared to roll out E-learning in schools once they are deployed. On average, 17.6% of the students indicated that they can integrate technology in teaching once they are deployed in schools while the majority (82.4%) indicated that they are not prepared to roll out E-learning in schools once they are employed.

4.6 Hindrances to E-learning Preparedness in Teacher Training Colleges.

From this study, several factors were highlighted as inhibitors to E-learning in colleges.
4.6.1 Infrastructural Limitations

Poor and inadequate ICT infrastructure in colleges is one of the factors that hinder E-learning in colleges. The average student per computer ratio was 13 students per computer. The computers are not easily accessible to students and staff. ICT infrastructure as a limitation was mentioned by students and staff.

Table 4.13 Poor Infrastructure

<table>
<thead>
<tr>
<th>College</th>
<th>Frequency</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Tutors</td>
</tr>
<tr>
<td>Baringo</td>
<td>13</td>
</tr>
<tr>
<td>Eregi</td>
<td>18</td>
</tr>
<tr>
<td>Kaimosi</td>
<td>20</td>
</tr>
<tr>
<td>Thogoto</td>
<td>20</td>
</tr>
<tr>
<td>Shanzu</td>
<td>19</td>
</tr>
<tr>
<td>Total</td>
<td>90(58%)</td>
</tr>
</tbody>
</table>

From the table above 58% of the tutors indicated that ICT infrastructure is a limitation while 56% of the students mentioned the same. Both the staff and students indicated that computers were not enough to meet the current population and most computers were of low speed. Tutors further observed that even if they may want to use them, they are denied access or are busy utilized by the students for ICT lessons. Olanayi (2006) confirms lack of ICT facilities as a hinderance to E-learning.
4.6.2 Poor Connectivity

Since connection to the internet is a very important component of E-learning, poor connection in the sampled colleges was mentioned by most tutors and students as a major hindrance to E-learning. Principals of these colleges indicated that financial limitation is a hindrance to connecting colleges to the internet. Without connection to the internet, Web based learning is not possible. Learners can not also access information from wide sources. This is also a hinderance to globalization. Table 4.1 below shows the frequency of tutors and students that mentioned poor internet connection as hindrance to E-learning preparedness.

**Table 4.14 Lack of Connection**

<table>
<thead>
<tr>
<th>College</th>
<th>Frequency</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Tutors</td>
</tr>
<tr>
<td>Baringo</td>
<td>12</td>
</tr>
<tr>
<td>Eregi</td>
<td>13</td>
</tr>
<tr>
<td>Kaimosi</td>
<td>17</td>
</tr>
<tr>
<td>Thogoto</td>
<td>14</td>
</tr>
<tr>
<td>Shanzu</td>
<td>15</td>
</tr>
<tr>
<td>Total</td>
<td>71(46%)</td>
</tr>
</tbody>
</table>

From the table above, 53% of the tutor population mentioned lack of connectivity to the internet as one of the hindrances to E-learning while the same was mentioned by 33% of the students.
4.6.3 Inadequate Personnel

Sufficient ICT personnel is important for E-learning to take place. It is quite interesting to note that only Kaimosi TTC had employed a computer technician. Few tutors have skills on using ICT and only competent people in using ICT were ICT tutors who are understaffed. Lack of Personnel was mentioned the following number of times by tutors and students.

Table 4.15 Inadequate personnel

<table>
<thead>
<tr>
<th>College</th>
<th>Frequency</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Tutors</td>
</tr>
<tr>
<td><strong>Baringo</strong></td>
<td>10</td>
</tr>
<tr>
<td><strong>Eregi</strong></td>
<td>17</td>
</tr>
<tr>
<td><strong>Kaimosi</strong></td>
<td>16</td>
</tr>
<tr>
<td><strong>Thogoto</strong></td>
<td>18</td>
</tr>
<tr>
<td><strong>Shanzu</strong></td>
<td>20</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>81(52%)</td>
</tr>
</tbody>
</table>

From the table above, 60% of the tutors view inadequate ICT personnel as hinderance to E-learning while 25% of the students have the same view.

