

**A Comparative Assessment of the Utilization of Information and Communication  
Technologies among Teacher Education Students and Lecturers in  
Universities in Kenya**



**George Makori**

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Comparative and International Education of Egerton University.

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George Makori

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### RECOMMENDATION

This thesis has been submitted for examination with our approval as university supervisors:

**Prof. Mwangi Ndirangu**

Department of Curriculum, Instruction and Educational Management,

Egerton University:

.....

Signature

.....4/12/13

Date

**Prof. Fredrick O. Ogola**

School of Education,

Maasai Mara University:

.....

Signature

.....1/12/2013

Date



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## DEDICATION

I dedicate this work to my wife and our sons. I will always be grateful to Gladys, my loving wife and partner for her patient understanding and encouragement that inspires me every day. I recognize that Keith and Felix made many positive comments to me while I wrote the thesis. I also dedicate the work to Calvin for giving me occasional leave to go to the 'varsity' and eventually complete the thesis. My love will be with you always.

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## ABSTRACT

Information and Communication Technologies (ICTs) in education (such as e-Learning, Electronic/Digital libraries and diverse computer based resources) are appearing at an ever accelerating pace, paralleling the rapid increase of innovations in the general society. At the same time, ICT use is crucial to universities in Kenya for increasing students' satisfaction, research work and teacher training efforts. Since such ICTs have become indispensable elements of our modern lives, it is important to understand how teacher training, especially at the university level, has utilised ICTs. For this reason, this study conducted a comparative assessment of how computers, telecommunication and audio-visual systems are used among teacher education students and lecturers in universities in Kenya. The study was guided by four objectives which focused on identifying the functions of ICTs; determining the influence of user characteristics on utilization of ICTs; determining the challenges facing the utilization of ICTs and whether there were differences between public and private universities in the utilization of ICTs. This descriptive survey utilized the ex post facto study approach. The study was guided by the modernisation and globalisation theories. The study used three hundred (300) fourth year Bachelor of Education students and 60 lecturers who were selected using the stratified random sampling method from universities in Kenya. The study utilized questionnaires to collect data. The questionnaires were discussed with research supervisors and other experts to enhance their validity for their use in the study. A pilot study was conducted in two universities which did not participate in the study. Reliability was determined using the Cronbach alpha method and a reliability coefficient of 0.70 and above was considered acceptable for the instruments to be used in this study. The student questionnaire had a reliability coefficient of 0.90 while the lecturer questionnaire had a reliability coefficient of 0.88. Data from the questionnaires was analysed using the Statistical Package for Social Sciences (SPSS) and presented by use of tables. The study found out that universities had made substantial investments in ICTs and that students and lecturers were using them frequently for educational and recreational purposes; that the student gender influenced the pattern of ICT utilization among students while the lecturers' age and cadre were significant factors. The study also found out that challenges such as lack of personal computers, inadequate technical support, large classes, slow internet connection, unreliable electricity supply and lack of e-learning policies impeded the utilisation of ICTs. The study further found out that although private universities had better ICT investments than their public

counterparts, there were no significant differences among teacher education students and lecturers in universities in Kenya. These findings are likely to inform stakeholders namely the general public, university management, policy makers, employers, lecturers and students in the faculties of education about the benefits of using ICTs, the influence of user characteristics, the challenges facing the utilisation of ICTs and how to address them.

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## ABBREVIATIONS AND ACRONYMS

<b>ACU</b>	-	Association of Commonwealth Universities
<b>AVU</b>	-	African Virtual University
<b>ATM</b>	-	Asynchronous Transfer Mode (a system of transferring data used by banks).
<b>CBI</b>	-	Computer Based Instruction
<b>CCK</b>	-	Communication Commission of Kenya
<b>CoL</b>	-	Commonwealth of Learning
<b>CD-ROM</b>	-	Compact Disc read –only memory
<b>CUEA</b>	-	Catholic University of East Africa
<b>DVD</b>	-	Digital Video Disc
<b>E-Mail</b>	-	Electronic Mail
<b>FM</b>	-	Frequency Modulation
<b>GoK</b>	-	Government of Kenya
<b>HELB</b>	-	Higher Education Loans Board
<b>IBL</b>	-	Internet Based Learning
<b>ICTs</b>	-	Information and Communication Technologies
<b>IT</b>	-	Information Technology
<b>JAB</b>	-	Joint Admissions Board
<b>KCSE</b>	-	Kenya Certificate of Secondary Education
<b>KENET</b>	-	Kenya Education Network Trust
<b>KNBS</b>	-	Kenya National Bureau of Statistics
<b>KU</b>	-	Kenyatta University
<b>LAN</b>	-	Local Area Network
<b>LCD</b>	-	Liquid Crystal Display
<b>MDG</b>	-	Millennium Development Goals
<b>MoIC</b>	-	Ministry of Information and Communication
<b>MoEST</b>	-	Ministry of Education, Science and Technology
<b>NEPAD</b>	-	New Partnership for African Development
<b>NICTs</b>	-	New Information and Communication Technologies
<b>NTTs</b>	-	New Training Technologies

<b>OECD</b>	-	Organization of Economic Development
<b>PC</b>	-	Personal Computer
<b>RAM</b>	-	Random Access Memory
<b>SMS</b>	-	Short Message Service
<b>SSA</b>	-	Sub-Saharan Africa
<b>SSPs</b>	-	Self Sponsored Programmes
<b>SPSS</b>	-	Statistical Package for Social Sciences
<b>TESSA</b>	-	Teacher Education for Sub-Saharan Africa
<b>TV</b>	-	Television
<b>UNDP</b>	-	United Nations Development Programme
<b>UNESCO</b>	-	United Nations Educational Scientific and Cultural Organisation
<b>UNU</b>	-	United Nations University
<b>USA/US</b>	-	United States of America/Unites States
<b>VCD</b>	-	Video Compact Disc
<b>VCR</b>	-	Video Cassette Recorder
<b>QFUL</b>	-	Questionnaire for University Lecturers
<b>QFUS</b>	-	Questionnaire for Undergraduate Students

# CHAPTER ONE

## INTRODUCTION

### 1.1 Background of the Study

The onset of the 21<sup>st</sup> century is extremely dynamic in almost all spheres of human endeavour and particularly in Information and Communication Technology (ICT). ICTs involve the integration of telecommunications (telephone lines and wireless signals), computers as well as various software and audio-visual systems which enable users to access, store, transmit and manipulate information in diverse ways ( Melody, 1986). Presently, information is being transmitted rapidly within and between nations in ways previously unimagined. UNESCO (1998) observed that these new possibilities exist largely as a result of two converging forces. First, the quantity of information available in the world is exponentially greater than that available only a few years ago, and the rate of its growth is accelerating. A synergistic effect occurs when increasing amount of information is coupled with new technology that enhances increased capacity to communicate among people in the world. The ICT provides opportunities to harness this force and use it positively, consciously, and with design, in order to contribute to meeting defined needs in society (Sanchez & Salwas, 2008).

As is the case in other sectors of the wider economy and society, education will need to come to terms with these new technologies. This would require purchase of hardware, substantial public and private sector investments in software research and development, and improvement of educational institutions going by increased potential for learning when ICTs are incorporated in teaching and learning. It will be difficult for national policy-makers to resist finding the necessary resources, whatever their sensibilities for expenditure on education, although without international co-operation and assistance, the poorest countries could fall still further behind in the rate of acquisition of these resources. Parents and the public at large, in the industrialised countries at least, are unlikely to accept for too long the notion that education should be less well equipped with the new technologies than other areas of social and economic activity (UNU, 2008).



Educational practice must incorporate this new technology (Pittman, 2007). New technological innovations in education such as E-Learning, Electronic/Digital libraries and diverse software programmes, are appearing at an ever accelerating pace, paralleling the rapid increase of innovations in the general society (Eynon, 2005). At the same time, computers have become one of the indispensable elements of the modern society. They provide new opportunities for delivering information, and ease communication and resource sharing. ICTs are also challenging educational institutions to integrate ICTs into their curricula and utilize them in diverse ways (Simsek, 2008). As a result, many researchers have directed their attention to these new pedagogical tools and started to investigate their utility in relation to what face-to-face courses offer from the perspectives of students, teachers and educational institutions (Czerniawicz & Brown, 2009).

While reflecting on ICTs, it is important to direct attention to their use in higher education in the 21<sup>st</sup> century. This is because higher education is particularly crucial for economic growth since it provides higher level skilled workers and is an important source of inventive outputs. By extension, the role of universities as centres of research and diffusion of findings of the same, will become increasingly important in the 21<sup>st</sup> century (Oyelaran-Oyeyinka & Adeya, 2004). Secondly, higher education produces workers whose skills and knowledge drive the industrialization process. Again, as competitiveness becomes more innovation driven, the dual role of universities (as research and training centres) will become the decisive factor in transforming economies. UNESCO (2013) observes that (ICTs) are increasingly utilized by higher education institutions worldwide. Trends show that ICTs are emerging as a part of on - campus delivery as well as open and distance learning modes of higher education delivery. ICTs in higher education are being used for developing course material; delivering content and sharing content; communication between learners, teachers and the outside world; creation and delivery of presentations and lectures; academic research; administrative and supporting student enrolment.

Higher education institutions in developing countries are on the whole making the most of computers and software available to them. However, challenges including insufficient telephone and telecommunication infrastructure, lack of training resources for teachers, lack



of skilled and experienced information technology specialists to assist with development, maintenance and support of ICT usage in higher education institutions (HEIs) remain. But in recent times, factors have emerged which have strengthened and encouraged moves to adopt ICTs into classrooms and learning settings. These include a growing need to explore efficiencies in terms of programme delivery; opportunities for flexible delivery provided by ICTs; the capacity of technology to provide support for customized educational programs to meet the needs of individual learners; and the growing use of the Internet and the World Wide Web as tools for information access and communication (Oliver & Short, 1997, Kennedy & McNaught, 1997 Oliver & Towers, 2000).

Positive ICT policies and investment are clearly beneficial to HEIs, even though ICTs have not replaced classroom-based modes of learning or teaching. Undoubtedly, ICTs can provide greater access for different target learners, and have become vehicles for enriched pedagogical experiences, particularly for distance educators and learners separated by time and space. Coordinated implementation of new or revised policies will likely require the involvement of outside Ministries (such as Telecommunications, Trade, Health) and national private and non-government educational boards and agencies for accreditation and recognition of the institutions, where applicable (Oliver, 2002).

There are different kinds of ICTs implemented for teaching and learning such as tele - and video-conferencing and e-learning tools. These products can be used in education for different purposes. Some of them help students with their learning by improving the communication between them and their instructors (Valasidou, Sidiropoulos, Hatzis & Bousiou, 2005). In this regard UNESCO (2002a) concludes that teacher education institutions may either assume a leadership role in the transformation of education or be left behind in the swirl of rapid technological change. For education to reap the full benefits of ICTs in learning, it is essential that pre-service and in-service teachers have basic ICT skills and competencies. Teacher education institutions and programmes must provide the leadership for pre-service and in-service teachers to acquire the skills in the use of these tools in their teaching. They must also provide leadership in determining how the new technologies can best be used in the context of the culture, needs, and economic conditions within their countries. Teacher education institutions also need to develop strategies and

plans to enhance the teaching-learning process within teacher education programmes and to assure that all future teachers are well prepared to use the new tools for learning.

All the different ICTs are a major source of social change as attested by classical thinkers such as Marquis de Condorcet and Emile Durkheim who made the earliest expressions of modernisation theory. On his part, Condorcet observed that technological changes can enable continuous progress and improvement in human affairs including education (Williams, 2004). Furthermore, he asserted that technological progress could eventually spur social progress. Durkheim suggested the concept of social evolution which indicates how societies and cultures develop over time, much like a living organism, by adapting to changes - especially technological ones - and components in their environment (Frank, 1998). According to Durkheim, as societies adapt to their surroundings, they interact with each other which further contributes to their progress and development.

As the interaction between societies spreads across borders, global networks are being established through telecommunication infrastructure, including the internet (Albrow, Martin & King, 1990). The Internet is perhaps the most remarkable technological breakthrough of the 1990s. Undoubtedly, it will continue to play an important role in transforming higher education itself just as the universities have contributed in remarkable ways in generating new technologies in ICT, life sciences and biotechnology (Rosenberg, 2001). Information and Communication Technologies (ICTs) are generally accepted as instrumental in enabling educators to modify the teaching methods they use in order to increase students' interest. The extended use of ICTs has created a knowledge-based society where information plays an important role for research, training and dissemination of research findings (Valasidou & Bousiou, 2008). Hoffman (2001) suggested that successful implementation of ICTs need to address five interlocking frameworks for change: the infrastructure, attitude, staff development, support (technical and administrative) and also sustainability and transferability.

In line with global efforts to achieve the Millennium Development Goals (MDGs) as outlined by the United Nations Development Programme (UNDP) and other United Nations



(UN) agencies, teacher training initiatives across the world should be reviewed. Motivated and well trained teachers will be instrumental if the MDGs for Kenya are to be achieved by 2015 (UNDP, 2003 & UN, 2004). In addition, Carnoy (2004) observed that it is difficult to improve learning in schools by whatever means without improving the teachers' knowledge of subject-matter, including ICT skills. He also concluded that teachers cannot develop higher order thinking skills in students without having acquired such skills themselves and to a much greater depth than the material they are supposed to teach.

Given the very great importance of teacher training, it is surprising that more emphasis is not placed on how it is carried out by national governments, donors and civil society organizations. Teacher training is all too often neglected in the face of more immediately visible educational goals and objectives; it is much easier to build a gleaming new school in an urban community than it is to successfully train a cadre of teachers willing to work in poor rural areas, far from centres of social and commercial life (Unwin, 2005). In the *EFA global monitoring report* for 2002, UNESCO (2002d) emphasized that some three million new teachers are required in Africa if the MDGs are to be achieved. Over and above this, there is a pressing need for teachers with a minimal level of training to have opportunities to upgrade their skills and qualifications (Unwin, 2005). Since 2003 the Ministry of Education, Science and Technology (MOES & T) in Kenya has embarked on major reforms in the education sector. The National Conference on Education and Training held on November 2003 mandated the MOES & T to develop a new policy framework for the education sector (GoK, 2005). As a result, the Sessional Paper No.1 of 2005 which was developed constitutes the Government of Kenya policy on Education and Training (GoK, 2005). The policy discusses teacher development and utilization of ICTs. In the university sub-sector, the Ministry for Higher Education, Science and Technology appointed a Taskforce for the development of a National Strategy for University Education in February 2006 among whose strategic goals was the integration of ICTs into university education and to increase innovation and research output of Kenyan universities (GoK, 2008). In addition to these efforts, the Government of Kenya has promulgated a National ICT policy (GoK, 2006). Through this ICT policy, the government aspires to encourage the use of IT in schools,

colleges and universities and other educational institutions in Kenya so as to enable students to improve their knowledge and skills

### **1.2 Statement of the Problem**

ICTs are essential to stimulate national development and international competitiveness of countries. For this reason, education is the avenue through which skills, knowledge and competencies are acquired; most countries especially in the developed world have not only integrated the use of ICTs in their primary and secondary school curricula but made ICTs a core component of teacher education and teacher development programs. While there is a fair documentation on how ICTs are and can be utilised to achieve maximum benefits for education in developed countries, there is little of such information on a developing country like Kenya. In addition, there is need to establish the reasons for using ICTs for teacher education in universities in Kenya, whether public and private universities differ with regard to their application of such ICTs, the challenges faced using ICTs in teacher education, and possible solutions to such challenges. Furthermore, it is not known what the current practices are regarding ICTs in teacher education in universities in Kenya, although such knowledge is necessary in order to inform policy and eventually establish and implement best practices in teacher education that are context specific. This study was designed to address these gaps.

### **1.3 Purpose of the Study**

The purpose of this study was to undertake a comparative assessment of the utilization of ICTs among teacher education students and lecturers in universities in Kenya. This study, therefore, conducted a comparative assessment of how computers, telecommunication and audio-visual systems are used in different universities in Kenya (both public and private) for learning, delivery and presentation of content and other educational uses particularly within teacher education. The study identified challenges associated with the use of ICTs for teacher education and proposes some recommendations that can be considered for adoption to address these challenges.



#### **1.4 Objectives of the Study**

The study was guided by the following objectives:

- i) To identify the functions of ICTs among teacher education students and lecturers in universities in Kenya;
- ii) To determine the influence of user characteristics on utilization of ICTs among teacher education students and lecturers in universities in Kenya;
- iii) To determine the challenges facing the utilization of ICTs among teacher education students and lecturers in universities in Kenya;
- iv) To determine whether there is a difference in the utilization of ICTs among teacher education students and lecturers in public and private universities in Kenya.

#### **1.5 Research Questions and Hypothesis**

The study sought to achieve its objectives by answering the following research questions:

- i) What functions do ICTs perform among teacher education students and lecturers in universities in Kenya?
- ii) What is the influence of user characteristics on utilization of ICTs among teacher education students and lecturers in universities in Kenya?
- iii) What are the challenges facing the utilization of ICTs among teacher education students and lecturers in universities in Kenya?
- iv) Whether is a difference in the utilization of ICTs among teacher education students and lecturers in public and private universities in Kenya:

**Hypothesis One (H<sub>01</sub>):** There is no statistically significant difference among teacher education students in use of ICTs by university type;

**Hypothesis Two (H<sub>02</sub>):** There is no statistically significant difference among teacher education lecturers in use of ICTs by university type.

### **1.6 Significance of the Study**

This study investigated the extent to which ICTs have been used among teacher education students and lecturers so as to inform stakeholders in universities in Kenya (including university management, lecturers and students) about what is happening in other similar institutions within the country that may be a basis for future decisions regarding the use of ICTs that they will make. In particular, it provides useful recommendations for lecturers, as they are key influences on their students' success in the lecture room. Like other teachers, lecturers require mastery of new methods and techniques with regard to information technology (Gorard, 2001). In the same vein, stakeholders will learn how other practitioners are dealing with challenges they may be facing. Since Kenya has recently formulated a national ICT policy, a study on the ongoing practices in teacher education in the different Kenyan universities is timely. By identifying some challenges faced in the process of using ICTs and making recommendations, teacher education in universities in Kenya will hopefully be enriched by this study. This is because education is the most important agent of transforming a traditional society into a modern one. Given that teachers play a leading role in education, this study of teacher education in Kenyan universities will contribute to the existing literature.

### **1.7 Scope of the Study**

This study covered ICTs as used in teacher education in public and private universities in Kenya. Only pre-service teacher education was covered (both distance/part-time and regular) but the focus was mainly on the regular study mode. The focus was further directed to ICT use to deliver course content and enhance communication between students and lecturers. The study did not analyse other applications of ICTs such as admissions, registration, or student records.