4.6.4 Lack of Supportive E-learning Softwares

E-learning cannot be effective unless there is sufficient supportive software. Tutors and students mentioned it as a hinderance to E-learning. Table 4.16 gives the frequency of times mentioned by tutors and students on lack of supportive software as inhibitor to E-learning.
Table 4.16 lack of E-learning Supportive Softwares

<table>
<thead>
<tr>
<th>College</th>
<th>Frequency</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Tutors</td>
</tr>
<tr>
<td>Baringo</td>
<td>12</td>
</tr>
<tr>
<td>Eregi</td>
<td>19</td>
</tr>
<tr>
<td>Kaimosi</td>
<td>20</td>
</tr>
<tr>
<td>Thogoto</td>
<td>19</td>
</tr>
<tr>
<td>Shanzu</td>
<td>23</td>
</tr>
<tr>
<td>Total</td>
<td>93(60%)</td>
</tr>
</tbody>
</table>

From table 4.16, 70% of tutors indicated that lack of E-learning software as a hinderance while 73% of students in the study mentioned the same.

4.6.5 Time Limitations

Tutors and students mentioned lack of time to use technology as a hinderance to E-learning. Table 4.18 gives frequency mentioned by tutors and students on time as a limitation to E-learning.

Table 4.17 Lack of Time

<table>
<thead>
<tr>
<th>Frequency</th>
<th>College</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Baringo</td>
</tr>
<tr>
<td>Tutors</td>
<td>18</td>
</tr>
<tr>
<td>Students</td>
<td>288</td>
</tr>
</tbody>
</table>
From the table 4.17, 72% of the tutors in the sample mentioned time as a limitation while 65% of the students view time as limiting factor to use of E-learning in colleges.

**4.6.6 Lack of Appropriate Knowledge and Skills**

Knowledge and skills in using technology for learning is essential. If teachers and students lack skills in using technology, then E-learning can not take place. Table 4.19 gives a summary of number of tutors and students who viewed lack of skills as a hinderance to E-learning preparedness in colleges.

**Table 4.18 Lack of appropriate skills and knowledge**

<table>
<thead>
<tr>
<th>College</th>
<th>Frequency</th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Tutors</td>
<td>Students</td>
<td></td>
</tr>
<tr>
<td>Baringo</td>
<td>14</td>
<td>348</td>
<td></td>
</tr>
<tr>
<td>Eregi</td>
<td>14</td>
<td>387</td>
<td></td>
</tr>
<tr>
<td>Kaimosi</td>
<td>16</td>
<td>419</td>
<td></td>
</tr>
<tr>
<td>Thogoto</td>
<td>18</td>
<td>317</td>
<td></td>
</tr>
<tr>
<td>Shanzu</td>
<td>17</td>
<td>345</td>
<td></td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>79(51%)</strong></td>
<td><strong>1816(69%)</strong></td>
<td></td>
</tr>
</tbody>
</table>

From the table above 51% of tutors and 69% of students view lack of appropriate knowledge and skills as a hinderance to E-learning in colleges.

**4.7 Enhancing E-learning Readiness in Teacher Training Colleges**

The following suggestions were made to enhance preparedness of E-learning in colleges and preparing students for E-learning in schools once deployed.
### 4.7.1 Suggestions made by Students

Students made the following suggestions in order to promote E-learning preparedness in colleges.

**Table 4.19 Suggestions made by Students**

<table>
<thead>
<tr>
<th>Suggestion</th>
<th>Baringo</th>
<th>Eregi</th>
<th>Kaimosi</th>
<th>Thogoto</th>
<th>Shanzu</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Increase number of computers</td>
<td>425</td>
<td>528</td>
<td>522</td>
<td>360</td>
<td>431</td>
<td>86.10</td>
</tr>
<tr>
<td>Connect colleges to internet</td>
<td>340</td>
<td>491</td>
<td>479</td>
<td>275</td>
<td>424</td>
<td>6.32</td>
</tr>
<tr>
<td>Train tutors in ICT and E-learning</td>
<td>258</td>
<td>363</td>
<td>347</td>
<td>249</td>
<td>266</td>
<td>56.34</td>
</tr>
<tr>
<td>Allocate more time to ICT lessons</td>
<td>320</td>
<td>502</td>
<td>473</td>
<td>318</td>
<td>417</td>
<td>77.12</td>
</tr>
<tr>
<td>Increase access to computers</td>
<td>432</td>
<td>544</td>
<td>530</td>
<td>359</td>
<td>448</td>
<td>87.87</td>
</tr>
<tr>
<td>Train them on using ICT in education</td>
<td>363</td>
<td>414</td>
<td>370</td>
<td>260</td>
<td>281</td>
<td>64.13</td>
</tr>
<tr>
<td>Make ICT examined by KNEC</td>
<td>338</td>
<td>384</td>
<td>380</td>
<td>288</td>
<td>344</td>
<td>65.88</td>
</tr>
</tbody>
</table>
Accessibility to ICT facilities in colleges should be enhanced if E-learning is to progress in teacher training colleges. This was mentioned by 87.87% of students interviewed. Increasing number of computers to be used was mentioned by 86.10% of the students. Others suggested connecting colleges to internet (76.32%), allocating more time to ICT (77.12%), training them on ICT use (64.13%) and making ICT examinable by KNEC (65.88%)

4.7.2 Suggestion made by Tutors

Tutors made the following suggestions as measure which would be made to promote E-learning in colleges. Table 4.20 gives a summary of the suggestions made.

Table 4.20 Suggestions by tutors

<table>
<thead>
<tr>
<th>Suggestion</th>
<th>Frequency</th>
<th>Percent age</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Seminars and workshops on technology use in education</strong></td>
<td>14 Baringo 19 Eregi 20 Kaimosi 19 Thogoto 24 Shanzu</td>
<td>61.93</td>
</tr>
<tr>
<td><strong>Purchase software</strong> for E-learning</td>
<td>13 Baringo 23 Eregi 24 Kaimosi 18 Thogoto 22 Shanzu</td>
<td>64.51</td>
</tr>
<tr>
<td><strong>Training on E-content development</strong></td>
<td>20 Baringo 25 Eregi 23 Kaimosi 22 Thogoto 24 Shanzu</td>
<td>73.55</td>
</tr>
<tr>
<td><strong>Increase number of computers</strong></td>
<td>18 Baringo 23 Eregi 21 Kaimosi 21 Thogoto 23 Shanzu</td>
<td>68.38</td>
</tr>
<tr>
<td><strong>Improve internet connection</strong></td>
<td>17 Baringo 18 Eregi 19 Kaimosi 17 Thogoto 21 Shanzu</td>
<td>59.35</td>
</tr>
</tbody>
</table>
Tutors suggested that to enhance E-learning in colleges, seminars and workshops on ICT use in education should be organized. 73.55% of them felt the need of training them on E-content development. They also suggested increase in number of computers (68.38%), improve on internet connectivity (59.35%), regular updating on E-learning (55.48%) easy accessibility to computers (51.61%) and purchasing necessary softwares (64.51%).

4.7.3 Suggestion made by Principals

The principals of these colleges suggested that more funding by the government on ICT in education should be done. They recommended for regular inserving of tutors on use of technology in learning and e-content development.
CHAPTER FIVE

SUMMARY, CONCLUSION AND RECOMMENDATIONS

5.1 Introduction

This chapter gives the summary of the findings, implications of the study findings, conclusion, recommendations and suggestions for further research. They are derived from themes of the study objectives.

5.2 Summary

From the findings of the study, colleges were not adequately equipped with necessary infrastructure for E-learning to take place. Computers are not enough for the student and staff population. The computer labs are also not easily accessible to students and staff. In addition, softwares that support E-learning in colleges are not there which makes E-learning in colleges difficult.

The study also revealed that most colleges are not connected to the internet and this makes learning via the internet to be impossible. Staff and students can not easily access information on the internet neither can they post information on the internet. There are no students who access studies off from colleges because of these limitation. Lack of internet connection has also led to lack of sharing information with colleagues.

Most tutors (90%) from these colleges indicated that they are not prepared to roll out E-learning in colleges. They do not have skills that can enable them effectively integrate technology in education. Most of them have minimal skills in using computers and very little skills and knowledge on how E-learning is to be done. They indicated that rarely do they use ICT in learning.
The research findings on the side of students preparedness from these colleges indicated that majority of them have poor technological skills and can not effectively use them in E-learning. Their preparation in use of technology in learning is where they are only taught ICT as a subject in one term of their study. The subject is not examined by KNEC. They are only taught basic operations on a computer and not how they can integrate technology in learning. Nearly all of them confessed that they are not prepared to handle E-learning once deployed.

From the study, only Computer-based learning is practised even though at very minimal levels. Web-based learning, digital collaborations and other forms of E-learning are not practised.

The reasons highlighted for lack of preparedness to use technology in learning includes, poor ICT infrastructure, poor connection to the internet, lack of E-learning softwares, time limitations and lack of knowledge and skills in using technology.