### **1.8 Limitations of the Study**

The study was based on self-reporting, as the researcher did not observe actual use of ICTs in teacher education. By collecting data from students and lecturers in addition to documentary sources, triangulation was possible, mitigating the potential bias of self-reporting.

### **1.9 Definition of Terms**

The following definitions were made with the awareness that the concepts are open-ended and constantly changing. The following terms were, therefore, operationalized for this study.

**Comparative Assessment:** An analysis of how computers, telecommunication and audio-visual systems are used in diverse contexts for a variety of functions. This entails an examination of how different institutions use the systems for teacher education purposes.

**Distance Learning:** All those learning methods in which, because of the physical separation of learners and teachers, the interactive (stimulation, explanation, questioning, guidance) as well as the proactive phase of teaching (selecting objectives, planning curriculum and instructional strategies and instructional strategies) is conducted through print, mechanical or electronic devices.

**Electronic learning (or e-Learning)** is a planned teaching/learning experience that uses a wide spectrum of technologies, mainly Internet or computer-based, to reach learners.

**Hypermedia:** Incorporation of a variety of media with simple text.

**Hypertext:** Non-sequential writing which allows writers to link information through a variety of paths or connections. It allows users to seek greater depths of information by moving between related documents along thematic lines or accessing definitions and bibliographic references without losing the context of the original inquiry.

**Informatics:** the application of computers and data communication to process, store and transmit information, in numeric, text or graphic form.

**Information and Communication Technologies (ICTs):** Includes computers, telecommunication and audio-visual systems that enable collection, processing, transportation and delivery of information and communication services to users.

**Interactive:** Involving the active participation of the user in directing the flow of the computer or video programme; a system which changes information with the viewer, processing the viewers input in order to generate the appropriate response within the context of the programme.

**Internet:** Interconnected systems of networks that connect computers and allows exchange of information.

**Multimedia:** The delivery of information, usually via personal computers that combines different formats (text, graphics, audio, still images, animation, motion video) and storage media (magnetic disc, optical disc, video/audio tape, RAM).

**Teacher education:** This involves the pre-service training of individuals in subject specific content, teaching methods a wide range of skills including school administration, human psychology and learner characteristics, and school-community relations, among others to enable individuals to take up jobs as teachers.

**Teacher education students:** Fourth year bachelor of education pre-service students enrolled in public and private universities

**Teacher development:** Training given to individuals who are already in the teaching profession as well as professional development activities that teachers undertake on their own for example learning to use the computer, reading articles about teaching, participating in seminars and workshops, among other activities.

**Telecommunication:** any transmission of information by wire, radio waves, optical media or electromagnetic system.

**Tele-conference:** A general term for a multi-party telephone call that enables more than two callers to participate in a conversation. The growing use of video allows participants at remote locations to see, hear and participate in proceedings or share visual data.

**Utilization of ICTS:** The use of computers, telecommunication and audio-visual systems in a variety of ways such as to transmit, collect/retrieve, share, store and present information.

**Virtual learning:** A learning strategy where learners use self-directed principles to master content at their own rate and at times convenient to them, either at the workplace or at home. This strategy replaces conventional lecture halls and classrooms, creating new opportunities and challenges for teachers and learners.



## CHAPTER TWO

### LITERATURE REVIEW

#### 2.1 Introduction

This chapter discusses comparative education research debates; ICTs and teacher education; international perspectives on ICTs in education; ICTs in education in Africa; the African Virtual University (AVU) and Teacher Education in Sub-Saharan Africa (TESSA). The chapter also discusses Kenya's experience on ICT in education and highlights the Government of Kenya (GoK) ICT policy as it relates to this study. It then analyses the modernisation and globalisation theories, as they were applied in the study. The chapter ends with a theoretical and conceptual framework that guided the study.

#### 2.2 Comparative Education Research

Comparative education is a field that has advanced over the last century through introspection and frequent discussion and debate on theory, practice, purpose, and methodology (Fairbrother, 2005). In a recent series of articles in *Comparative Education*, Crossley and Jarvis and others (Crossley & Jarvis, 2000b) acknowledged the field's strengths, achievements, in broadening discourse, while drawing attention not only to challenges brought about by globalization and socio-economic change, but also to shortcomings in comparative education theory and method. As an example, Little (2000) noted that only a minority of articles appearing in the journal over the previous 20 years had adopted an explicitly comparative approach. Rust and his colleagues (Rust *et al.*, 1999), in *Comparative Education Review*, also expressed a concern for the implications for the field of their finding that only one - third of so called comparative studies appearing in relevant journals, actually involved study of more than one country, but rather focused on the tasks of description and explanation within single settings. These and other scholars have urged comparative educationists to engage in more explicit comparison in their work, to discuss more actively the methodological considerations of research and analytical strategies, and to focus scholarly effort not only on problem - solving but also on theory building in education, all to directly address important questions facing education today ( Broadfoot, 2000).

Past and current scholars in comparative education have dwelt at length on the purposes, perspectives, approaches, and methods of the field (Arnove *et al.*, 1982; Bray, 2003). Among the purposes of comparative education studies they argue, are understanding our own and other countries' educational systems; improving, developing, and reforming them, policy, and practice; predicting the success and consequences of educational change; and developing tools to aid in each of these endeavours through the construction of theoretical frameworks.

Comparative education and other social science fields utilize a variety of analytical strategies and methods that contribute to our ability to understand, reform, predict, and theorize. Theisen and Adams (1990) categorized the body of comparative education research in terms of four tasks: description, analysis, evaluation, and exploration. Rust *et al.* (1999) developed a more detailed typology of nine research strategies in comparative education, including literature review, historical analysis, experimentation, content-analysis, field research, comparative research, and theoretical or conceptual research. Other scholars have added to this framework the role of comparative research in clarifying, illuminating, or developing concepts that contribute to our ability to explain phenomena and relationships (Bendix, 1963; Raivola, 1986).

Bray and Thomas (1995) have constructed a matrix to delineate the possibilities for research taking into consideration as units of analysis sites ranging from the world to the individual classroom. At the level of nation-state, studies may focus on single countries, two or three countries, regional groupings, or strive towards the global. A multi-society comparison need not be cross-national, however. There is certain potential for insight from multi-site intra-national comparative studies (Crossley & Jarvis, 2000a).

Comparisons taking the country as a unit of analysis are prominent in the field of comparative education. This is a legitimate practice considering that each country has a government which is the ultimate political unit exercising sovereignty over its internal and foreign affairs, and countries are thus the traditionally recognised entities of international governance. Moreover, in many countries control of important aspects of education are centralised and shapes national education systems. Thus, data on education are often



available on a national aggregate basis. Country comparisons, like world-systems comparisons, are thus useful in providing a general framework for understanding and interpretation of relationships between education and society.

However, the use of the country or nation-state as the dominant research framework has been continually challenged (e.g. Kelly & Altbach 1988; Mitter 2004). Scholars cite world systems analysis and intra-national regional variations as major issues that make the use of the nation-state an inadequate unit of analysis. The main arguments are that national school systems exist within the context of unequal power relations among nations, and that regional variations in education within nation-states are often as great if not greater than those between nation-states, thereby making intra-national comparisons as significant as international comparisons.

To illustrate the methodological complexities involved in the use of countries, Postlethwaite (1994) cited several countries having decentralised political systems: For example, Canada is a country but it consists of 10 provinces and 2 federal territories. Each province is responsible for its own educational system. The same is true for Australia with its 6 states and 2 territories, and for Germany with its 16 separate states, where education is the legal responsibility of each state. Belgium has 2, and the United Kingdom has 3, separate systems. The United States has 50 separate systems. Each of the 26 cantons in Switzerland is responsible for education within its own canton. In these cases, intra-national comparisons may yield more meaningful results than would aggregate international studies. The examples above have shown that cross-national comparisons tend implicitly to assume that countries are homogeneous, equivalent units of analysis. This, as the literature indicates (e.g. Walberg & Zhang 1998; Gorard 2001), can lead to misleading conclusions if data are not interpreted with caution and balance.

### **2.3 ICTs and Teacher Education**

Professional teacher development is a complex and sophisticated process that involves training in content in specific subject areas, teaching methods and a wide range of other skills (UNESCO, 2002a). It should also take place throughout the professional life of a teacher



(Haddad, 2002). Murphy (2002) observed that the wide perception of ineffectiveness of conventional programmes of teacher development and the relatively high level of public expenditure going into these programmes, have provided a strong rationale for seeking alternatives that would make more effective use of distance education and ICTs as part of the teacher development effort.

ICTs can be used to enhance the quality of pre-service teachers and reduce the cost of in-service training. As Fontaine (2002) noted, ICTs can be used to reach many more teachers on an ongoing basis, allow the incorporation of a host of new topics and issues into the educational curriculum and encourage more fundamental pedagogical reforms. Rumajogee (2002) discusses various opportunities that are provided by ICT when used for teacher development. These include:

- i) Simulation of specific skills through demonstration lessons in real classroom settings that can be watched and analysed without disrupting an actual class. Such lessons can easily represent a range of subjects, approaches and methodologies;
- ii) Technologies such as radio, TV and computer enable teacher education to be provided at any time and in any place;
- iii) Use of technology for teacher training also familiarises the teacher with technology.

In reference to technology use and teacher education, Carlson and Gadio (2002) strongly asserted that teachers remain the gate keepers for students' access to educational opportunities afforded by technology; they cannot and should not be ignored' (p.119).

Shi (2004) recommended that despite a general recognition that all teachers should be technologically literate; most teacher education programmes have not been providing their students with sufficient opportunities to become proficient in the technologies and should learn through technology. The US Congress has recommended developing future teachers who know how to use modern learning technologies to improve student learning (Preparing Tomorrow's Teachers to Use Technology, 2002).

Fontaine (2002) cautioned that conventional teacher training approaches should not be discarded completely, but that combining computers with occasional face-to-face training can be highly effective. ICT should always be used with the understanding that it is neither a quick nor an inexpensive fix. Furthermore, teachers need easy access if they are to become comfortable using ICT. According to him, unless computer access is very good, it may eventually mean that only the most dedicated professional will use it on a daily basis.

#### **2.4 International Perspectives on ICTs in Education**

Mohnsen (1995) noted that during the 19<sup>th</sup> century, the new technology in education was the chalkboard. In the 21<sup>st</sup> century the new technology includes computers, video cassette recorders (VCRs) and players and laser disc players. She also examined two computer revolutions: the first which occurred in the 1960s, particularly in the U.S.A. whereby computer terminals were installed in one room in several different schools and linked to a 'master computer' located at the district office or other central locations. Teachers had to sign up for times when they could take their classes to the computer room. She notes that this first effort did not last long, because the machines were too expensive and they often broke down. The second computer revolution that Mohnsen describes began in the late 1970s, with the appearance of the personal computer. This is the most significant one educationally as it opened up the possibilities of bringing computers into homes and classrooms: from primary schools to university lecture rooms. Following her sequence, we may talk of a 'third revolution' where there are computers, videos, laser discs and other 'information technologies'. Entering this third revolution should be done courageously. This is so because the development opportunities opened up by computer technology are so important and exploitation of the opportunities provided by this technology must be regarded as fundamental duties of society.

Hawkrige (1983) posed a useful series of questions regarding the marrying of information technology to education and provides useful information on the potential impact of technology on education. His admission that new technologies offer challenges and new frontiers in education provides this study with substantial matter for investigation. He further concludes that it is important to think about how education can take advantage of technology



rather than the other way round - how technology can take advantage of education. As if in response to the issues that Hawkrige (1983) pointed out, Cottrel et al (1988) catalogued briefly how advanced information technology can be used in education. In their work they discussed various phases of computer evolution from the 19<sup>th</sup> century through to the 1980s. Both descriptive and analytical, their work showed the advances that have been achieved. It therefore offered a useful background to this study.

Defleur and Ball-Rokeach (1989), though writing about mass media, concurred with the foregoing views. To them, just as the average person in the 19<sup>th</sup> century had to develop the ability to read in order to use the newspaper, people today must become *computer literate* before computer-based educational media can emerge and succeed. They also note that just as the development of the education system was crucial to people learning to read, so is today's public education system essential to the development of mass computer literacy. Other than emphasizing the necessity for everyone to master their use, Defleur and Ball-Rokeach's (1989) suggestion that computer use demands low skill requirements dispels myths and fears of many adults who hesitate to learn new ways of things. To them, people do not have to become computer programmers any more than readers of newspapers have to become reporters or editors. More specifically, Laurillard (1993) discussed the use of technology in higher education. Her highly descriptive work offers useful insights to a variety of teaching media, their characteristics, advantages and disadvantages. Her most significant contribution to the present study is her claim that higher education must be able to evolve and adapt to new conditions while preserving the traditional high standards of an academic tradition. Her suggestions should arouse those who are either hesitant or slow in adapting ICTs for higher education, and particularly teacher education.

French et al (1999) offered an informative discussion on information technology and learning. Their discussion on Internet Based Learning (IBL) in the USA highlights the potential benefits that can accrue specifically for distance learners. In that perspective, their work informed this study since a majority of the non-traditional students belong to that category. Their discussion further outlined how IBL can remove barriers to greater participation by adults. They also identified problems that must be addressed to maximize



the use of information technology's potential for this audience. In addition, they discussed future challenges that information technology poses to educational practice. The problems and challenges of using ICTs in selected Kenyan universities are compared and contrasted with their findings.

Herremans (1995) outlined some reasons for using New Training Technologies (NTTs) in education. In the first place, they will improve quality of the teaching process by increasing learning attractiveness and therefore its effectiveness. This position is justified by noting that improved quality of training material and media increases the retention rate by 30-40 % using interactive video disc in a classroom. Several factors are responsible for this; for example, such technologies are better adapted to individual learning styles. Many PC-based NTTs contain sound, animation and video in addition to text. The multimedia PCs available make them useful outlets for learning. Secondly, increased retention by use of NTTs reduces failure rates and consequently training length and costs. Thirdly, the use of NTTs will complement lack of education and training opportunities in certain places at certain times. These include 'satellite' learning centres (far away locations from campus) or students' homes or their workplaces. The issues that Herremans (1995) addressed are significant, particularly the forms of ICTs that he discussed.

ICTs can be used to promote the efficiency of education by improving the quality of teaching, educational administration and educational research (Stonier & Colin, 1985). The use of application packages (for example text editing), cheap access to databases (including encyclopaedias) and other inexpensive communication systems and good computer assisted learning packages, will revolutionarise the education process. Some of the benefits of ICTs to education include the fact that they are interactive; they simulate complex situations; they are exciting to work with; they animate otherwise dull material; they allow learners to proceed at their pace; they give instant responses; they allow privacy; they can be used to communicate over a long distance; and they can be customised to deliver learning material (Stonier & Colin, 1985).

In the first place, ICTs are interactive, allowing the user to determine what happens next, unlike books. The user is required to be active as motor involvement takes place. Consequently such involvement accords the user an additional sense of freedom and control over the system. Secondly, ICTs can simulate complex situations such as chemical reactions or ecosystems in science or demographic or economic changes. Such simulations can facilitate the acquisition of problem-solving skills by students (Stonier & Colin, 1985). In addition to the two related benefits above, ICTs are exciting to work with. Students love to make things happen and to respond to challenges. Therefore by combining education with games of challenge (for example in language learning or mathematics) computer assisted learning is great fun. Fourthly, ICTs can present concepts to be mastered in an understandable manner by means of animations unlike lecturing or writing. A fifth benefit of ICTs is their infinite patience no matter how slowly the user progresses. For example, a computer will not get tired despite the frequency of the user's mistakes. A sixth benefit is that many ICTs allow instant responses. They allow the user to know where there has been an error, the nature of the error and when the solution is correct. This is in line with features of good education that provide effective positive reinforcement (Stonier & Colin, 1985).

Two other benefits of ICTs include the fact that, on one hand, ICTs provide privacy whether users commit embarrassing mistakes, display ignorance, demonstrate lack of skill, and are slow to comprehend, or have poor coordination. On the other, in regard to distance learning, they can be used to simulate interactions for example video and telephone conferencing. This can allow the lecturer and two or more students to share ideas, even when separated geographically; ICTs facilitate the learning experience from student to student, student to library or student to the world via the Internet. They can also create custom tailored education for individuals to proceed at their pace and convenience (Stonier & Colin, 1985).

Mohnsen (1995) made an exposition of the use of technology, albeit in physical education. In her examination, she described various types of technologies available to physical educators. She also described how ICTs can help educators to track attendance, record grades and enhance physical fitness. In particular, she introduced the many uses and benefits of video, how to choose computer software, and peripherals such as printers and monitors. Her work



also focused on the telecommunication function of computers, through sharing of information as in bulletin boards, electronic mail systems or review of lesson plans. Mohnsen further showed how computers can help students to understand cognitive concepts and develop skills. Her work, though specifically addressed to physical education, was highly relevant to this study. She summed her sentiments on technology in education by observing that the uses of technology in physical education are new and wide open.

In contrast to the supposed benefits of ICTs in education, optimistic views about ICTs and their use are challenged by Herremans' (1995) position regarding new information technologies and their use in education and training. Herremans noted that 'it is now commonplace to say that we are living in a fast changing world, but do we have the needed resources and infrastructure in place to cope with this situation?' (p.1). These reflections are particularly appropriate for a developing country like Kenya where this study is based. In the light of declining budgetary allocations for education and economy-wide constraints, educational practitioners, especially in higher levels and particularly those engaged in teacher education have to carefully evaluate the best use of resources. Herremans made a sound precaution by noting that New Training Technologies (NTT) 'are not the panacea, but they may contribute to a large extent to the development of both necessary attitudes and educational opportunities for lifelong learning. They may provide students with the necessary knowledge and skills to access the labour market or to retrain people so that they can adapt to evolving jobs' (p.1)

Kirschner and Selinger (2003) were also critical of the developments in the use of ICTs in education by observing that teachers adopt new technologies and incorporate the technologies into their traditional view of teaching and learning. They further argued that the overhead projector and video have made very little impact on teaching styles and so computers are not necessarily different. However, as Stonier and Colin (1985) noted, computers are different from any previous technologies because multimedia and hypertext give students access to new ways of thinking through dynamic images, simulations and models, and the internet provides access to a huge array of information. Kirschner and Selinger (2003) further argued that while technology is not a panacea for all educational ills,



today's technologies are essential tools for the teaching trade. To use these tools well, teachers need a vision of the technologies' potential, opportunities to apply them, training and just-in-time support, and time to experiment.

Given the foregoing reservations about using ICTs two critical issues arise. The first one is, whether developing countries (especially in Sub-Saharan Africa), with large segments of people living in extreme poverty and in dire need of basic needs should invest money in ICTs for the education system or use the money to improve their living conditions. The other one is, whether these countries such as Kenya should invest in ICTs at the expense of other educational facilities that are inadequate or completely non-existent such as well-stocked libraries, lecture rooms or office space for staff. Osin (1998) offered a reflection on these issues (living conditions and educational facilities) by observing that these interests are not contradictory and that the only way to reach a long term solution for the economic problems of the population is to raise the educational level, particularly for the low-socio-economic groups. He then continues to argue that the introduction of computers in education in developing countries is financially feasible. Similarly, Potashnik and Adkins (1996) suggested that the introduction of ICTs in education should not wait until a country has reached some predetermined state of economic or educational development.

Furthermore, short-term concerns for equity at the national level such as ICT provision versus health care must be balanced by long-term concerns for equity at the international level where the level of basic ICT skills of the people in any country is increasingly important for global competitiveness, and ultimately economic growth and wealth generation (Rumajogee, 2002). The tendency of some people to assume that ICTs are a panacea to all educational problems is a major concern in education. A balanced view is to regard ICTs as one strategy for improving educational provision, not as an end. Based on a study of schools in OECD countries, Venezky and Davis (2003) reported that the central finding of their study is that ICT rarely acts as a catalyst by itself for schooling change, yet can be a powerful lever for realizing educational innovations. As ICTs become important for education in an era of global interconnectedness, Haddad and Draxler (2002) argued that to *tech* or *not to tech* is not the question. The real question is how to harvest the power of technology to meet the

challenges of the 21<sup>st</sup> century and make education relevant, responsive and effective for anyone, anywhere, anytime.

## **2.5 ICTs in Education in Africa**

Turning to Africa, there have been numerous international and national schemes over the last decade designed to introduce ICT into schools. Most of these have been introduced with the best of intentions, but many have failed to live up to the ambitious aspirations of those who had promoted them. This has often been because they have been top-down and supply-led with insufficient attention being paid to the involvement and training of teachers. Nevertheless, there have been some interesting initiatives that have sought to go beyond merely introducing computers into schools, and giving teachers some training in how to use Microsoft Office packages on them (Kinyanjui , 2004). Among these are the Connectivity for Educator Development programme in Uganda ([www.connected.ac.ug/frameset.htm](http://www.connected.ac.ug/frameset.htm)), Schools OnLine's programmes in Senegal ([www.schoolsonline.org/whatwedo/senegal.htm](http://www.schoolsonline.org/whatwedo/senegal.htm)) and Tanzania ([www.schoolsonline.org/whatwedo/tanzania.htm](http://www.schoolsonline.org/whatwedo/tanzania.htm)), World Links' programmes in Ghana ([www.worldlinks.org/english/html/ghana.htm](http://www.worldlinks.org/english/html/ghana.htm)) and Uganda ([www.world-links.org/english/html/uganda.htm](http://www.world-links.org/english/html/uganda.htm)), SchoolNet Namibia's experiences in using Open Source and thin-client solutions in supporting youth empowerment ([www.schoolnet.na](http://www.schoolnet.na)) and the Commonwealth of Learning's Southern Africa Teacher Training Programme ([www.col.org/programmes/catalyst/safricateacher.htm](http://www.col.org/programmes/catalyst/safricateacher.htm))

Even with such programmes, though, there have nevertheless been significant implementation problems. The SRI (2001) evaluation of the World Links' programmes reported that despite the significant progress that had been made, particular barriers persisted. For example, in the nations of both Latin America and Africa, teachers reported that the lack of computers, inadequate hardware/software and unreliable Internet access, constituted the major barriers keeping them from using computers in their teaching. A smaller number of teachers in selected countries also indicated a need for more technical support in integrating ICT into the curriculum and stronger national policies on the role of technology in student learning (Kinyanjui , 2004).



Among the most ambitious African initiatives is the e-Schools Programme being advocated by NEPAD (The New Partnership for Africa's Development, ([www.nepad.org/en.html](http://www.nepad.org/en.html))). This has developed through various guises since its announcement at the Africa Economic Summit in Durban in June 2003, and now places a growing emphasis on the important role of teacher training. Nevertheless, as with so many other educational-ICT initiatives in Africa, its focus remains primarily on the importance of giving pupils and teachers ICT skills, rather than on using ICT to enhance their wider learning experiences. At the All-Africa Ministers' Conference on Open and Distance Learning held in Cape Town in February 2004, NEPAD's e-Africa Commission Programme Commissioner/Coordinator, stressed that the e-Schools Initiative will ensure that a majority of the people on the continent had the skills required to function in the knowledge economy (Kinyanjui , 2004).

The coordinator went on to define NEPAD's e-Schools' objectives which include minimizing the effects of the digital divide on young people and providing them with ICT skills necessary to function in the knowledge economy; ensuring that every African youth leaving school has the necessary ICT skills that will assist them find jobs, create jobs or further their education optimally; making universal e-access in every institution a policy priority on the African continent. The initiative also aims at redefining universal service/access to meet the requirement of the new economy; transforming every institution of learning into a health literacy center and zone to combat diseases especially malaria, HIV AIDS and tuberculosis (Kinyanjui, 2004)

The lack of mention amongst these objectives of the use of ICT to enhance wider learning and educational experiences suggests that despite NEPAD's increased rhetoric on teacher training, this initiative remains primarily about using education to enhance ICT skills, in the expectation, or hope, that this will in itself be of benefit to African people. The initiative aims to connect more than half a million primary and secondary schools in Africa to the Internet, but without comprehensive frameworks developed at national level to train teachers in the appropriate use of such technology, it is likely that such activities will achieve little in the way of real educational change in the continent. Kinyanjui (2004) and others involved in the e-Schools initiative do comment that teacher training is important, but until the core

emphasis shifts away from a focus primarily on getting schools connected, to a deeper understanding of how this can transform children's learning experiences, it will remain problematic.

## **2.6 The African Virtual University (AVU)**

Started in 1997 as a pilot project of the African Department of the World Bank, the AVU is a technology-based distance education network. It involved 23 African, European and North American universities (Butcher, 2003). It is an independent, non-profit making organisation with headquarters in Nairobi and has thirty learning centres in 17 tertiary institutions across Africa. The goal of the AVU initiative was to use ICT in Sub-Saharan African (SSA) to enhance access to quality higher education in subject areas of importance for economic development (Butcher, 2003).

According to Rumajogee (2002, 108), the objectives of the AVU are:

- i) to use modern technology (especially satellite TV technology) in diverse countries to demonstrate that it can be used effectively as a teaching medium;
- ii) to prove that a project can be successfully implemented in various African countries, each with its own government, educational system, independent universities, (jealously guarding academic freedom) telecommunications authorities (jealously guarding their air space) language and culture;
- iii) to prove that a project can generate the economy of scale to sustain itself after the inevitable discontinuation of donor funding;
- iv) to upgrade the capacity of African countries in teaching mathematics and science, subjects that are very much needed to kick-start their economies;
- v) to prove that diverse communities can easily adapt to modern technology, that is that such communities can leap frog from paper age; and
- vi) to prove that diverse university curricula and timetables can be subjected to the dictates of common sense and usefulness.

The World Bank (2002) described the AVU as a 'university without walls' that uses modern ICT to enhance access to high quality resources across the world. Levey (2002) noted that



the project had received criticism because all the courses provided had been developed in the northern hemisphere. During a strategic review, it was decided that AVU will not aspire to be a university in its own right, but will rather help to expand access to higher education by delivery of courses from other universities through distance learning programmes. In addition, AVU resource centres will provide technological support for partner institutions. The digital library, which is a core component of the initiative, offers access to full text journals and a catalogue of subject-related web links (Murphy , 2002).

### **2.7 Teacher Education in Sub-Saharan African (TESSA)**

The Teacher Education in Sub-Saharan African research and development programme (TESSA) is a consortium programme involving 13 national institutions from across Sub-Saharan Africa and a number of international organisations ([www.tessa.org](http://www.tessa.org)). It aims to help all forms of teacher education (pre-service and in-service, in both face-to-face and off-campus settings) to expand and develop. This is in order to meet the goal of 'Education for All' (EFA) by 2015. Its prime aim is to research and develop high-quality resources and support systems in ways that can help to improve teacher education and classroom practices significantly ([www.tessa.org](http://www.tessa.org)).

TESSA has created 'Open Educational Resources' (OERs) in multimedia formats for teacher educators and teachers working in Sub-Saharan Africa. These OERs consist of large numbers of up-to-date materials to support school-based education and training for teachers. The materials can be used 'on line' or in paper format. The materials can be freely downloaded, adapted, translated and integrated with other materials in courses and programmes for teachers or used by individual teachers or teacher educators at no cost. Because the TESSA materials are OERs, they have tremendous flexibility, enabling easy sharing and reuse within the TESSA network. This can reduce duplication of effort and facilitate effective use of limited resources.

At the heart of the TESSA OERs are activities for teachers to do in classrooms that would help them develop their skills in supporting pupils' learning ([www.tessa.org](http://www.tessa.org)). These school-based activities can be used by teachers in schools or in training institutions and involve the

teacher' using his or her classroom experience as a way of learning about teaching. School-based activities are different from many more traditional activities used in teacher education, as they link theory and practice; teachers are encouraged to think critically about what is happening in their classrooms. The TESSA materials are designed for use in a range of teacher education and training programmes in the region, such as B.Ed courses, diplomas, in-service programmes, continuing professional development courses and upgrading programmes. Teacher educators working in different contexts (universities, colleges, regions and districts) are able to use them in a variety of situations and programmes ([www.tessa.org](http://www.tessa.org)).

### **2.8 Kenya's Experience on ICTs in Education**

Most of the research on ICTs in Kenya has focused on library and information sciences. However, there are recent studies (for example, Wanyembi, 2002; Kiptabut, 2003; Oyelaran-Oyeyinka & Adeya, 2004 and Wims & Lawler, 2007) that specifically discuss ICTs and their use in education. Muya's (1979) study of UNESCO's information programme linked information with technology. Two of his observations illuminated this study. Muya observed that the Kenyan information scene was very uncoordinated and that there was unnecessary duplication of resources. He also observed that information should be coordinated through networking. However, Muya did not attempt to explore how his recommendations could be achieved. This study established the extent to which his concerns have been addressed. It also makes appropriate recommendations on how to achieve them.

Muiruri (1986) studied the use of IT in libraries to improve efficiency and give better services. Her study made reference to computer use in developed countries. By highlighting the technological gap between developed and developing countries, the study offered a comparative dimension that this study pursued. In addition, since her study was reported in 1986, she offered a basis for examining how the selected Kenyan universities have progressively developed in their use of computers for educational purposes to date. Further, this study sought to explore some of her recommendations.

Njuguna (1991) made a critical study of computerised information systems in selected Kenyan libraries. He identified six factors that have militated against the adoption of



computer technologies in libraries in Kenya: computer illiteracy among staff; apathy by national decision makers; financial limitations; limited choice of software; inability to retain professionals who have trained in computer science; lack of cooperation and coordination among local libraries.

Since these factors may also be significant in teacher education, this study investigated what had changed and described present trends in university education, over two decades later. In general, Njuguna (1991) reported that various sectors in Kenya among them banks, airlines, hotels, publishing firms, among others, utilize computer technology. He then noted that Kenyan universities are similarly utilizing computer technology for various services. However, his discussion did not explain how they specifically utilized them and for what services they applied them. This study established how teacher education students and lecturers in universities utilized ICTs.

Anyango's (1995) study on e-mail technology developments in Kenya was closely related to this study. Though focused on library information services, the study discussed the educational significance of e-mail. In particular, it surveys how e-mail can be used to enhance research by enabling ready access to electronic databases and journals. To this end the study is complemented by the present one. However, this study further makes a survey of other internet strategies that have significant educational value in Kenyan universities.

Wanyembi (2002) made a significant contribution to research in ICTs in Kenyan universities. His work mainly addressed the areas of ICT management, control and maintenance in public universities in Kenya. He estimated that each public university had over 1000 pieces of various makes, types and capacities of computers scattered over several campuses, in administrative offices, computer laboratories, in various faculties and departments. He also discussed the reasons why ICTs had been adopted in SSA countries including Kenya. The recommendation for further research provided motivation to this study on teacher education as he wrote that little is known about the planning, development, implementation, utilization, exploitation, management, control and maintenance of information systems in many public universities in Kenya.

Kiptabut's (2003) study made some recommendations about the use of Computer Based Instruction (CBI) by teachers. One of the findings of his study was that teachers should make use of CBI in their day-to-day instruction as it has positive effect on the students' learning ability, motivation and perception of classroom environment. Consequently, he recommended that further studies should be carried on the use of multimedia CBI. Building on his findings regarding CBI, this study on teacher education explored how lecturers in universities in Kenya have utilized ICTs in teacher training. Other studies that are relevant to the present one include Oyelaran-Oyeyinka and Adeya (2004) which explored the dynamics of adoption and usage of ICTs in African universities (Kenya and Nigeria). On their part, Wims and Lawler (2007) evaluated the impact of investing in ICTs in educational institutions in Kenya. However, the former is limited to internet adoption and usage while the later focuses mainly on secondary schools. This study contributes to fill these gaps.

## **2.9 The National Information and Communications Technology (ICT) Policy**

Having realised the importance of ICTs in societal and economic development, the government of Kenya promulgated a national ICT policy (GoK, 2006) based on the Economic Recovery Strategy for Wealth and Employment Creation (ERS). The ultimate vision of the policy is to create an 'e-enabled' knowledge based society by the year 2015 (GoK, 2006). The government hopes to use the ICT to improve the livelihoods of the people of Kenya and to optimise the contribution of ICT to the development of the economy by ensuring the availability of efficient, reliable and affordable info-communication services throughout the country (GoK, 2006). The government aspires to encourage the use of IT in schools, colleges and universities and other educational institutions in the country so as to enable students to improve their knowledge and skills. A leading challenge outlined by the policy in regard to human resource development is the establishment of a teaching workforce that possesses the requisite skills and competencies necessary for effective use of ICTs for enhancing the learning process.

This study served as a formative evaluation of the utilisation of ICTs in Kenyan universities and contributes towards realisation of the goals of Vision 2030 (GoK, 2007). The foregoing



discussion shows that there are many unanswered questions about the utilization of ICTs for teacher education in Kenya. The findings of this study anticipate to bridge the existing gap by showing how teacher education is carried out in selected universities in Kenya using ICTs.

## **2.10 Theoretical Framework**

This study was informed by two theories namely: modernisation and globalisation. Subsections 2.10.1 and 2.10.2 expound on the modernisation and globalisation theories, respectively, by focusing on the proponents; the guiding principles of each theory; and how each of the theories informed this study and their relationship to each other.

### **2.10.1 Modernisation Theory**

Modernisation theory started as an intellectual response to the two world wars. It represents an attempt to take an optimistic view about the future of humankind. According to Färgerlind and Saha (1991), the process of modernisation is characterised as revolutionary (a dramatic shift from tradition to modern); complex (having multiple causes); systematic; global (affecting all societies); phased (an advance through stages); homogenizing (convergent); irreversible and progressive. They further indicated that modernisation theory is based on the notion that there is a direct causal link between five sets of variables, namely: modernising institutions, values, behaviour, society and economic development. Underlying modernisation theory is the reasoning that in order for a society to become modern (to develop economically and socially), it must be composed of a modern population, meaning modern values, beliefs and behaviour.

Modernisation theory contends that education is perhaps the most important agent of transforming a traditional society into a modern one. Given that teachers play a leading role in education, a study of ICT use among teacher education students and lecturers in Kenyan universities, therefore, was significant. The study further made recommendations that are useful for adoption in teacher education practices in the light of the fast evolving information age. The manner in which such education is carried out will need to reform and reflect the modern times. As UNESCO (1998) observed that many educational reforms explicitly

include the modernisation of education systems among their objectives, and this is commonly taken to mean the introduction of new teaching equipment and adoption of teaching methods based on the latest information. More education ( in a modern sense) is seen as the indispensable basis for the rapid modernisation of production techniques and a means of expediting and controlling the transfer of advanced technologies.

### **2.10.2 Globalisation Theory**

Globalisation theory was used in this study since it clearly captures the impact of new communication technologies on educational, social and cultural life. McGrew (1992) writes that globalisation is the multiplicity of linkages and interconnections between states and societies which make up the modern world system. It describes the process by which events, decisions and activities in one part of the world have significant consequences for individuals and communities in quite distant parts of the globe. On his part, Mercer (1998) contributed to globalisation theory by stating that the foundations of our world were being shaken. To him, the information technology revolution meant that our working lives will never be same again; and that the economic effects of globalisation were being experienced everywhere. Other authors have offered explanations of globalisation (McLuhan, 1960; Giddens, 1990; Appadurai, 1990; Robertson, 1992 Webster, 1995 and Therborn, 2000). Their definitions converge at least on the core issue of worldwide reach through connectedness mediated by Information and Communication Technologies, what Robertson (1992) labelled as crystallisation of the world. Similarly, Therborn (2000) defined globalisation as the tendencies to a world-wide reach, impact, or connectedness of social phenomena.

Appadurai (1990) identified five dimensions of global flows: 'ethnoscapes', 'mediascapes', 'technoscapes', 'finanscapes' and 'ideoscapes'. Two of his dimensions, 'mediascapes' and 'technoscapes', are particularly relevant to this study of ICTs in teacher education in Kenyan universities. Education can incorporate the flow of information in the form of data in scientific reports, stories, pictures and documentary films, which accelerate the spread of new information and communication technologies. Through this flow of ideas, images and information, the world was shrinking into what McLuhan (1960) envisaged as a 'global village'. His concern was to capture the impact of new information and communication



technologies on social and cultural life. Hannerz's (1990) analysis acknowledged that the world had become a network of social relationships, and between its different regions there was a flow of meanings as well as of people and goods. Thus, both McLuhan (1960) and Hannerz (1990) concurred with Appadurai (1990) on the matter of interconnectedness. This interconnectedness leads to what Giddens (1990) referred to as 'time-space' shrinkage due to the diffusion of technology. This shrinkage occurs not only at the international level but also intra-nationally, and thus globalisation theory is relevant to this study. Despite these arguments that support the emergence of new patterns of global relations, the 'opponents' or 'sceptics' of globalisation argue that not much has changed. They assert further that we still inhabit a world in which national forces remain highly significant. They claim that the world is not any more interdependent as it used to be. The work of these 'sceptics' (see for example Jones, 2000) continues to challenge the globalisation theory.

Held (1999) identified the link between modernisation and globalisation by noting that the world is becoming more uniform and standardised, through technological, commercial and cultural synchronisation and globalisation is tied to modernity. Such a link between technological development and modernity further establishes a conceptualisation of globalisation as a corollary of modernity (Held,1999). The work of Giddens (1990) that views globalisation as a consequence of modernity reinforces this conceptualisation.