5.3 Implications of Study Findings

The study findings shows that despite the benefits of emerging technologies in education, teacher training colleges are not ready to benefit from them. These colleges lack necessary infrastructure that can enable E-learning to take place. Since ICT infrastructure is vital for E-learning, the poor endowment of this facilities hampers E-learning in colleges.

Despite the emphasis of E-learning even within KESSP, little is taking place on the ground. Teacher training colleges are far from utilizing E-learning which is a modern global trend in educational institutions. Teachers are not well prepared to integrate
technology in education and this makes them lack connection to the global knowledge economy.

Due to lack of Web-based mode of instruction in colleges, the government and colleges cannot reap from the benefits of online learning. Online learning reduces the barrier of distance in accessing to education and also enhances more people to access to education. With Kenya faced with lack of adequate teachers, more teachers can be trained via online learning if it was practised in colleges.

Lack of internet within colleges means Kenyan teachers and students are alienated from the global knowledge economy which is propelled through use of internet. Knowledge is no longer limited by physical boundaries. There is need therefore to connect colleges to the internet so that Kenyan students are not disadvantaged.

The findings from this study stresses the need for having a clear and well defined E-learning policy in educational institutions. The policy should promote acquisition of ICT infrastructure, connectivity and necessary soft wares to promote E-learning in colleges and schools.

5.4 Conclusion

Despite the benefits of E-learning in increasing access to education, improve the quality of education and lower the cost, teacher training colleges in Kenya are not ready to utilise -learning. They lack infrastrucrure, both hardware and soft ware for E-learning. They have poor connection to the internet. The tutors and students do not have necessary and sufficient skills to utilize technology in learning. This makes the Kenyan students in teacher training colleges lack behind in the knowledge economy. Colleges are also not benefiting from use of technology in
learning.

There is need therefore to address this issue with urgency and seriousness it deserves. Teacher trainees are expected to employ E-learning in schools since it’s a priority of the government to roll out E-learning, however they are not receiving adequate preparation to enable them roll out E-learning.

5.5 Recommendations

Based on the findings from this study, the researcher makes the following recommendations;

(i) There is need for more funding of ICT facilities in colleges so that the computer versus staff and students ratio is improved. The government and Colleges should increase their expenditure on ICT in colleges.

(ii) There is need for tutors to be trained on using ICT in education, especially how they can integrate technology in teaching. This is because most of the tutors indicated that they lack skills in using technology in learning. There should also be regular updates on ICT use in education.

(iii) Students in colleges should be taught how to integrate ICT in education. They should know how to use ICT in teaching their subjects to effectively use them once deployed.

(iv) Cost of Internet connection in colleges should be subsidized so that they can get connected to the internet easily, they should have tariffs that make them pay less and subscribe less to connect to the internet.
(v) The government should build more computer laboratories in colleges and stock them with modern computers. This will reduce the anomaly in the computer versus student ratio.

(vi) The colleges should purchase necessary E-learning softwares to promote E-learning in colleges.

5.6 Suggestions for Further Research

The following studies are recommended by the researcher;

(i) E-learning preparedness in primary and secondary schools

(ii) E-learning preparedness of higher learning institutions

(iii) Impact of technology on learning in primary and secondary schools.
REFERENCES


Economic Intelligence unit (2008) *E-readiness rankings, maintaining momentum*  

Elena, L. (2008). *New policy on ICT use in education*  
Retrieved March 15, 2009 from  


Retrieved November 23, 2008 from  


Damascus, Syria.

Nafukho, F. M. (2005). *The pace of e-learning in Africa’s institutions of higher learning.* Published in higher education policy, 100 graduate education, USA


Retrieved August 23, 2009 from [http://www.fig.net/pub/fig2006/paper/ts84-o3](http://www.fig.net/pub/fig2006/paper/ts84-o3)


APPENDIX I
E-LEARNING READINESS AMONG PUBLIC TEACHER TRAINING
COLLEGES IN KENYA
QUESTIONNAIRE FOR THE PRINCIPAL

This is a study that seeks to establish the preparedness of Teacher training colleges in Kenya to benefit from using electronic technology to promote quality education and prepare teachers who will roll out E-learning in schools. Your college is one of the few that have been selected for this study. Your honest response to this questionnaire will make this study a success

COLLEGE POPULATION
1 (a) Name of the college…………………………

(b) What is the total number of staff and students in your college?

i) Teaching staff

Male (    ) Female (    )

iii) Students……………………………………

Male (    ) Female (    )

ICT FACILITIES AND PERSONNEL IN COLLEGES
2. i) How many computer laboratories are in your college? ………………………

ii) What is the total number of Personal Computers (PCs) in your college? ……..

iii) How adequate are the available computers to the Tutor and student population?