### **2.11 Conceptual Framework**

This study took the utilisation of ICTs as the independent variable while teacher education was the dependent variable. Figure 1 illustrates the interplay of variables in this study on utilisation of ICTs for teacher education:

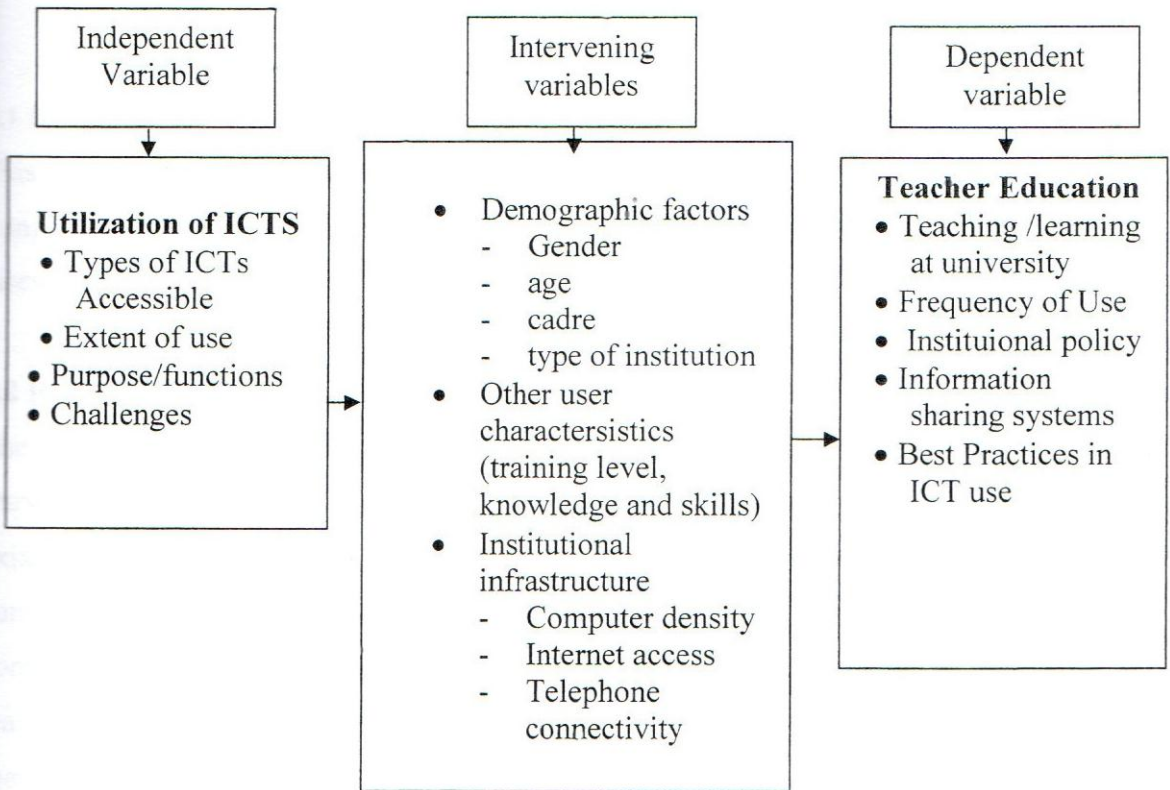


Figure 1: Interplay between the Variables in Utilization of ICTs

On the one side, the extent of utilisation of ICTs for teacher education and nature of functions they were used for is an outcome the type of the institution (private/public), the skill level of the users, infrastructure profiles of the institution and other institutional conditions, among other factors. On the other side, teacher education at universities involves both the presentation of the content by the lecturers using technology. It also involves tasks that require sharing or retrieval of material related to the topics or subjects under consideration. All these activities operate in a variety of contexts and are influenced by the intervening variables as shown in the framework.



## CHAPTER THREE

### METHODOLOGY

#### 3.1 Introduction

This chapter discusses the research design, the study population, the sampling procedures and sample size, instrumentation, and the data collection procedures used in this study. It also discusses how data was analysed.

#### 3.2 Research Design

The study utilised a descriptive survey that adopted the *ex post facto* approach to gather data. Surveys gather data at a particular point in time with the intention of describing the nature of existing conditions, or identifying standards against which existing conditions can be compared (Moser & Kalton, 1971; Cohen & Manion, 1997). The *ex post facto* approach was considered appropriate for this study in order to analyse and describe how ICTs are used in teacher education in various universities in Kenya. This is because the manifestation of how they are utilised cannot be manipulated (Mugenda & Mugenda, 1999). The survey was useful in establishing what functions the ICTs are used among teacher education students and lecturers in universities in Kenya, the influence of user characteristics, the challenges faced while using ICTs and whether public and private universities differ with regard to their application of such ICTs among teacher education students and lecturers. In this way, insight into the types of ICTs that existed were gained as well as understanding of the similarities and differences in their utilization.

The rationale for the *ex post facto* approach is informed by the pioneering work in Comparative and International Education methodology by Bereday (1964), Holmes (1969), and Noah and Eckstein (1969) all of who advocated for descriptive surveys. In that respect, Bray and Thomas (1995) noted that Comparative and International Education typically focuses on countries as the locational unit of analysis but that the units may range from the global to the local (that of schools, universities or individuals). To this end, descriptive studies are likely to continue to be the most commonly used approach to studying education-society relations (Preston, 1997; Arnove & Torres, 1999).

### 3.3 Population of the Study

The study population included students and lecturers in faculties or schools of education in public and private universities in Kenya that offer teacher education. The public universities offering teacher education are: University of Nairobi, Kenyatta, Egerton, Moi, Maseno and Masinde Muliro universities. The private ones are: University of Eastern Africa (Baraton), Kabarak University and Catholic University of Eastern Africa, CUEA (ACU, 2005). According to the Joint Admissions Board (JAB) statistics for 2007/2008, 2599 students were admitted for the Bachelor of Education degree programme in the public universities as shown on Table 1:

Table 1

Bachelor of Education Students and Lecturers in the Faculties of Education

	<b>Name of university</b>	<b>Number admitted</b>	<b>Number of lecturers</b>
1.	Kenyatta	797	135
2.	UoN	532	115
3.	Moi	574	108
4.	Egerton	365	75
5.	Maseno	201	60
6.	Masinde Muliro	130	55
	<b>Total</b>	<b>2599</b>	<b>548</b>

Source: JAB 2007/2008 University Admissions

Together with those that were admitted to the private universities and those who enrolled under self sponsored programmes, the working figure for this study was 3000 fourth year Bachelor of Education students. For purposes of the study, the number of lecturers in all the faculties or schools of education combined was 548.

### 3.4 Sampling Procedures and Sample Size

The sample for the study was drawn from universities in Kenya. The universities were selected using stratified random sampling procedures. They were stratified into public and private universities. From each stratum, two universities were selected purposefully as shown



in Table Two. Egerton University was considered on the basis of its top ranking for ICT use in Kenya in 2009; ranked 21 overall in Africa and 4,110 worldwide ([www.webometrics.info](http://www.webometrics.info)), while Kenyatta University is the oldest university in Kenya offering teacher education. Both CUEA and Baraton were the first private universities to offer Bachelor of Education programmes.

In the first place, three hundred (300) fourth year Bachelor of Education students were selected by simple random sampling for the study. In the same way, sixty (60) lecturers from the schools or faculties of education were selected randomly for the study as shown on Table 2. The sample for this study was determined using the logic proposed by Van Dalen (1979) who suggests that a sample of 10-20% will help to ensure representativeness. The study applied 10% to pick student and lecturer respondents.

Table 2  
Sample Size of Undergraduate Students and Lecturers

University Category	University	Students	Lecturers
Public 1	Egerton	75	15
Public 2	Kenyatta	75	15
Private 1	CUEA	75	15
Private 2	Baraton	75	15
	<b>Total</b>	<b>300</b>	<b>60</b>

The total number of student respondents was 223 representing a response rate of 74.3% .Of these, 106 (48%) were from private universities while 117 (52%) were from public universities as shown in Table 3 :

Table 3  
Distribution of Student Respondents by Type of University

Categories of Respondents	Frequency	Percent
Private	106	48%
Public	117	52%
<b>Total</b>	<b>223</b>	<b>100%</b>

Table 4 summarises the response rate for fourth year Bachelor of Education students according to their university category:

Table 4  
Categories of Respondents

<b>Categories of Respondents</b>	<b>Frequency</b>	<b>Percent</b>
Egerton Students	59	27%
KU Students	58	26%
Baraton Students	56	25%
CUEA Students	50	22%
<b>Total</b>	<b>223</b>	<b>100%</b>

The student respondents were further classified according to their gender as shown in Table 5 below. There was an almost 1:1 ratio in the study – 113 (51%) males and 110 (49%) females. This is an important detail because there have been efforts in Kenya to achieve gender parity in education:

Table 5  
Distribution of Gender of Respondents

<b>Categories of Respondents</b>	<b>Frequency</b>	<b>Percent</b>
Male	113	51%
Female	110	49%
<b>Total</b>	<b>223</b>	<b>100%</b>



Table 6 shows the distribution of the Lecturer respondents by gender and types of universities from the schools or faculties of education. There were 30 lecturers from private universities (16 females and 14 males); and 30 lecturers from public universities (12 females and 18 males):

Table 6  
Lecturers' Distribution by Gender and Type of University

Gender of Respondents	Types of Universities		Total
	Private	Public	
Female	16 (57%)	12 (40%)	28 (100%)
Male	14 (43%)	18(60%)	32 (100%)
<b>Total</b>	<b>30 (50%)</b>	<b>30(50%)</b>	<b>60(100%)</b>

### 3.5 Instrumentation

The study utilized questionnaires to collect data. Questionnaires were used because they tend to objectify, intensify and standardize the observations that respondents make (Van Dalen, 1979; Punch 1998, Gall, 2003 and Gay & Airasian, 2003)). Two sets of questionnaires were developed to cover the research objectives (one for undergraduate students and another for university lecturers in schools or faculties of education) as follows:

#### 3.5.1 The Questionnaire for Undergraduate Students (QFUS)

The QFUS, Appendix A, consisted of eleven (11) main items and seventy-nine (79) sub-items (five point likert and closed-ended in nature) grouped into nine (9) topics. These items covered the student demographic characteristics, types of ICTs accessible and if they used them for learning, reasons for using ICT and constraints on the use of ICT for studies.

#### 3.5.2 The Questionnaire for University Lecturers (QFUL)

The QFUL, Appendix B, consisted of twelve (12) main items and one hundred and two (102) sub-items (five point likert and closed-ended in nature) grouped into nine (9) topics. These items covered the bio-data of the respondents, types of ICTs accessible and if they are used for teaching, frequency of using ICTs and constraints on use of ICTs for university teaching.

### **3.5.3 Validity and Reliability of the Instruments**

The questionnaires were discussed with research supervisors and other experts in the Department of Psychology, Counselling and Educational Foundations at Egerton University to enhance their validity for the study. At the same time, the researcher made clear the study objectives and carefully structured the items of the study to help the respondents to give thoughtful consideration to what they reported. A pilot study was conducted to pre-test the research instruments in two universities which did not participate in the study (one public and another private). The aim of this piloting process was to test specifically for question variation, meaning, task difficulty, and respondent interest and attention and to ensure the validity of the data collection. At the same time, the researcher pretested the following: flow, order, skip patterns and timing. Based upon their feedback, some of the items were rephrased and clarified. Reliability was determined using the Cronbach alpha method for internal consistency upon single administration (Mugenda & Mugenda, 1999). The student questionnaire had a reliability coefficient of 0.90 while the lecturer questionnaire had a reliability coefficient of 0.88. A reliability coefficient of 0.70 and above was considered acceptable for the instruments to be used in this study (Straus 1987, Koul, 1993, Black 1999). Therefore, the instruments were considered sufficiently reliable for this study.

### **3.6 Data Collection Procedure**

Prior to entry into the field, the researcher obtained an introductory letter from the Director, Graduate School, Egerton University. This letter was used to seek authority to conduct research from the National Council for Science and Technology and the various university authorities. Thereafter, the researcher travelled to each of the identified universities to administer the questionnaires to the students and lecturers. A cover letter of formal invitation to participants was attached to the questionnaires. Participants' involvement in the study was strictly voluntary as such, the researcher did not offer any incentive for participation. At the same time, participants were not required to provide their names or any identifying information as a part of the survey. Every effort was made to assure participants' confidentiality of any information they gave since the questionnaire was anonymous and only group data would be reported. In order to ensure a high response rate, the student questionnaires were administered a few minutes before the commencement of a common



lecture on an appointed date while researcher relied on contact persons in each faculty and campus to administer and collect the lecturer questionnaires. The researcher also visited lecturers' offices to remind participants, and for those that could not be met telephone calls were used to remind them. All questionnaires were then collected for analysis.

### **3.7 Data Analysis**

The data obtained was computed using the Statistical Package for Social Sciences (SPSS) version 17.0 for Windows. Descriptive statistics (frequencies, percentages, cross tabulations, means, and t-tests) were generated for analysis. This analysis resulted in a comprehensive picture of ICT use for teacher education in various universities in Kenya. The responses were summarised to show the utilisation of ICTs (types, frequency of use, reasons, knowledge and skills on ICT use, use of ICTs for lectures or studies, use of internet, attitudes and helpfulness) and constraints of ICT use. The data collected was further analysed to identify the factors that lead to utilisation of ICTs or impede their adoption and possible solutions to challenges identified.

## CHAPTER FOUR

### RESULTS AND DISCUSSION

#### 4.1 Introduction

This chapter presents the results and discussion of the findings of this study. The results are presented and discussed under four headings in line with the objectives of the study:

#### 4.2 Functions of ICTS among Teacher Education Students and Lecturers in Public and Private Universities in Kenya.

The first objective of the study sought to identify the functions performed by ICTs among teacher education students and lecturers in universities in Kenya. The findings from the students' and lecturers' responses on this are presented in sub-sections 4.2.1 and 4.2.2 respectively.

##### 4.2.1 Students' Responses on Functions of ICTs among Teacher Education Students in Public and Private Universities in Kenya.

The students were asked to indicate the types of ICTs they used frequently (on and off campus); the frequency of use; their perceived degree of competence in the use of ICTs; their preferences of various ICTs for academic and non-academic uses; and the reasons for using them. A comparison of private and public universities on each of these aspects is also presented. The responses on the various types of ICTs used on-campus were as shown on

Table 7:

Table 7

Types of ICT Used on Campus

N=224

Type of ICT	Frequency	%
The Internet	201	90
Computer Labs	181	81
Mobile Telephone	172	77
Television	136	61
Radio	127	57
Laptop Computer	90	40



Table 7 shows that although students used a variety of ICTs, the internet, computer laboratories and the mobile telephone were the most popular among students on campus. At the same time, a few students reported that they used the laptop computer on campus. The results on high internet and computer laboratory usage may partly be due to the proliferation of ICTs in the larger Kenyan society. Such developments have impacted positively on the universities. All Kenyan universities have increased their bandwidth acquisition as reported by the Kenya Education Network (KENET, 2009). For example, at Egerton University, the bandwidth available in 2008 was 516kb/sec but this has grown to more than 36Mb/sec currently (A.Mugambi, network administrator (EU), personal communication, April 18<sup>th</sup>, 2013).

The use of computer laboratories or resource centres by 81% of the students was an indication that students were utilizing the ICT infrastructure provided by their universities. It is also notable that these institutional computers were also connected to the internet going by the high frequency of use of the internet on campus (90%). Table 7 also shows that the other ICTs that students used on campus were the television (61%) and the radio (57%). This may imply that many students obtained additional information from these 'traditional' types of ICTs for either study or non-study related needs. Students may use documentaries and feature programmes on television to get information relevant to their studies. Some of these documentaries are aired on both pay and the free to access television channels. These facilities are provided by the universities in student's common rooms. Other students may have also acquired their own television sets which they use in their hostels (Saiross & Mutula, 2004).

The mobile telephone was a popular gadget among the students on campus as reported by 77% of them. It is noted that the mobile telephone has a variety of features that were once paid for as separate devices – the camera, video recorder, GPS, text messaging and FM radio facilities. As a result, students can use their personal mobile telephones to make podcasts, take field notes, and organize their schedules and homework. At the same time, the mobile telephone with a camera has a great potential for data collection. It can enrich fieldwork by allowing students to capture images of objects of interest for later identification and

discussion. Another important aspect of the mobile telephone is that it is fairly affordable. Therefore, many students have one, even those who come from lower income brackets (Manzo, 2008). Unfortunately, despite the benefits to university learning and teaching associated with the mobile telephone, some students have misused the gadget to cheat in examinations, disrupt lecture activities or take unauthorized or inappropriate images of lecturers or students for uploading to the web (Andrew, 2009). Other users of the mobile telephone argue that it takes too long to download something while some have difficulty reading something on its screen because it is too small or that they experience difficulty entering a lot of text on the telephone (Aaron, 2011).

The use of radio is increasingly becoming common because many mobile telephones have an FM radio feature. This allows the students to flexibly and conveniently use their mobile telephones to follow radio programmes of their choice. In some cases there are call-in live shows both on television and radio, where they may contribute their views on various subjects. Table 7 also shows that only 40% of the students reported that they used laptop computers on campus. This may be largely due to the high cost of obtaining them. However, the Kenya ICT Board and the Ministry of Information and Communication (MoIC) had launched a laptop initiative to provide a financial subsidy towards purchasing laptops for registered university students in public and private universities and colleges. The laptop initiative was known as 'Wezesha' (a Kiswahili word that means 'to enable'). The first phase aimed at providing 15,667 laptops out of which, 5% (approximately 784 laptops) were allocated and reserved for students with special needs. This phase was concluded in March 2012 ([www.wezesha.org](http://www.wezesha.org)). Though worthwhile, this initiative only covered approximately 12% of the student population given that the country had 122,874 university students of whom approximately 80 percent were in public universities (Kenya National Bureau of Statistics, 2009).

The study was also interested in comparing how students in private and public universities used ICTs on campus. The results of this comparison were as shown on Table 8:



Table 8

Comparison of Students' Use of ICT on Campus in Private and Public universities

Type of ICT	Private (%)	Public (%)
Mobile Telephone	92	60
The Internet	91	88
Computer Labs	85	80
Television	82	39
Laptop Computer	43	36
Radio	37	39

On the over all, the results show that private universities had a markedly higher use of identified ICTs on campus compared with public universities. On the one hand, in regard to the ICT types identified, both university types reported high use of the internet and computer labs but comparatively lower use of laptop computers. The results also show that private university students had a higher use of the mobile telephone on campus as compared with their colleagues in public universities.

From the results on Table 8, both university types indicated a high on campus use of internet and computer labs. This implies that both private and public universities had invested substantially on ICT infrastructure for use by their students.

The use of the mobile telephone and television on campus was higher in private universities at 92% and 82%, compared to 60% and 39% in public universities, respectively. This may point to the fact that many of the students from private universities hailed from the higher social and economic strata and that they had better access to mobile telephones and television on campus as compared to their colleagues from public universities.

With regard to laptop computers, private and public university students reported low use of the ICT type at 43% and 36%, on campus respectively. This is mainly because fewer students could afford to buy their own laptop computers. The findings may imply that

financial initiatives by various providers were needed so that more laptops may be made available to students.

The study also investigated the frequency of use of various ICTs among private and public university students off campus. The results were as shown on Table 9:

Table 9

Students' Use of ICT off Campus in both private and public universities

N=224		
ICT Type	Frequency	%
Mobile Telephone	130	58
The Internet	189	85
Computer Labs	51	23
Television	127	57
Laptop Computer	60	27
Radio	149	69

The notable ICTs used off-campus were the internet (85%), the radio (69%), the mobile telephone (58%) and the television (57%), in that order. However, the use of laptop computers (27%) and computer labs (23%) were less popular off - campus. These findings on off - campus use of various ICTs show that the Kenyan society is becoming ICT saturated with extensive proliferation of diverse forms of ICT based technologies that could be used either alone or in combination. The low responses on usage of laptop and computer labs suggests that the students depended heavily on institutional computers for their ICT needs. The response on high internet use (85%) as compared to other ICTs implied that a majority of students were able to access internet services off campus. A number of reasons may explain this pattern of internet use. To begin with, some internet service providers may be located off campus. Secondly, such internet services may be flexibly available in cyber cafés that open for long hours, including weekends (Cilesiz, 2009). Yet again, the providers charge modestly (Adetoro, 2010). These privately owned cyber cafés are an alternative to university libraries (Mutula, 2003; Saiross & Mutula, 2004). The cyber cafés are 'classrooms' for



learning both how to use computers and to access information from the internet. The cafés act as internet training schools, places for learning, and have a potential to extend this training to a broader area of knowledge with increased competence and contribution from the internet café staff (Furuholt & Kristiansen, 2004).

These results on high internet and mobile telephone usage were consistent with the Quarterly Statistical Reports by the Communication Commission of Kenya (CCK) who observed that mobile tariffs continue to decline as competition between the service providers intensifies in both voice and data markets (CCK, 2011). The growth in the number of internet /data subscriptions in the second quarter (October - December) of the year 2010-2011, according to CCK reached 4.7 million up from 3.2 million, indicating an increase of 46.8 per cent.

The use of radio by 69% of the students' off-campus suggests that in addition to the FM radio on their mobile telephones, they also use radio sets to obtain information for their studies or for non study purposes. At the same time, the use of television by 57% of the students shows that a significant number of students obtain information through this type of medium. In other cases, the ICT types are combined, for example, when radio and television talk shows invite listeners' views through telephone calls or Short Message Services (SMS). The results show that fewer students use mobile telephony off-campus than on-campus (58%, compared to 77%). This may suggest that there is a reduced need to contact family members and friends when they are off-campus using the mobile telephones and that they may use other outlets to access the internet.

The study undertook to compare students' use of ICTs off campus by university type. The results are shown on Table 10:

Table 10

Comparison of Students' Use of ICT off Campus in Private and Public universities

Type of ICT	Private (%)	Public (%)
Radio	70	63
Television	65	60
Mobile Telephone	55	61
The Internet	45	38
Laptop Computer	35	21
Computer Labs	17	11

The results on Table 10 show that private university students had a higher off campus usage of all the ICTs except the mobile telephone. The results also show that both categories of respondents reported lower results for Internet, laptop computer and computer labs usage. The results further show that public university students reported higher mobile telephone usage off campus (61%) than their private counterparts (55%). The explanation for this may be that while some of them do not use mobile telephones on campus; more opportunities are available to use the telephones off campus. Such mobile telephones may be those belonging to parents and other family members or friends, among others. The results on higher internet use by private universities (45% against 38) point to the possibilities implied earlier that some of them may access the internet on the parents' telephones or probably others have internet connections at their homes. It may also be concluded from the results that students used radio and television for entertainment purposes while off campus, more than the other ICT types.

These results on off campus use of ICTs suggest that although the students relied on institutional ICTs for internet and computer related needs, they still had access to some ICTs while off campus, albeit to a lower extent. This may also imply that universities need to explore the potential that exists in adjusting their training programmes so as to provide the



possibilities of their students to accessing online learning resources off campus. Students can also receive other formats of learning materials such as take away CDs or DVDs with content which they can interact with while off campus, among other numerous possibilities such as utilizing SMS as a means of communicating important information ( like opening dates, upcoming events or other urgent alerts).

In addition to on and off campus uses of ICTs, the study sought to establish how frequently students used ICTs for study purposes. The responses on students' frequency of ICT use for study purposes were as shown on Table 11:

Table 11  
Frequency of ICT Use for Study Purposes in Both Private and Public Universities

N=223		
Frequency of ICT Use	Frequency	%
Every Day	45	20
2-3 times per Week	81	36
Once a Week	65	29
Once a Month	20	9
Rarely/Never	12	6
<b>Total</b>	<b>223</b>	<b>100</b>

Respondents who reported that they used ICT resources between daily and once a week accounted for 85% of the students. These findings may imply that universities have made efforts to avail the ICTs through resource centres and computer laboratories, thus increasing access for their students. In some cases, the universities had installed wireless internet connectivity and set up internet hot spots. Therefore, students were taking individual initiative to use these facilities for study purposes (Onyenania & Osaheni, 2010). Other initiatives were, for example, the use of mobile telephones to access the internet. This was often done at any time and place they needed to do so.

A comparison of how frequently students used ICTs in both private and public universities was undertaken to establish their usage patterns as shown on Table 12:

Table 12

Comparison of Students' Frequency of ICT Use for Study Purposes based on university type

<b>Frequency of ICT Use</b>	<b>Private</b>	<b>Public</b>
Every Day	30	10
2-3 times per Week	33	39
Once a Week	26	32
Once a Month	8	11
Rarely/Never	3	8

The results on Table 12 show that although a majority of students in both university types used ICTs frequently, private university students had a higher usage at 89% compared with their counterparts from public universities at 81%. This frequent use of ICTs for study purposes by students is also reported by Kirkwood (2007); Baro, Onyenania and Osaheni (2010). Kirkwood (2007), for example asserted that 73% of the undergraduate students surveyed in the UK reported that ICT use was important in their everyday study life. On their part, Baro et. al. (2010) noted that 87% of the undergraduate students in three Nigerian universities used various ICTs daily to source information relevant to their courses.

Other studies from the US and Russia (such as Jacobsen & Forste, 2011; Lebedeva, 2011; among others) emphasize everyday use of ICT among students. Jacobsen and Forste (2011) for instance, established that two thirds of the 3,000 students in their US study reported that they used some kind of electronic media everyday for studying or doing homework. Lebedeva (2011) also observed that a majority of undergraduate students in Russia, whatever their year of study, frequently used ICTs for study purposes. All these findings from diverse contexts concur with the findings of this study that frequent ICT use in universities in Kenya has become a lifestyle among students.



The study further sought to establish whether the students had relevant skills to use various applications such as Word processing (Word), PowerPoint, audio and video files, discussion forums, E-mail and the use of digital libraries. Table 13 shows the responses on their perceived competence:

Table 13

Students' Competence with ICT Applications

<b>N=223</b>		
<b>ICT Application</b>	<b>Frequency</b>	<b>Percent</b>
E-mail (receiving and sending)	209	94
Word processing	207	93
PowerPoint(for presenting information)	151	68
Search Engines (surfing for study material at: Yahoo!, Google, Bing)	126	57
Video Files	109	49
Audio files	99	44
Discussion Forums (such as Instant Messenger)	69	31
Digital Libraries ( or online libraries and databases)	67	30

The Table shows that teacher education students had a higher competence in the use of e-mail although other internet based applications were not well known. A majority of students also reported high competence in word processing perhaps because it is a basic skill that is not even dependent on availability of internet connection. The use of search engines was moderate among the student respondents perhaps because it requires some slightly higher - level technical knowledge. Other ICT applications tended to be advanced for those without specific know-how on their use.

The use of e-mail and word processing was reported as the most commonly used applications (by 94% and 93% of the respondents, respectively). These findings suggest that such applications may be less difficult to use and as such were widely used by a majority of the students.

Despite their immense educational value, some ICT applications were not well known by a majority of the students such as audio (44%) and video files (49%), discussion forums (31%) and digital databases/online libraries (30%). Such applications are a bit advanced for ordinary students who may require some training on how to access and use them. For this reason, the findings point towards a knowledge gap among students that may have to be addressed in order to maximize educational benefits arising from using such applications. Moreover, some applications such as discussion forums may enable students to access useful educational information, share study challenges, teach each other, clarify each others' assumptions or, get new skills and ideas (Adetero, 2010).

A comparison of students' competence with various ICTs in both private and public universities was undertaken to establish their usage patterns as shown on Table 14:

Table 14

Comparison of Students' Competence with ICT Applications

<b>ICT Application</b>	<b>Private</b>	<b>Public</b>
E-mail (receiving and sending)	95	92
Word processing	94	90
PowerPoint (for presenting information)	74	61
Search Engines (surfing for study material at: Yahoo!, Google, Bing )	51	47
Video Files	49	47
Audio files	45	43
Discussion Forums (such as Instant Messenger)	33	31
Digital Libraries ( or online libraries and databases)	32	28

The results from Table 14 show that private university students had a higher usage of various ICTs compared to their public university counterparts. The Table also shows that students in both university categories reported higher competencies with regard to e-mail, word processing and power point. However, fewer students indicated that they had relevant skills on other ICT applications (search engines, audio and video files, discussion forums, and the



use of digital libraries). This is perhaps due to the fact that such application required a higher level of technical training that was not available to all students.

Another question to the respondents on the functions of ICTs sought to establish students' preferences for use of ICT for academic and non-academic purposes. Results on Table 15 show the students' preferences of ICT use for various academic purposes.

Table 15

Students' ICT Preferences for Academic Activities

<b>Academic Activities</b>	<b>Percentage</b>
Sending e-mail to Lecturers on course issues (take away tests, assignments or reports)	61
Doing assignments and other course related tasks or homework	60
Class discussions or tutorial presentations	57
General reference to supplement lecture notes	56

The findings on Table 15 showed preferences for ICT in conducting various academic activities. The results also show that some students used internet for general reference to supplement lecture notes. A study by Valasidou (2008) among undergraduate students in Greece concluded that a majority of students preferred ICTs for academic activities. This concurs with the findings of this study that students preferred to use various ICTs for study related activities.

A comparison of students' ICT use preferences for various academic purposes in both private and public universities was undertaken to establish their usage patterns. The results are as shown on Table 16:

Table 16

Comparison of Students' Preference for ICTs in Private and Public universities

N= 224		
Academic Activities	Private	Public
Sending e-mail to Lecturer about course issues (take away tests, assignments or reports)	64	57
Doing assignments and other course related tasks or homework	62	55
Class discussions or tutorial presentations	58	51
General reference to supplement lecture notes	60	53

The results on Table 16 clearly show that there were differences in ICT preferences for academic purposes between private and public university students. The major implication of the findings on Table 16 is that despite the institution type in which they were enrolled, students preferred to use ICTs to contact their lecturers, to do their assignments, to conduct class discussions and for general reference.

The study also sought to establish the students' ICT preferences for non-academic (recreational) purposes. Results on Table 17 show the various recreational uses of the ICTs:



Table 17

## Percentage of Students' Recreational/Non-Academic Uses of ICTs

<b>Recreational/Non-Academic Uses</b>	<b>Always/ Sometimes</b>	<b>Rarely/ Never</b>
E-mail	95	5
Social Networking (Facebook, Twitter, LinkedIn)	79	19
Chatting (with friends and others using Instant Messenger)	70	30
Playing computer games	65	35
Downloading and listening to music	61	39
Downloading pictures or watching videos	60	40
Online Business/Banking	8	92
Online Shopping	5	95

Source: Field Data

An analysis of the recreational uses of ICTs shows that use of e-mail in communication, social networking and online chatting were the highest used, either always or sometimes, by many students. Manipulative skills such as playing games and downloading music or pictures had moderate use. However, uses related to online business or shopping were rarely or never used by many students. These findings on Table 17 show that 95% of the respondents indicated that they sent and received e-mail. This is a popular use since it can be done through a computer or on a mobile telephone. Such use does not require any specialized skills. Students used e-mail to communicate with each other, family members and friends. E-mail has increasingly become popular because of the possibility of attaching various types of files rather than using regular postal mail (snail mail).

The results also show that social networking (especially use of, Facebook, Twitter, LinkedIn and YouTube) and chatting were very popular recreational uses of ICTs among students. These findings may suggest that other than e-mail, the use of social networking and chatting is increasingly popular. According to a recent survey in Africa (2011), Kenya is the second most active country in Twitter use (after South Africa) with 2.47 million users followed by

Nigeria, Egypt and Morocco ([www.pcmag.com](http://www.pcmag.com)). The results on Table 16 also show other notable non-academic activities for which students used ICTs were: playing computer games or downloading/listening to music and downloading pictures or watching videos. The findings on business/banking and online shopping show that they had low uptake among university students in Kenyan universities.

The findings of this study on recreational uses by students concur with other previous studies (Ellison, Steinfield & Lampe 2007, Yan 2008). Yan (2008), for example; reports that blogs, wikis and online social communities (Myspace; Facebook; and YouTube) were increasingly popular among undergraduate students in the US. This is probably because applications such as Facebook allow users to create profiles, display personal information, upload pictures, access other users' profiles, create online friends and interact with them (Ellison et. al, 2007). These observations of students elsewhere concur with the findings of this study that social networking is popular among students no matter their context.

These non academic usage patterns of students among students implies immense educational potential of ICTs which university administration and ICT managers may consider to exploit for academic purposes. Such potential lies on aspects such as using the social networks to undertake assignments, exchange study ideas, share updates on their coursework or helping each other to complete study-related projects.

A comparison of students' ICT preferences for various non-academic purposes in both private and public universities was undertaken to establish their usage patterns as shown on Table 18:



Table 18  
Comparison of Students' Recreational Uses of ICTs

<b>Recreational/Non-Academic Uses</b>	<b>Private</b>	<b>Public</b>
E-mail (creating, sending, reading)	98	91
Social Networking (Facebook, Twitter, LinkedIn)	79	62
Chatting (with friends and others using Instant Messenger)	65	61
Playing computer games	57	34
Downloading and listening to music	54	57
Downloading pictures or watching videos	56	58
Online Business/Banking	7	7
Online Shopping	8	3

Source: Field Data

The results on Table 18 show that e-mail, social networking, chatting and playing games were very popular recreational uses of ICTs in both university types. However, private university students reported higher usage of all these non-academic uses than their public counterparts. The results on Table 18 also showed other notable non-academic activities for which students used ICTs were: playing computer games, downloading/listening to music and downloading pictures or watching videos in which the public university students reported higher usage than the private university students. The findings on business/banking and online shopping showed that they had low uptake among university students in both private and public universities.

A final item on the functions of ICTs among Bachelor of Education students sought to establish their reasons for using these resources. Their responses were as shown on Table 19:

Table 19  
Students' Reasons for ICTs Usage

N=224	
Reason for ICT Use	Percentage
Good access to ICTs	74
ICT provide better learning opportunities	72
Enjoy using ICTs	70
ICTs save study time	68

The responses on Table 19 show various reasons why students in both private and public universities used ICTs. These reasons for students' use of ICTs were related to factors that coexisted concurrently: institutional, the nature of ICTs and the students. Seventy-four per cent (74%) of the students indicated that they had good access to the ICTs perhaps due to the fact it that the universities had undertaken significant efforts to provide ICT facilities which were being put into use by the students. Related to the nature of the ICTs, students indicated that ICT provided them with better learning opportunities and that their use saved study time (72% and 68%, respectively). These factors also imply that ICTs had numerous attributes which make them popular with students. These are for example: they are interactive; they simulate complex situations making them easier to understand; they are exciting to work with; they animate otherwise dull learning experiences; they allow learners to proceed at their own pace; they give instant responses; they allow individualisation of learning content; among others (Stonier & Colin, 1985). As a consequence, 70% of the students reported that they enjoyed using ICTs. The findings of this study on why students preferred using ICTs in their learning agreed with a study in the UK about undergraduates by Kirkwood (2007) whose conclusion was that both institutional and student factors were significant with regard to ICT usage by students. As such, while these findings may be specific to the respondents, they have relevance to undergraduate students in a wide range of situations and contexts worldwide.

In summary, the students' responses on first objective of the study on functions of ICTs for teacher education revealed that they used various ICTs (the Internet, computer resource



rooms/laboratories, laptop computers, mobile telephones, television and radio both on and off-campus. These ICTs were used frequently for academic functions such as communication with their lecturers on course matters, submitting assignments, class discussions, tutorial presentations and general reference in their studies, despite the existing challenges related to the use of the various media. The students also utilized the ICTs for non-academic functions that included sending of e-mails to their friends and others, social networking, and manipulation of media files (both audio and visual). The findings of this study further showed that despite some knowledge/skill gaps that were reported, the students had sufficient relevant skills to utilize the ICTs in their studies.

#### **4.2.2 Functions of ICTs among Teacher Education Lecturers in Public and Private Universities in Kenya**

The second aspect of the first objective was concerned with the lecturers' perceptions on the functions of ICTs among teacher education lecturers in universities in Kenya. The issues of concern were: ICT facilities available to the lecturer for teaching and research, frequency and competencies in their use and finally, the reasons for the use of the ICTs.

The first aspect of the objective requested lecturers to indicate the types of ICTs made available in their universities. The results were as indicated on Table 20:

Table 20  
Types of ICTs Available to University Lecturers in both Public and Private Universities  
N=60

<b>ICT type</b>	<b>Frequency</b>	<b>Percent (%)</b>
Mobile Telephone	53	88
Internet	52	87
Desktop Computer	51	85
Laptop Computer	51	85
Television	47	78
Radio	46	77
LCD Projection Systems	40	66

Responses on Table 20 show that a majority of the teaching staff had access to the mobile telephone, the internet, laptop and desktop computers. These ICT types were critical for lecturers in communication, information processing and handling. In particular, the high percentage of lecturers who used mobile telephones and the internet in universities in Kenya is consistent with reports by the CCK and by KENET. According to the CCK (2011), there had been an almost 50% increase in the voice and data markets (mobile phone and internet use) during the period October-December of the year 2010-2011. This national pattern of steady growth in mobile telephones and the internet is comparable to global statistics where there are 1.5 billion users of mobile phones, with half a billion new ones recorded every year (Stone, 2004).