Very Adequate

Adequate

Not adequate

iv) What is the student per computer ratio?

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

..........................................................
v) If the student per computer ratio is poor, what are the causes of the poor ratio?

…………………………………………………………………………………………………
………………………………………………………………………………………………...
vi) At what times are computers accessible to:

a) Students ..............................

b) Tutors ..............................

c) Non-teaching staff .................

vii) Has the college employed a computer laboratory technician (s)?

Yes ☐

NO ☐

If yes, what is the qualification of the technician (s)?.................................

……………………………………………………………………………………………

viii) Are the technician(s) readily available to assist tutors and students?

Yes ☐

No ☐

ix) What is the average age and speed of the computers in your institution?

………………………………………………………………………………………………

xi) What are the hindrances to acquiring ICT infrastructure in the colleg

………………………………………………………………………………………………

………………………………………………………………………………………………

………………………………………………………………………………………………........
xi) What is the cost of computer maintenance and accessories per year?

…………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………
v) How are tutors periodically updated on the new developments on ICT use in education? ……………………………………………………………

COLLEGE’S CONNECTIVITY TO THE INTERNET

4. i) Which fraction of the college computers are connected to the internet? …………………………………………………………………………………

ii) What is the cost of internet subscription? …………………………………………………………………………………………………………………………..

iii) Does the students’ and tutors have access to internet connected computers?

Yes ☐
No ☐

iv) If no, how do they access to the internet?

Cyber cafes in the college ☐
Cyber cafes in the neighborhood ☐
Others (specify) ………………………………………………………………………………………………………………………………………………………………

v) Does the college have a website?

Yes ☐
No ☐

vi) If yes, which information is posted on the college website?

a) Admissions ☐

b) Staff e-mails ☐

c) Student e-mails ☐

d) Course content ☐
e) Others (specify) .................................................................

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

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

vi) Does the college have students who access to the college through online learning?

Yes  □

No  □

vii) If no, what plans is the college making to promote online learning?

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

iv) What are the hindrances in connecting colleges to the internet? ............... 

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

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

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

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

CONTENT DIGITALIZATION

5. Content digitalization is where content is availed in electronic form rather than print form,

i) what fraction of tutors is prepared to digitalize content in their respective subject areas? ........................

ii) Which efforts is the college making to prepare tutors for content digitalization? ................................................

iii) Are students prepared on content digitalization during their study period in colleges ..........................
iv) Are digitalized materials available in the library for use by the students and staff?

FINANCING OF ICT ACTIVITIES IN THE COLLEGE

1. i) Indicate the percentage of financial support from the following to ICT and internet services in the college

   Government  
   Donors 
   Parents  

   Others (specify)  

   ii) What is your opinion on financing of ICT and Internet services in your college?

   Adequate  
   Average  
   Inadequate  

   iii) How can the financing of ICT and internet services in colleges be improved?

7. i) Does your college subscribe to online journals?

   Yes  
   No  

ii) Which types of journals do you subscribe to?

iii) What is the cost of subscription?

8. i) Does your college have digital content in the library?

   Yes [ ]
   No [ ]

   ii) How is the library staff prepared in managing the digital material?

   i) Quality of education

   ii) Cost of education

   iii) Access to education

9. Suggest measures that can be taken to hasten the integration of ICT in education

Thank you for answering this questionnaire
APPENDIX II

AN ASSESSMENT OF E-LEARNING READINESS AMONG PUBLIC TEACHER TRAINING COLLEGES IN KENYA

QUESTIONNAIRES FOR TUTORS

This is a study that seeks to establish the preparedness of Teacher training colleges in Kenya to benefit from using electronic technology to promote quality education and prepare teachers who will be ready to roll out E-learning in schools. Your college has been selected for this study and you are identified as one of the respondents. Your honest response to this questionnaire will make this study a success.

PERSONAL INFORMATION

1. i) Name of college where teaching …………………………………………………

   ii) Gender  Male (  )  Female (  ) (Tick as appropriate)

2. Which are your areas of subject specialization?

   ……………………………………………………………………………………………………………

   ……………………………………………………………………………………………………………

3. i) Have you acquired skills on using computers?