The mobile telephone is the personal property of the lecturer and can be used for a variety of tasks related to the lecturers' work. These include communication with colleagues, receiving messages about departmental or faculty work, feedback to students, a means of accessing the internet and as a device for taking videos, photographs or other recordings. In the UK, the mobile phone is used frequently among lecturers as a means of communication with their students (Watson, Blakeley & Abbot, 1998). The findings on available ICTs further show that many lecturers reported having good access to both laptops and desktop computers (85%). This implies that either the cost of such ICTs has become affordable for lecturers or that their respective institutions had ensured they had access to them in the workplace.

It is also significant to note that a sizeable number of lecturers (80%) had access to computer labs in their universities. This may mean that such an option was popular among lecturers and that university management had equipped the labs and availed the necessary technical support for their optimum use by lecturers. The findings on this item further revealed that though LCD projection is very useful for lesson presentations, fewer lecturers had access to this medium (66%). It may be necessary for the institutions to avail them, conduct necessary training on their use and encourage lecturers to use them. It can be observed from the findings that the traditional ICTs (in this case, the television and radio) were also available to lecturers, as reported by 78% and 77% of the respondents.



The study was interested in comparing the types of ICTs available to lecturers in private and public universities. Table 21 shows the responses on this item from the respondents.

Table 21  
A Comparison of Types of ICTs Accessible to University Lecturers by University Type

ICT Type	Private (%)	Public (%)
Mobile telephone	93	85
The Internet	90	87
Desktop computers	82	80
Laptop computers	86	83
Television	74	78
Radio	70	75
LCD Projection Systems	74	68

The results on Table 21 show that private university lecturers reported higher access to various ICTs. This trend implies that these universities had made greater efforts to provide ICT facilities to their staff than their public counterparts. These responses imply that in both categories of universities, the ICTs with higher scores for both categories of university lecturers were related in the sense that the use of mobile telephone, laptop and desktop computer were all associated with internet use (Swarts & Wachira, 2009).

With regard to the second aspect of the objective, respondents were asked to indicate how frequently they used the various ICTs accessible to them for teaching. Their responses were as shown on Table 22:

Table 22  
Frequency of ICTs Use by Lecturers for Teaching

N=60 ICT Type	%	
	Always/Sometimes	Rarely/Never
Mobile telephone	42	58
Internet	81	19
Desktop Computer	50	50
Laptop Computer	83	27
Television	22	78
Radio	19	81
Digital Libraries	40	60
LCD Projection Systems	80	20

These findings on Table 22 show that the laptop computer, the internet and LCD projector were the more popular ICTs because they directly related to the teaching - learning process. The high frequency of use of the laptop computer may imply that by the nature of versatility of the ICT, lecturers may use it both at home and at work. Laptop computers are also small, making them highly portable. The high access to the internet by lecturers may be closely linked with their possession of laptops which may be used in downloading teaching materials, publishing papers and other teaching related tasks (Shabaya, 2009). The use of the LCD projection systems could reflect the improvement in teaching technology in the universities where the use of chalkboard is becoming less and less popular as more sophisticated technologies are embraced (Hoosen, 2010). The lecturers also used LCD projection for making presentations in seminars, workshops and conferences.

Despite the debate on the appropriateness of using lectures in higher education (for example Copley, 2007; Hammond & Atkinson, 2011), lectures remain an integral part of teaching and learning in higher education. This finding on high use of the laptop and LCD projection systems may suggest that these two media provide excellent opportunities for enhancing teaching and learning. The ability of the LCD projection systems to project a variety of visuals such as still pictures, video and printed information might provide students with stimulating and motivating learning environments and students in universities are likely to enjoy the learning experiences provided (Humphrey, 2012).



Table 22 further shows that desktop computers were not used as frequently as other ICT types. A possible explanation for this usage pattern may be due to the nature of desktops which, unlike laptop computers, tend to be 'fixed' and may not be easily moved from one point to another. The results also showed that only 40% of the teaching staff made use of digital libraries as a resource for teaching. Digital libraries can supplement the conventional libraries which mainly have more paper-based resources. Other ICTs like the television and radio were used for teaching, albeit, it would seem, very rarely.

The study was further interested on the frequency of use by lecturers of the various ICTs for teaching, based on university type. The results were as shown on Table 23:

Table 23  
Frequency of ICTs Use by Lecturers for Teaching based on university type

ICT Type	Private	Public
	Always/Sometimes	Always/Sometimes
Mobile telephone	60	64
The Internet	90	70
Desktop Computer	70	66
Laptop Computer	76	68
Television	30	13
Radio	24	28
Digital Libraries	53	48
LCD Projection Systems	65	72

Source: Field Data

The results on Table 23 show that both categories of lecturers reported a high frequency of use of the internet, laptop and desktop computers, LCD projection and mobile telephones for teaching. Private university lecturers reported higher use of the internet for teaching (90% against 70%). This may imply that their institutions may have provided reliable internet connections or provided access in some other way to them (Ayoo & Otike, 2002). The slight differences between the two categories of institutions with regard to frequency of use of the internet for teaching also implies that private and public universities have intensified investments to provide internet access for teaching purposes (Thairu, 2003). Further, the

frequency of use of other types of ICTs showed similarities between the two categories of universities. Private university lecturers reported higher use of laptop and desktop computers (at 76% and 70%, respectively); public university lecturers reported use of these ICT types at 68% and 66%, respectively. This may mean that more private university lecturers own or have better access to laptop and desktop computers than their public counterparts. At the same time, the ratios of the available computers to the lecturers may be lower in private universities enabling more of them to access the ICT more frequently (Oyieke, 2008).

The Table also shows that public university lecturers reported higher use of LCD Projection system (72%) and mobile telephones (64%) compared to 65% and 60%, respectively among private university lecturers. This may imply that since public universities had larger numbers of students, lecturers frequently found it necessary to present their lessons using LCD projection. (Juma, 2003).

The objective further sought to identify the lecturers' teaching and research uses of ICTs. The findings on this item were as indicated on Table 24:

Table 24  
Teaching and Research Uses of ICT among Lecturers

<b>N=60</b>	
<b>Teaching and research Uses of ICTs</b>	<b>Percentage</b>
Access to relevant content for teaching	84
Submitting research papers	75
Receiving student assignments/reports	54
Sharing information on a joint research project or networking with peers	34

The findings on the Table 24 imply that lecturers used ICTs for much of their work pertaining to teaching, research, assessment and publication. The least popular use was peer networking that directly related to communication via e-mail and mobile telephony. They also used ICTs to submit research papers for conferences and publication. The lecturers' also



reported that they used ICTs to access content for teaching mainly from online databases and other open educational resources.

An earlier study by Oyeyinka and Adeya (2004) examined various ways in which academics' used ICTs in Kenya and Nigeria. Their study, however, analysed the specific uses of the internet for teaching and research among lecturers rather than other forms of the ICTs as reported in this study. The study concluded that internet use for research and teaching was directed at searching for teaching materials, networking with peers, publishing work in progress and other academic research. Comparable analysis in Spain showed that the general trend in the use of ICTs by lecturers revolved around activities relating to information presentation, searching and transmission (Garcia-Valcarcel & Tejedor, 2009). Other relevant studies in Malaysian and Turkish universities on how lecturers used ICTs for teaching and research concur with these findings (Suki & Suki, 2009; Tarik, Deniz & Firat, 2009).

The study further undertook a comparison of the lecturers' teaching and research uses of ICTs based on the university type as shown on Table 25:

Table 25  
Teaching and Research Uses of ICT among Lecturers Based on University Type

<b>N=60</b>		
<b>Teaching and Research Uses of ICT</b>	<b>Private University</b>	<b>Public University</b>
Access to relevant content for teaching	86	82
Submitting research papers	78	75
Receiving student assignments/reports	52	48
Sharing information on a joint research project or networking with peers	35	37

The results on Table 25 show that private university lecturers used ICTs more than their public counterparts to access relevant content for teaching (86% against 82%). This may imply that they preferred online resources for teaching than the physical libraries or other collections of books, journals or other printed materials. They also reported higher use of ICTs to receive student assignments and reports (52%) compared to their public counterparts

(48%). This also implies that private university lecturers encouraged their students to submit assignments and written reports online (Shabaya, 2009). Private university lecturers also reported slightly higher use of ICTs for submitting research papers (78% against 75%). This response is consistent with the fact that they had better internet access which could lead to greater participation on online activities (Thairu, 2003).

A further interest of this study was to establish the lecturers' competencies in the use of ICTs for teacher education in universities in Kenya. Table 26 shows the lecturers' responses.

Table 26  
Lecturer' Competencies in Use of ICTs for teaching

<b>N=60</b>	
<b>Lecturers' activities using ICTs</b>	<b>Percentage</b>
<b>Using the internet for teaching</b> (accessing websites, using search engines and downloading files)	70
<b>E-Mail</b> (sending, sorting and forwarding messages; attaching, opening and saving files; and creating contacts)	64
<b>Word processing</b> (editing, spell-checking, include tables, creating new documents and saving documents)	62
<b>Computer operations</b> (running programmes, using CD-ROMs, searching files and making back-ups)	59
<b>Using PowerPoint to make presentations</b> (creating presentations, adding Clip Art, introducing animations, rearranging slides or creating transitions)	53

Table 26 shows that lecturers were confident to varying degrees with regard to the skills relating to the use of ICT. For example, the Table shows a score 53% and above in all competencies. The findings on Table 26 imply that lecturers felt confident in using the internet to search for information and performing common e-mail tasks like sending, sorting and forwarding messages; attaching, opening and saving files as well as creating contacts. A significant number of lecturers (62%) also had word processing and computer operation skills. These findings could imply that the universities had provided training to staff or the staff had taken individual initiatives to acquire word processing skills. The findings may also



be an indicator of staff readiness to integrate ICTs in their teaching. Consequently, the use of ICTs such as PowerPoint presentations could be further encouraged through the provision of additional training which may result in invaluable benefits to lecturers in ICT use (Chitiyo & Harmon, 2009). These findings on perception of competence in using ICTs also confirm an earlier finding in the E-readiness Survey of 2008 by the Kenya Education Network Trust (KENET) which noted that higher education institutions in Kenya were using ICTs for teaching and learning (Meoli & Waema, 2009).

A comparison of competencies in use of ICTs among teacher education lecturers in private and public universities was as shown on Table 27:

Table 27

Lecturer' Competencies in Use of ICTs for Teaching Based on University Type

<b>N=60</b>		
<b>Lecturers' activities using ICTs</b>	<b>Private</b>	<b>Public</b>
<b>Using the Internet for teaching</b> (accessing websites, using search engines and downloading files)	72	68
<b>E-Mail</b> (sending, sorting and forwarding messages; attaching, opening and saving files; and creating contacts)	80	72
<b>Word Processing</b> (editing, spell-checking, include tables, creating new documents and saving documents)	60	66
<b>Computer Operations</b> (running programmes, using CD-ROMs, searching files and making back-ups)	54	60
<b>Using PowerPoint to make presentations</b> (creating presentations, adding Clip Art, introducing animations, rearranging slides or modifying transitions)	51	57

The overall picture from the results on Table 27 is that lecturers in private and public universities have some reasonable mastery of various competencies in use of ICTs. The results from the Table indicate that public university lecturers reported slightly higher scores on more competencies than their private university counterparts. The use of the internet (accessing websites, using search engines and downloading files) and e-mail - competencies that are closely related had higher scores among both categories of lecturers. These skills are

also essential for the utilization of ICTs. The results for private university lecturers' use of internet (72% against 68%) is also positively related to better internet access reported among this category of lecturers.

The results on Table 27 also indicate that the use of e-mail at 80% and 72% (for private and public university lecturers, respectively) implies that since private university lecturers had better internet access, they also used e-mail more frequently for tasks related to teaching. The results for word processing (60% against 66%) imply that a significant number of lecturers have the capacity to handle and manipulate soft copies of documents and files. The results further show that in both categories, lecturers can plan and present lectures using various ICTs competently though to slightly different but comparable degrees.

A final item investigated the reasons for use of various ICT technologies by teacher education lecturers. The responses were as shown on Table 28.

Table 28  
Reasons for Lecturers' ICTs Use

N=60	
Reason for ICT Use	Percentage
ICTs enhance quality teaching	65
Use of ICTs convenient and saves instructional time	62
Availability of ICTs	54
I know how to use ICTs	50

Results on Table 28 indicate that the reasons for lecturers' ICT use were related to the nature of ICTs, the user competencies or the ICT situation (availability of the ICTs and institutional policies) in their universities. The responses show that 65% of the lecturers indicated that ICTs enhanced quality teaching. As by Lawler and Wims (2007), the availability of ICTs provides access to up-to-date educational resources. Ndirangu and Kabira (2012), further observe that the use of ICTs in teaching also helps to increase the quality of what is learned. This is closely related to the fact that 62% of the lecturers indicated that ICTs were convenient to use and saved instructional time. It can be noted that the proliferation of ICTs



is changing the role of the teacher as a dispenser of information to a facilitator and that the library as being located in a particular place is not as popular as online libraries.

A comparison between public and private universities on the reasons why lecturers use the various technologies in their work was as shown on Table 29:

Table 29  
A Comparison of Reasons for Lecturers' Use of ICTs by Type of University  
N=60

Reason for ICT Use	Private	Public
ICTs enhance quality teaching	80	70
Use of ICTs convenient and saves instructional time	90	88
Availability of ICTs	82	57
I know how to use ICTs	52	56

Source: Field Data

The results on Table 29 imply that among both categories of university lecturers, ICTs were used because they were convenient and saved instructional time (90% against 88%). This reason is related to the nature of ICTs as critical instruments for increasing breadth and richness of learning as well as fostering motivation for learning in the universities (Ndirangu & Kabira, 2012). Good access to ICTs and that ICTs enhanced quality teaching had a considerably higher score among private university lecturers as indicated on the Table, again reinforcing a significant finding of this study that there was better provision of ICT facilities among private than in public universities. This may further imply that there was a correlation between good access to ICTs and using them. University management may, therefore, consider the relationship between provision of ICT facilities and usage patterns as a factor in promoting ICT usage.

#### 4.3 Influence of User Characteristics on Utilization of ICTs among Teacher Education Students and Lecturers in Universities in Kenya

The second objective of the study sought to determine the influence of user characteristics on utilization of ICTs among teacher education students and lecturers in universities in Kenya.

The findings from the students' and lecturers' responses were as presented in sub-sections 4.3.1 and 4.3.2 respectively.

#### 4.3.1 Influence of Gender on Utilization of ICTs among Teacher Education Students in Universities in Kenya

The study investigated the influence of students' gender on: use of ICT on and off campus by, students' competence and frequency of use of ICTs. Table 30 presents findings on students' on and off campus use of ICTs by gender:

Table 30  
Students' ICTs Use on Campus by Gender

Type of ICT	Male (N=114)		Female (N=110)	
	f	%	f	%
Internet	100	88	101	92
Mobile Telephone	91	91	81	74
Desktop Computer	72	64	66	60
Television	76	67	60	55
Radio	71	63	56	51
Laptop Computer	50	44	40	37

Source: Field Data

The results on Table 30 show that although females reported higher internet use than males (92% against 88%), males reported higher use of all other ICT types (mobile telephone, desktop computer, television, radio and laptop computer). The Table also shows that fewer students used laptops on campus (44% and 37, respectively), compared to other types of ICT probably because of the high cost of obtaining laptops. These findings have various implications on the use of ICTs among teacher education students in universities in Kenya. For example, universities were making significant investments in ICT facilities for student use. At the same time, parents, sponsors, guardians and other stakeholders have facilitated students to acquire various ICT devices especially the mobile telephone that enable them to access the internet. These findings indicate that use of ICTs on campus among male and female students was comparable.



Gender was investigated as a possible factor that may influence ICT use among undergraduate students because of its centrality as a universal organizing principle of all human activity (Vekiri & Chronaki, 2008). This pattern of ICT use shown on Table 30 whereby both male and female students reported over 50% use of various types of ICTs corresponds to what Mahmood (2009) observed that male and female students in Northern and Western Europe seemed to rely mostly on university ICT facilities on campus. This observation seems to apply to the Kenyan situation as well.

On the use of ICTs off-campus based on gender, Table 31 shows the students' responses.

Table 31  
Students' ICTs Use off - campus Based on Gender

Type of ICT	Male (N=113)		Female (N=110)	
	f	%	f	%
Internet	41	36	42	38
Mobile Telephony	72	64	58	53
Desktop Computer	28	25	23	21
Television	58	52	69	63
Radio	74	65	75	68
Laptop Computer	28	25	32	29

Source: Field Data

Results on Table 31 show that there was a higher use of ICTs like radio, mobile telephone and television off campus by both male and female students, compared to other ICTs. Comparatively, it was noted that female students reported higher off - campus use of radio and television while males had higher off-campus use of mobile telephone. These findings may imply that females preferred to follow programmes of choice flexibly and conveniently through radio or using the FM radio features on their mobile telephones. They also preferred to watch television than their male counterparts. The findings on mobile telephony and internet use implied that male students preferred to communicate via mobile telephones (voice calls and short messages) while it is possible that females used the internet for communication (e-mail and other social network services), among other uses. It can also be

observed further that while various types of ICTs were availed in central places on campus (typically the computer labs, the common rooms, dining halls or cafeterias), students who stayed off campus had access to the television and radio as part of the household facilities. It can also be observed from these results that fewer male and female students used desktop computers off campus, compared with other types of ICTs implying a reliance on institutional ICT facilities.

The foregoing observations on ICT use off campus appear to be in line with observations by others who have carried out related reviews on ICT use among students off campus or at home. For example, Aduamoah et al (2012) conducted a study in Ghana to establish the perceptions on ICT use among education students which showed that undergraduate students relied mainly on institutional ICT facilities. Earlier studies on ICT use off-campus such as Gay et al (2006) indicated that undergraduate students in Barbados relied mainly on university ICT facilities for study purposes. A similar observation was made among students in the OECD countries (OECD, 2005). These studies point to the conclusion that though students use ICTs off-campus, they relied significantly on institutional ICTs, a fact already discussed in the early part of this study.

#### **4.3.2 Students' ICT Competence**

The second dimension of this objective was concerned with students' ICT competence based on gender. The results were as shown on Table 32:



Table 32  
 Student Competence with Software Applications and Technologies Based on Gender

ICT Application	Male (n=114)		Female (n=110)	
	f	%	f	%
E-mail	105	92	100	90
Word Processing	103	91	103	94
Search Engines (Google, Yahoo!, Bing, etc)	77	68	48	44
Instant Messenger	72	64	75	68
Powerpoint	68	60	82	74
Video Files	63	56	48	43
Audio files	61	54	45	41
Digital Libraries	38	34	31	28

The results on Table 32 show students ICT competence for carrying out such functions as communication, word processing, entertainment and social interaction. Comparatively, more males than females reported higher competence on the use of e-mail and search engines. However, more females than males reported higher competencies on applications such as Word Processing; Power Point presentations and Instant Messenger.

Both male and female students indicated that they were proficient in the use of e-mail (at 92% and 90%, respectively). This implies that many students perceived themselves as having reasonable mastery of the application and that educational practitioners in higher education can utilize this competency (Tapscott, 2009). There were high numbers of both male and female students who reported that they used the basic word processing and handling applications (Word and PowerPoint). These applications are important for educational purposes especially day to day preparation of documents and class presentations or assignments. The use of Audio files, Video files and Web-based sources of content is utilized by more males than females. This may imply that males tend to have an affinity to tasks which tend towards manipulation (So, Choi, Lim & Xiong, 2012). Female students indicated that they utilized chats (68%) more than males implying that they had stronger social tendencies that made them to share their feelings and thoughts more (Carrier et al, 2009).

These findings on student competencies and the trends among male and female students confirm the conclusions of various studies. For example Kaino (2008) conducted a study in Botswana to establish whether the gender gap had narrowed in education through the use of technology. Her study was partly in response to the earlier observation that when ICT was introduced into education many years ago, it was perceived as a male domain and males were considered to be endowed with technological know-how and that while females were “guests”; males were the “hosts” (Jones & Smart, 1993). Recent studies on ICT and education show that there was no gender difference on ICT use among undergraduate students. For example, Mandour (2009) examined the interaction of gender and ICT in education in Egypt and concluded that the gender gap had narrowed. On their part, Nasah et al (2010) observed from their investigations on patterns of ICT use among undergraduates in education from Hong Kong, Pakistan, Turkey, Denmark, Israel, Chile and Iran, that the gender gap in ICT use may be closing.

#### 4.3.3 Students’ Frequency of ICT Use Based on Gender

The study was also interested on a third dimension of this objective to establish the frequency of ICT use for study purposes among male and female students. Table 33 shows the cross tabulation of gender and frequency of ICT use for study purposes.

Table 33  
Frequency of ICT use for study purposes by gender

	Every day	2-3 times per week	Weekly	Monthly	Rarely/Never
Male	15%	44%	28%	9%	4%
Female	26%	28%	30%	9%	7%

The Table shows that those who used ICTs for study purposes from everyday to weekly accounted for 87% for males and 84% for females. This shows that a high percentage of students of both gender had reasonable access to ICT facilities and that they used them



frequently. This finding on frequency of ICT use for study purposes among male and female students is in agreement with other studies. For example, Junco et al (2010) pointed out that the original gender gap in computer and internet use appears to have narrowed down to the point of nonexistence. Mahmood (2009) also agrees that today gender has no significant effect on the frequency of student ICT use.

#### 4.4 Influence of Age, Designation and Gender on Utilization of ICTs among Teacher Education Lecturers in Universities in Kenya

The study was further interested in the perceived influence of selected demographic characteristics such as lecturers' age, designation, and gender on the utilization of ICTs among teacher education lecturers in universities in Kenya. The results on the frequency of use of ICTs for teaching by age was as shown on Table 34:

Table 34  
Frequency of ICT use per age category

ICT type	Frequency of ICT use for teaching per age category (%)			
	30-39	40-49	50-59	60-69
Laptop Computer	55	28	10	7
Internet	50	27	12	11
LCD Projector	53	26	18	3
Desktop Computer	37	42	15	6
Mobile Telephone	48	26	19	5
Digital Libraries	50	31	14	5
Television	52	23	18	7
Radio	40	32	21	7

The results on Table 34 show that lecturers in the 30-39 age category reported more frequent use of various ICTs especially laptop computers, LCD projectors and the internet. The results on Table 34 also indicate that there was a decreasing trend in ICT usage by age, except in the case of desktop computers. The 30-39 age category may also be part of the Net Generation referred to by Tapscott (2009) or Digital Natives of Prensky (2001). This category of

lecturers appeared to have sophisticated skills in digital technologies as attested by Margaryann, Allison and Vojt, 2011. These results concur with previous work by Powell (1996) who found a significant difference among faculty attitudes towards computers relative to age while Oyelaran-Oyeyinka and Adeya (2004) reported that age is positively related to ICT usage among lecturers in Kenya and Nigeria. In contrast with these conclusions, Jegede (2009) conducted a study on age and ICT-related behaviours among higher education teachers in Nigeria in which he found out that age is not a factor when considering the attitudes, competencies and user patterns among teacher educators. Similarly, Nasah et al (2010) cautioned that though age is a factor in ICT use it is not the most important predictor of one's digital propensity.

The next demographic characteristic among lecturers related to their cadres. An analysis of how frequently the lecturers in the various cadres use ICTs for teaching is shown on Table 35:

Table 35  
Frequency of ICT use per Cadre of Lecturers

ICT Type	Frequency of ICT use per Lecturer Cadres (%)			
	Ass. Lecturer	Lecturer	Snr. Lecturer	Professor
Laptop Computer	53	27	11	10
Internet	52	25	10	13
LCD Projector	50	29	17	4
Desktop Computer	36	40	14	10
Mobile Telephone	40	25	20	13
Digital Libraries	50	30	10	10
Television	48	20	20	12
Radio	42	28	20	10

The results on Table 35 show that both Assistant Lecturers and Lecturers reported more frequent use of the various ICTs. Given that these categories constitute the younger academics, Oyelaran-Oyeyinka and Adeya (2004) whose earlier work in Kenyan and Nigerian universities on usage of ICTs also concluded that younger academics tended to be



more enthusiastic users and adopters of ICTs. In particular, the laptop computer, the internet, the LCD projector and digital libraries were used frequently by assistant lecturers more than all the other categories of academics. Senior lecturers and professors reported less frequent use of various ICTs. The results, therefore, imply that these older academics tend to be less enthusiastic users and adopters of ICTs.

A further interest of the study was ICT use based on gender. An analysis of how frequently the lecturers used ICTs for teaching based on this characteristic is shown on Table 36:

Table 36  
Use of ICTs by Lecturers by Gender

Type of ICT	Female	Male
	%	%
Radio	38	39
Television	38	40
Mobile telephone	77	74
Laptop Computer	76	78
Desktop Computer	70	73
The internet	80	86
LCD projector	63	65

The findings on Table 36 show that males consistently reported higher use of various ICT types than females. Females indicated higher use of mobile telephones (77%), implying that they may have stronger social ties with each other and tended to talk more and longer than males (Oblinger & Oblinger, 2005). The use of the internet, laptop and desktop computers is comparable for both females and males as shown by their responses. However, there was a near-identical trend in the frequency of ICT use among university lecturers based on gender (Salaway, 2008). It can also be observed that higher education has exhibited a trend towards the use of ICTs in support for instructional services (Brown & Thorton, 2009).

## 4.5 Challenges Facing the Utilization of ICTs among Teacher Education Students and Lecturers in Universities in Kenya

The third objective of the study sought to investigate the challenges facing the utilization of ICTs among teacher education students and lecturers in universities in Kenya. The findings from students' and lecturers' responses on this are presented in sub-sections 4.5.1 and 4.5.2 respectively.

### 4.5.1 Challenges Facing Utilization of ICTs among Teacher Education Students' in Universities in Kenya

This section presents the responses on the challenges facing the utilization of ICTs among teacher education students' in private and public universities in Kenya. Table 37 shows the students' responses:

Table 37  
Students' Challenges on Use of ICTs in Private and Public universities

Challenges	Private (%)	Public (%)
Lack of a personal computer	83	97
Unreliable internet connectivity	61	70
Lack of computer mastery	60	47
Lack of technical support	52	62
Insufficient computers on campus	43	45
Lack of training for others	44	57
Lack of interest among staff	40	58
Lack of personal interest in ICTs	39	40
Unreliable electricity	29	47

Table 37 shows that the major challenges facing both private and public university students were lack of personal computers (that they neither owned a laptop nor a desktop computer) and unreliable internet connectivity. The Table shows that more public university students reported lack of personal computers off campus as a leading constraint to their use of ICTs for educational purposes than their private counterparts. The results also show that internet



connectivity in both private and public universities was sometimes unreliable perhaps due to instances of low speeds or factors such as poor server maintenance, virus or hacker attacks, cabling problems, among other causes. This made it difficult for the students to use the internet or other online resources for educational purposes as much as they would have wanted to. The findings also reveal that 60% of the students in private universities (compared with 47% of their public counterparts) reported lack of computer mastery as a constraint to their use of ICTs for education. This may mean that some students did not feel confident to undertake basic computer operations such as using search engines to look for information on the internet or to undertake word processing on their own.

Table 37 also shows that students in both university types reported lack of technical support as a constraint implying that students lacked appropriate assistance while they worked with various ICTs, especially in resource rooms. This assistance is usually provided by technical staff that help students to exploit online resources, obtain print-outs of documents, write or copy CDs and DVDs, save files, download information or access certain websites. In some cases, the students noted the inadequate support staff.

The results further show that the students in public universities also reported two other notable constraints: lack of interest towards ICTs use among staff (58%) and lack of training on ICT among their peers (57%). It can be noted that if teaching staff had a poor attitude towards using ICTs for teaching, presentation or reference in class; students who looked up to them as role models may be negatively impacted as well. At the same time, if their colleagues did not demonstrate any interest in using ICTs, this may discourage others from using them. Some of the other challenges indicated by the students related to institutional factors like inadequate number of computers on campus and unreliable electricity which may have been due to frequent electricity 'blackouts' or power outages.

From the results, private and public university students faced similar challenges which could be classified into two ways: the external or first-order challenges and the internal or second-order challenges as observed by Veen, 2003 and Al-Senaidi (2009). In the context of this study, the external challenges included insufficient computers on campus, unreliable

connectivity, lack of technical support, unreliable electricity and lack of interest among staff. The internal challenges relate to student- specific constraints such as lack of a personal computer, lack of mastery in the use of ICTs and lack of interest in the use of ICTs. Policy interventions in addressing these challenges may have to be directed along these two major pathways.

#### 4.5.2 Challenges Facing Utilization of ICTs among Teacher Education Lecturers' in Universities in Kenya

The study was also interested in the challenges faced by teaching staff in using ICTs for teaching. Table 38 shows the constraints that private and public university lecturers faced in utilizing ICTs:

Table 38  
Private and Public university Lecturers' Constraints on usage of ICTS

Constraint	Private (%)	Public (%)
Class size too large	72	83
Slow connectivity speeds	70	76
Lack of e-learning policy in institution	67	57
Unreliable connectivity	66	60
Lack of technical support	50	56
Ease of use of software	47	43
Lack of own computer	46	30
Insufficient institutional computers	44	50
Lack of training	40	52
Lack of interest among staff	37	47
Unreliable electricity	30	70

The results on Table 38 show that there were near - identical levels of challenges facing private and public university lecturers, albeit, to varying degrees. From the results, large class sizes were a major constraint in using ICTs in both categories of universities. This was



because ICT equipped resource rooms were small and therefore could not accommodate all the possible students. The bigger lecture halls which had high student capacity did not have sufficient ICT facilities, for example, LCD projectors and screens to be used for lecture presentations. These large classes had become the norm in Kenya's universities for some time given the increased enrolments from the subsidized secondary education initiative. Therefore, a solution for addressing the large classes must be sought (Thairu, 2003).

The results also show that 70% of the lecturers in private universities and 76% in public universities reported slow internet connectivity speeds which translated into poor or unreliable internet access. This was probably due to the fact that sometimes internet was either down or completely unavailable according to Meoli and Waema (2009).

The results on Table 38 further show that the lecturers indicated that their institutions lacked an e-learning policy (67% and 57%, respectively). This implies lack of clear guidelines that supported availability, use and maintenance of ICT facilities. At the same time, absence of clear e-learning policies and guidelines may be reflected into low quality ICT services. This was likely to impede the use of ICTs by lecturers to prepare and deliver content to students. Perhaps with the Kenya government ICT policy (GoK, 2006), it may be possible that like other sectors, the universities may have to follow suit and develop appropriate guidelines to direct their ICT adoption and use. This would enhance teacher education, among other uses.

The results further show that 50% and 56% of the lecturers (in private and public universities, respectively) indicated lack of technical support as a constraint in using ICTs. This probably implies that lecturers cannot access meaningful help to challenges they encountered while using ICTs. These constraints may be addressed if sufficient numbers of well trained technical staff were available or if the ICT skills of the lecturers were enhanced through training programmes from time to time. In addition, the institutions may have to review whether such ICT technical staff were adequate or whether additional ones needed to be recruited.

A major constraint that 70% of public university lecturers identified to their utilization of ICTs was unreliable electricity. This was probably due to electricity black-outs or frequent power outages. As a measure to address the constraint, some universities had invested in back-up generators. More sustainable solutions were still needed to address this constraint including possibilities of solar powered ICT devices.

Other constraints that public university lecturers identified as shown on Table 37 were lack of technical support (56%) and lack of training (52%). In this instance, it can be noted that public universities may need to adjust their budgets so as to recruit more IT professionals who will provide an essential technical support base for ICT use. Consequently, the institutions may have to review the ICT training given to their teaching staff in appropriating ICT services. Either way, this study notes that if lecturers contend with various constraints in their use of ICTs, then their students may not benefit meaningfully from such ICTs.

#### **4.6 Differences in the Utilization of ICTs Among Teacher Education Students and Lecturers in Public and Private Universities in Kenya.**

The fourth objective of this study sought to determine whether there was a difference in the utilisation of ICTs among teacher education students and lecturers in universities in Kenya. In this regard, two hypotheses were formulated as follows:

**Hypothesis One (H<sub>01</sub>):** There is no statistically significant difference among teacher education students in use of ICTs by university type;

**Hypothesis Two (H<sub>02</sub>):** There is no statistically significant difference among teacher education lecturers in use of ICTs by university type.

**H<sub>01</sub>: There is no statistically significant difference among teacher education students in use of ICTs by university type.**

In order to determine whether there were any differences among teacher education students in private and public universities on use of ICTs, the means of the students' responses were generated as shown on Table 39:



Table 39  
Means of Private and Public University Students on ICT Use

	Types of Universities	N	Mean	Std. Deviation	Std. Error Mean
mean academic use	Private	106	2.6838	1.09682	.10653
	Public	117	2.4585	.92931	.08591

The results on Table 39 show that private university students indicated a slightly higher mean score than their public counterparts in use of ICTs. This finding is consistent with the observation that these universities had better ICT investments than the public universities and their ratio of various ICTs to students was lower. In contrast, the higher numbers of students in public universities had reduced the ratio of students to various ICT facilities.

A t-test was conducted to establish whether this difference was statistically significant as shown on Table 40:

Table 40  
T-Test of Private and Public University Students on ICT Use

		t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference
mean academic use	Equal variances assumed	-1.659	221	.098	-.22527	.13575
	Equal variances not assumed	-1.646	206.810	.101	-.22527	.13686

The results on Table 40 show that there were no statistically significant differences among teacher education students in private and public universities in utilisation of ICTs. This is because the computed t-value obtained from the results was -1.659 at a significance level of 0.05.

**Hypothesis Two (H<sub>02</sub>): There is no statistically significant difference among teacher education lecturers in use of ICTs by university type.**

In order to determine whether there were any differences among teacher education lecturers in private and public universities on use of ICTs, the means of lecturers were generated as shown on Table 41:

Table 41  
Means of Private and Public University Lecturers on ICT Use

	Types of Universities	N	Mean	Std. Deviation	Std. Error Mean
mean ICT use	Private	30	2.3952	.78934	.14411
	Public	30	2.3810	.88964	.16243

The results on Table 41 show that private university lecturers indicated a slightly higher mean (2.39) than their public counterparts (2.38) in use of ICTs. This finding points to the observation that private universities provided better ICT facilities to their staff than the public universities.

A t-test was conducted to establish whether this difference was statistically significant as shown on Table 42:

Table 42  
T-Test of Private and Public University Lecturers on ICT Use

		t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference
mean ICT use	Equal variances assumed	.066	58	.948	.01429	.21714
	Equal variances not assumed	.066	57.189	.948	.01429	.21714

The results on Table 42 show that there was no statistically significant difference among teacher education lecturers in private and public universities in utilisation of ICTs. This is because the computed t-value obtained from the results was .066 at a significance level of 0.05.



## CHAPTER FIVE

### SUMMARY OF FINDINGS, CONCLUSIONS AND RECOMMENDATIONS

#### 5.1 Introduction

The purpose of this study was to determine the extent to which Information and Communication technologies (ICTs) have been used among teacher education students and lecturers in Kenyan universities. This study therefore, carried out a comparative assessment of how computers, telecommunication and audio-visual systems were being used among teacher education lecturers and students in both public and private universities in the delivery of instruction and other educational uses. The chapter presents the summary of major findings, conclusions, recommendations and suggestions for further research.

#### 5.2 Summary of Findings

The study made a comparative assessment of the utilization of ICTs among teacher education students and lecturers in universities in Kenya.

The study was conducted in selected public and private universities in Kenya that offer the teacher education programme. Based on statistical analysis and subsequent interpretation of the results, the study came up with the following findings as guided by each objective:

##### 5.2.1 Functions of ICTs among teacher education students and lecturers in universities in Kenya:-

With regard to the functions of ICTs, the study came up with the following findings:

- i) Both public and private universities had made substantial investments in ICT infrastructure and internet provision for students' and lecturers' in their institutions. These included broadband/high speed internet and wireless networks. The study established that all Kenyan universities had increased their institutional computer and communications hardware and software that included laptop and desktop computers, LCD projection systems, among others;
- ii) A significant number of students owned and used the mobile telephone off campus not only for communication but also for internet access, taking photographs, listening to radio FM radio stations, among other uses;

- iii) Students depended more on institutional facilities although they were able to access a variety of ICT services (such as computer and internet use, radio and television) off campus in cyber cafés;
- iv) Students in both public and private universities used ICTs frequently for study related activities such as sending e-mail to lecturers on course issues, doing assignments and other study-related tasks, and for general reference to supplement lecture notes;
- v) Students used ICTs for recreational purposes (such as chatting and playing games) and online social networking (especially use of Facebook and Twitter);
- vi) Students had relevant skills to effectively use some ICTs in their studies such as use of e-mail and word processing. However, the use of search engines (software systems designed for obtaining information on the World Wide Web) was poor perhaps because it required a higher level of technical skills and knowledge, which students appeared not to possess. Other ICT applications (such as video and audio files, discussion forums and digital libraries) tended to be advanced for those without specific know-how on their use and therefore were lowly used;
- vii) Students indicated that ICT provided them with better learning opportunities and that their use saved study time. These advantages would imply that ICTs had numerous attributes which made them popular with students;
- viii) Lecturers in both public and private universities used ICTs for teaching, research, and assessment. They also used ICTs to submit research papers for conferences and publication. The lecturers' also reported that they used ICTs to access content for teaching mainly from online databases and other open educational resources;
- ix) Lecturers were confident to varying degrees with regard to their mastery of skills relating to various ICTs. For example, they were confident in using the internet to search for information and performing common e-mail tasks like sending, sorting and forwarding messages; attaching, opening and saving files as well as creating contacts. A significant number of them reported that they had word processing and other computer operation skills;



- x) Most lecturers used ICTs out of their own volition rather than as a requirement from their institutions.