   Yes  □

   No  □

   ii) If yes, how did you acquire the skills?

   Formal training in college    □

   Personal interaction with computers    □

   Seminars organized by college    □

   Others (Specify)

   ……………………………………………………………………………………………………………
USE OF ICT IN TEACHING

4. i) In your teaching, do you use electronic technology?
   Yes ☐
   No ☐

   ii) How do you use electronic technology in the teaching and learning process in your subject specialization?

   iii) In which ways do you benefit from the use of electronic technology in teaching?

   iv) What are the hindrances in integrating electronic technology in the learning process?

   v) Do you use the internet as aid in the teaching and learning process?

   vi) Where do you normally access the internet?
      From the college ☐
      From cyber cafes ☐
      Others (specify).................................................................
vii) Which support do you receive from the college in accessing the internet?
……………………………………………………………………………………
……………………………………………………………………………………

viii) Do your students submit their assignments through E-mail?
      Yes ☐
      No ☑

ix) If Yes, how effective is the arrangement? ………………………………………
      ……………………………………………………………………………………………

x) How do you use the internet to exchange materials with colleagues in other colleges?
      ……………………………………………………………………………………………
      ……………………………………………………………………………………………

xi) Apart from academic work, which other purposes do you the internet for?
      ……………………………………………………………………………………………
      ……………………………………………………………………………………………

E-LEARNING IN COLLEGES

5. i) E-learning is currently emphasized by the Ministry of education, do you feel prepared to roll out this program in your college?
      Yes ☐
      No ☑

   ii) Have you received any training in use of electronic technology in teaching?
      ……………………………………………………………………………………………

   iii) How are you preparing students to roll out e-learning in schools once deployed?
      ……………………………………………………………………………………………
iv) In your view, which steps can be taken to hasten the rolling out of e-learning in colleges?


CONTENT DIGITALIZATION

6.i) Do you have skills in the preparation of electronic content?
   Yes  □
   No   □

ii) If yes, do you always prepare the electronic content for your students?
   Yes □
   No  □

iii) Which measures is the college making in training you for content digitalization?
     ...........................................................................................................
     ...........................................................................................................
     ...........................................................................................................

iv) Which challenges do you face in preparing electronic content?

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

v) How do you utilize computers to enhance quality teaching and learning?

     ...........................................................................................................
ACCESSIBILITY TO ICT FACILITIES

7. What is your comment on accessibility to ICT facilities in your college?

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

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

8. ICT increase sharing of knowledge and hastens a knowledge economy, how has the use of ICT helped you promote sharing of knowledge and information?

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

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

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

9. What is your assessment on level of your students’ preparedness to use electronic technology in teaching once deployed in schools?

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

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

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

10. In your opinion what can done to improve use of electronic technology in TTCs?

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

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

..........................................................................................................................
APPENDIX III
AN ASSESSMENT OF E-LEARNING READINESS AMONG PUBLIC TEACHER TRAINING COLLEGES IN KENYA
QUESTIONNAIRE FOR STUDENTS

This is a study that seeks to establish the preparedness of Teacher training colleges in Kenya to benefit from using electronic technology to promote quality education and prepare teachers who will be ready to roll out E-learning in schools. Your college has been selected for this study and you are lucky to be identified as one of the respondents. Your honest response to this questionnaire will make this study a success.

KNOWLEDGE ON USE OF COMPUTERS
1. Name of the college…………………………………………………………………………..

2. i) What is the level of your computer education?
   - Certificate ☐
   - Diploma ☐
   - Other (Specify) ………………………………………

   ii) How do you use computers for your studies? ……………………………………………………

   …………………………………………………………………………………………………………………

   …………………………………………………………………………………………………………………

   iii) In the course of your study, do you receive training on how to use ICT in teaching and learning?
   - Yes ☐
   - No ☐

1. i) Do you have knowledge on use of the internet as a source academic material?
   - Yes ☐
   - No ☐
ii) How do you normally access to the internet?

From the colleges  
From cyber cafes
Others (specify)

iii) How do you use the internet to exchange materials with colleagues from other colleges?

 iv) Apart from academic work, which other areas do you use the internet for?

TRAINING ON ICT USE

4. How is the college preparing you to effectively use ICT once you are deployed in schools?

5. i) What is your comment on the preparation which you are receiving from college on ICT us in education?

Adequate
Average
Inadequate
ii) Do you feel you are well prepared to implement ICT in schools once deployed?

iii) What are the limitations in preparing you to use ICT and computers?

ACCESSIBILITY TO ICT EQUIPMENTS

6. i) How accessible are ICT equipments in your college?

ii) Apart from the college ICT facilities, do you have access to ICT and internet outside college?

iii) How affordable is the cost of accessing ICT facilities and internet outside college?

iv) Which assistance do you receive from your college in accessing to internet and ICT facilities outside college?

7. How has the use of ICT helped you fit to the global knowledge society?

8. How do you use the internet to interact with other people across the globe?
APPENDIX IV

OBSERVATION SCHEDULE

1. Name of the college

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

2. Number of computer laboratories .................................

3. Number of Personal Computers .................................

4. Average age and speed of computers ........................

5. Connection of college computers to the internet.

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

6. Accessibility to ICT facilities

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

7. Number of computer technicians ..............................

8. Use of e-learning by the college

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

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

9. Level of integration of ICT in teaching and learning

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

10. Speed of internet connection .................................

11. Different uses of computers by students and tutors

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

........................................................................................................................................
## APPENDIX V
### RESEARCH SCHEDULE

<table>
<thead>
<tr>
<th>ACTIVITY</th>
<th>DURATION</th>
<th>FROM-TO</th>
</tr>
</thead>
<tbody>
<tr>
<td>Preparation of proposal</td>
<td>1-2 months</td>
<td>Sept-Oct 2008</td>
</tr>
<tr>
<td>Proposal submission</td>
<td></td>
<td>Nov 2008</td>
</tr>
<tr>
<td>Correcting the proposal</td>
<td>4 months</td>
<td>Dec 2008-June 2009</td>
</tr>
<tr>
<td>Defending the proposal</td>
<td></td>
<td>July 2009</td>
</tr>
<tr>
<td>Production of research instruments</td>
<td>1 week</td>
<td>July 2009</td>
</tr>
<tr>
<td>Piloting</td>
<td>1 week</td>
<td>July 2009</td>
</tr>
<tr>
<td>Finalizing research instruments</td>
<td>1 week</td>
<td>July 2009</td>
</tr>
<tr>
<td>Production of bulk research instruments</td>
<td>1 week</td>
<td>July - Aug 2009</td>
</tr>
<tr>
<td>Data collection</td>
<td>2 weeks</td>
<td>Sept-Dec 2009</td>
</tr>
<tr>
<td>Data analysis</td>
<td>3 weeks</td>
<td>Jan - April 2010</td>
</tr>
<tr>
<td>Writing thesis report</td>
<td>3 weeks</td>
<td>May - Sept 2010</td>
</tr>
<tr>
<td>Defending thesis</td>
<td>2 months</td>
<td>Sept – Oct 2010</td>
</tr>
<tr>
<td>Binding and submission</td>
<td>2 months</td>
<td>Nov 2010</td>
</tr>
</tbody>
</table>
## APPENDIX VI

### BUDGET

<table>
<thead>
<tr>
<th>ITEM</th>
<th>AMOUNT</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Proposal writing</td>
<td></td>
</tr>
<tr>
<td>i) Typing and printing</td>
<td>3,000</td>
</tr>
<tr>
<td>2. Piloting</td>
<td></td>
</tr>
<tr>
<td>i) Photocopying of research instruments</td>
<td>2,000</td>
</tr>
<tr>
<td>ii) Traveling and subsistence</td>
<td>15,000</td>
</tr>
<tr>
<td>3. Data Collection</td>
<td></td>
</tr>
<tr>
<td>i) Photocopying of research instruments</td>
<td>7,000</td>
</tr>
<tr>
<td>ii) Traveling</td>
<td>10,000</td>
</tr>
<tr>
<td>iii) Subsistence</td>
<td>10,000</td>
</tr>
<tr>
<td>4. Data Analysis and Presentation</td>
<td></td>
</tr>
<tr>
<td>i) Typing and Printing</td>
<td>6,000</td>
</tr>
<tr>
<td>ii) Photocopying and binding</td>
<td>8,000</td>
</tr>
<tr>
<td><strong>TOTAL</strong></td>
<td><strong>61,000</strong></td>
</tr>
</tbody>
</table>