### **5.2.2 Influence of user characteristics on utilization of ICTs among teacher education students and lecturers in universities in Kenya:-**

With regard to the influence of user characteristics on utilization of ICTs, the study came up with the following findings:

- i) Both male and female students had good access to various ICT facilities on campus and they used them frequently. However, fewer students of either gender used laptops probably because of the high cost of obtaining them;
- ii) Female students had a marginally higher usage of the internet; however, male students had higher use of all other ICT types;
- iii) More male than female students reported possession of a higher level of competence in the use of e-mail and search engines. However, more females than males reported higher competencies on applications such as Word Processing; PowerPoint presentations and Instant Messenger;
- iv) Younger lecturers (ages 30-39) used various ICTs more frequently as compared to their older colleagues;
- v) Lecturers in the lower cadres were more enthusiastic users and adopters of various ICTs. In particular, the laptop computer, the internet, the LCD projector and digital libraries were used frequently by assistant lecturers more than all the other categories of academics. Senior lecturers and professors reported less frequent use of various ICTs;
- vi) There was a near-identical trend in the frequency of ICT use among university lecturers based on gender.

### **5.2.3 Challenges facing the utilization of ICTs among teacher education students and lecturers in universities in Kenya:-**

The following challenges were reported among teacher education students and lecturers:

- i) Students in private and public universities reported that they needed to own a laptop computer for academic use. Comparatively, more public university reported lack of

- personal computers off campus as a leading constraint to their use of ICTs for educational purposes than their private counterparts;
- ii) Students in both university types reported lack of technical support as a constraint in using ICTs, especially in computer resource centres in their universities. This assistance is usually provided by technical staff that help students to exploit the online resources, make copies of documents, write or copy CDs and DVDs, save files, download information or access certain websites;
  - iii) Handling large classes was a major challenge for lecturers while using the various ICTs. This was because computer resource centres were inadequate and therefore could not accommodate all the possible students. The bigger lecture halls which had high student capacity did not have sufficient ICT facilities, for example, LCD projectors and screens to be used for lecture presentations;
  - iv) Lecturers in private and public universities reported slow internet connectivity speeds which translated into poor or unreliable internet access. This was probably due to the fact that sometimes internet was either down or completely unavailable;
  - v) Lecturers in private and public universities indicated lack of technical support as a constraint in using ICTs. This probably implies that lecturers cannot access meaningful help to challenges they encountered while using ICTs;
  - vi) Unreliable electricity supply was an important challenge which resulted into frequent power outages affecting the use of various ICTs by both students and lecturers;
  - vii) Lecturers indicated universities lacked an e-learning policy. This implies lack of clear guidelines that supported provision, use and maintenance of ICT facilities. At the same time, absence of clear e-learning policies and guidelines may be reflected into low quality ICT services;

#### **5.2.4 Difference in the utilization of ICTs among teacher education students and lecturers in public and private universities in Kenya:-**

The following findings were determined statistically:



- i) Private university students indicated a slightly higher mean (2.68) than their public counterparts (2.45) in use of ICTs. This finding is consistent with the observation that these universities had better ICT investments than the public universities and their ratio of various ICTs to students was lower. In contrast, the higher numbers of students in public universities had reduced the ratio of students to various ICT facilities. However, the t-test results indicated that there were no statistically significant differences among teacher education students in private and public universities in utilisation of ICTs. This is because the computed t-value obtained from the results was -1.659 at a significance level of 0.05.
- ii) Private university lecturers indicated a slightly higher mean (2.39) than their public counterparts (2.38) in use of ICTs. This finding points to the observation that private universities provided better ICT facilities to their staff than the public universities. However, the t-test results indicated that there was no statistically significant difference among teacher education lecturers in private and public universities in utilisation of ICTs. This is because the computed t-value obtained from the results was .066 at a significance level of 0.05.

### 5.3 Conclusions

The following conclusions were arrived at on the basis of these findings:-

- i) Substantial investments had been made to procure various ICTs and internet provision in private and public universities and that lecturers and students were using them frequently for educational and recreational purposes;
- ii) Selected characteristics of students (gender) and lecturers (gender, age and cadre) influenced their ICT usage patterns to various degrees;
- iii) Challenges such as lack of personal computers, inadequate technical support, large classes, slow internet connection, unreliable electricity supply and lack of e-learning policies impeded the utilisation of ICTs.
- iv) Private universities had better ICT investments than their public counterparts although there are no significant differences among teacher education students and lecturers in both university types in Kenya.

- v) Students and lecturers faced various challenges such as limited skills in utilizing some ICTs; inadequate technical support; unreliable electricity/power supply lack of ICT-use policies to guide

#### **5.4 Recommendations**

Based on the conclusions above, the study made the following recommendations:

- i) The universities should design and conduct ICT-use courses among teacher education students and lecturers in universities in Kenya;
- ii) The university management should strengthen the technical support available for use among teacher education students and lecturers in universities in Kenya;
- iii) The university management should invest in alternative power sources so as to limit the interruptions due to unreliable mains electricity;
- iv) The universities should design and implement ICT-use policies that can be integrated into teacher education programmes. Such policies can improve the lecturers' attitude towards using ICTs for teaching, presentation or reference in class. Consequently, students' who look up to them as role models may be positively impacted as well;
- v) The government should initiate sustainable financial mechanisms through relevant departments to provide laptops and computers to students in universities in order to reduce the dependence on institutional ICTs. As a starting point, other phases of the wezesha laptop initiative can be implemented.

#### **5.5 Suggestions for Further Research**

Based on the findings, the study suggests further research in the following areas:-

- i) a comparison of the utilization of ICTs among teacher education students and lecturers in universities from other developing countries;
- ii) the educational potential of social networking among undergraduates (such as Face book) for higher education;
- iii) the utilization of ICTs in other areas of higher education such as the humanities, business studies, science, among others;
- iv) the extent to which undergraduate students' family background and economic status impact the use of ICTs in higher education;



v) the extent to which ICTs are misused among teacher education students in universities in Kenya.

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## APPENDIX 1: QUESTIONNAIRE FOR STUDENTS

Dear respondent

My name is George Makori. I am a PhD student at Egerton University and currently undertaking a research on utilization of ICTs for teacher education in universities in Kenya. I have selected you to participate in this study in your position as a fourth year Bachelor of Education student at your university. I assure you that your responses will be treated confidentially. They will not be used for any other purpose other than the research purpose for which they are intended. Do not write your name on the questionnaire.

Yours sincerely,

George Makori  
(PhD, Student)

---

### A) Gender

(Tick one to indicate your gender)

1. Gender: Male  Female

### B) Types of ICT Accessible to you

2. What ICTs do you have access to? (Please tick all relevant boxes)

Type of ICT	Please tick box if you have access to this ICT		Please tick box if you use the ICT for learning
	In campus	Off campus	
i) Radio			
ii) TV			
iii) Fixed Land Line Telephone			
iv) Mobile Telephone			
iv) Shared Mobile Telephone			
v) Lap-Top Computer			
vi) Desk Top Computer			
vii) Computer Lab at Faculty/Institution			
viii) Internet			

Other ICT (Please specify) \_\_\_\_\_

---

**C) Reasons for ICTs usage**

3. To what extent do you agree or disagree with the following statements with respect to reasons why you use ICTs for learning? (Please tick the box that best conforms to your views): (**SA**- Strongly Agree, **A** – Agree, **U**- Unsure **D**- Disagree, and **SD**-Strongly Disagree)

Statement	SA	A	U	D	SD
i) ICTs are integrated in my learning programme at my institution					
ii) I have a good access to ICTs					
iii) ICTs save my study time					
iv) ICTs provide me with better learning opportunities than traditional means of learning					
v) I enjoy using ICTs					

Others (please specify) \_\_\_\_\_



#### D) Experience with Software Applications or Web-Based Technologies

4. Which of the following features of software applications or web-based technologies do you know how to use as a student?

Feature	Know how to use (Please tick all relevant boxes )	Would like to learn (Please tick all relevant boxes )
i) Use of : I. Microsoft Office (Word) II. Microsoft PowerPoint III. Audio files IV. Video files	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>
ii) Web-Based sources of content		
iii) Discussion Forums		
iv) Chats		
v) E-mail		
vi) CD-ROM Based Digital libraries		

Others (Specify) \_\_\_\_\_

#### E) Computers and Internet usage

5. How frequently do you use the internet for study purposes? (Tick one)

- i) Every day
- ii) 2-3 times per week
- iii) Weekly
- iv) Monthly
- v) Rarely or never

6. Please indicate the study purpose for which you use the Internet using the key below :  
 (SA-Strongly Agree, A-Agree, U-Unsure, D-Disagree, SD-Strongly Disagree)

Use of Internet	SA	A	U	D	SD
i) Sharing information on joint research projects					
ii) Submission of research papers					
iii) Distance Learning (sending assignments and queries to tutors)					
iv) Accessing content for supplementary learning purposes					
v) Research purposes in areas of interest					

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

7. Who provides the Internet service? Please tick one:

Faculty

Department

Private providers

Others (Please list) \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_

8. Is Internet access free or at cost? Tick one:

Free

At cost

9. If at cost, do you think it is affordable?

Yes

No

Please explain your answer \_\_\_\_\_  
 \_\_\_\_\_



10. How confident are you in using the Internet for study purposes?

- i) Very confident and can explain to others
- ii) Very confident
- iii) Confident
- iv) Not confident
- v) Not sure

If not confident, please suggest what should be done to make your use of Internet better:

---

---

**F) Overall attitude to ICT/Internet usage**

11. Please tick the statement that best describes your attitude on issues stated below using the

key provided: (SA- Strongly, A- Agree, U- Unsure, D-Disagree and, SD-Strongly

Disagree)

Statement	SA	A	U	D	SD
i) I prefer to using the computer to do my assignments					
ii) I prefer learning using the Internet than having a lecturer to teach me					
iii) I like learning using the computer as a supplement to being taught by a tutor					
iv) I prefer interacting with my tutor through E-mail					
v) I would like to use the Internet for distance learning					

**G) Constraints on use of ICTS/Internet**

12. Please indicate the extent to which you think the following factors limit your use of ICTs

(SA- Strongly Agree, A- Agree, U- Unsure, D-Disagree, SD-Strongly Disagree)

<b>Factor</b>	<b>SA</b>	<b>A</b>	<b>U</b>	<b>D</b>	<b>SD</b>
i) Lack of personal computer					
ii) Lack of computers in your institution					
iii) Unreliable electricity					
iv) Unreliable connectivity					
v) Lack of mastery in the use of the computer					
vi) Lack of training for others in your institution (for group tasks)					
vii) Lack of interest among staff in your institution in incorporating ICTs in teaching-learning					
viii) I am not interested in using ICTs					
ix) Low connectivity speeds to the internet					
x) Lack of technical support in your institution					

Other Constraints on use of ICTs/Internet (Please specify) \_\_\_\_\_

\_\_\_\_\_



### H) Recreational uses of ICTs

13. Which of the following non study activities do you use ICTs for? (Please tick any boxes that apply)

Recreational use of ICTs	Frequency of use			
	Always	Sometimes	Rarely	Never
Blogging				
Chat				
E-mail				
Downloading music				
Downloading pictures				
Online shopping				
Online business/banking				
Games				

Other activities (please specify) \_\_\_\_\_

### I) Helpfulness of ICT/Internet for study purposes

14. In your opinion, do you think ICT/Internet is useful for your study purposes?

(Please tick one)

- i. Very Helpful
- ii. Helpful
- iii. Helpful to an extent
- iv. Not Helpful
- v. Not Sure

**J) Recommendations/Suggestions**

15. To what extent do you think your institution has been able to provide ICTs for effective

study purposes? \_\_\_\_\_

\_\_\_\_\_

Please explain your answer \_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

**END**

**Thank you for sparing time to fill this questionnaire.**



## APPENDIX 2: QUESTIONNAIRE FOR LECTURERS

Dear respondent,

My name is George Makori. I am a PhD student at Egerton University and currently undertaking a research on utilization of ICTs for teacher education in universities in Kenya. I have selected you to participate in this study in your position as a lecturer in the faculty/school of education. I assure you that your responses will be treated confidentially. They will not be used for any other purpose other than the research purpose for which they are intended. Do not write your name on the questionnaire.

Yours sincerely,

George Makori

(PhD, Student)

---

### A) Personal information

1. Please tick the relevant box to indicate your gender:

Female  Male

2. Age: Please put a single tick in the box appropriate for your age

29 and below  30-39  40-49

50-59  60-69  70 and above

3. Designation: Please put a single tick in the box appropriate for your designation

- i. Tutorial fellow
- ii. Teaching assistant
- iii. Assistant lecturer
- iv. Lecturer
- v. Senior lecturer
- vi. Ass. Professor
- vii. Professor

viii. Other

(please

specify):

**B) Types of ICTs accessible to you**

4. What ICTS do you have access to? (Please tick all relevant boxes)

Type of ICT	<i>Please tick box if you have access to this ICT</i>	<i>Please tick box if you use this for teaching</i>	<i>Please Indicate if :</i>	
			Personal	Institutional
i) Radio				
ii) TV				
iii) Fixed Land-Line Telephone				
iv) Mobile Telephone				
v) Shared Office Mobile phone				
vi) Lap-Top Computer				
vii) Desk-Top Computer				
viii) Computer Lab at Institution				
ix) Internet				
x) LCD Projector				

Other ICTs (Please specify) \_\_\_\_\_

5. How frequently do you use ICTs for your lectures? (Please indicate if: Always, Sometimes, Rarely or Never)

Type of ICT	Frequency			
	Always	Sometimes	Rarely	Never
i) Radio				
ii) TV				
iii) Fixed Land-Line Telephone				
iv) Personal Mobile Telephone				
v) Shared Mobile Phone				
vi) Lap-Top Computer				
vii) Desk-Top Computer				
viii) LCD Projector				
ix) Internet				
x) CD-ROM Digital Libraries				



Other ICTs (Please specify) \_\_\_\_\_

**C) Reasons for using ICTs**

6. To what extent do you agree or disagree with the following statements with respect to reasons why you use ICTs for teaching? (Please tick the box that best conforms to your views): (**SA**- Strongly Agree, **A**- Agree, **U**- Unsure, **D**-Disagree, **SD**-Strongly Disagree)

Statement	SA	A	U	D	SD
i) Using ICTs is a requirement by my institution					
ii) I find it easier to teach using ICTs than with traditional methods					
iii) I want to be an innovator in my teaching					
iv) Use of ICTs is convenient and saves instructional time					
v) Use of ICTs provides students with higher quality learning opportunities than with traditional methods					
vi) Use of ICTs enables students to participate in my courses from a distance					
vii) I have easy access to the ICTs					
viii) ICTs are easy to use					

**D) General ICT knowledge and skills**

Please indicate your level of confidence in the use of ICTs along the provided scale of 1-5:

1. Very Confident and could explain function to others, 2. Very Confident, 3. Not sure  
4. Confident, 5. Not confident

**7. Computer Management**

- i. Locate and run a programme (software application) 1 2 3 4 5
- ii. Use CD-ROM based software 1 2 3 4 5
- iii. Search for files on the computer system 1 2 3 4 5
- iv. Back up files onto various media types (CD-RW, USB flash drive, etc) 1 2 3 4 5

**8. Word Processing**

- i. Use simple editing e.g. bold, italics, centring, font size etc 1 2 3 4  
5

ii.	Use a spell checker	1	2	3	4	5
iii.	Include tables in a document	1	2	3	4	5
iv.	Save a document in various file formats	1	2	3	4	5
v.	Create new document templates	1	2	3	4	5

### 9. Power Point Presentation

i.	Create a basic presentation package	1	2	3	4	5
ii.	Add clip art to slides	1	2	3	4	5
iii.	Introduce animation onto slides	1	2	3	4	5
iv.	Rearrange slides within a presentation	1	2	3	4	5
v.	Modify transition between slides	1	2	3	4	5

### 10. Using the Internet

i.	Access an Internet site via its website address	1	2	3	4	5
ii.	Use search engines to find information	1	2	3	4	5
iii.	Download files from the Internet	1	2	3	4	5

### 11. E-mail

i.	Send and receive e-mail messages	1	2	3	4	5
ii.	Attach files to outgoing e-mails	1	2	3	4	5
iii.	Open and save files attached to incoming e-mails	1	2	3	4	5
iv.	Forward e-mails to selected contacts	1	2	3	4	5
v.	Create new contacts in address book	1	2	3	4	5
vi.	Sort messages and file in created folders	1	2	3	4	5

### E) ICTs for Curriculum Planning and Presentation

Please indicate your level of confidence in the use of ICTs along the provided scale of 1-5:

1. Very Confident and could explain function to others, 2. Very Confident, 3. Not sure  
4. Confident, 5. Not confident

### 12. Lecture planning

i.	Research for teaching material using CD-ROM or the Internet	1	2	3	4	5
----	---	---	---	---	---	---



- |  |   |   |   |   |   |
|--|---|---|---|---|---|
| ii. Prepare the Lecture room to use ICTs         | 1 | 2 | 3 | 4 | 5 |
| iii. Use graphical images in lecture preparation | 1 | 2 | 3 | 4 | 5 |

### 13. Teaching and Presentation

- |  |   |   |   |   |   |
|--|---|---|---|---|---|
| i. Organize and manage the use of ICTs in the lecture room                             | 1 | 2 | 3 | 4 | 5 |
| ii. Provide a list of relevant websites for further study                              | 1 | 2 | 3 | 4 | 5 |
| iii. Include Internet sites in learning activities                                     | 1 | 2 | 3 | 4 | 5 |
| iv. Use a data projector for content delivery  | 1 | 2 | 3 | 4 | 5 |
| v. Encourage students to use e-mail for tutor contact<br>and submission of assignments | 1 | 2 | 3 | 4 | 5 |

### 14. Do you have access to the following technologies for administering and delivering the curriculum?

Technology	Yes	No
i) Intranet access (Connection within Institutional Computers)		
ii) Internet access		
iii) Microsoft Office software (Word, Excel, PowerPoint)		
iv) Graphics software (e.g. Photoshop)		
v) Printer		
vi) Scanner		
vii) CD Writer		
viii) Digital video/Still Camera		
ix) Video camera		
x) Laptop computer		
xi) LCD projector		
xii) Electronic white board		
xiii) Large screen computer monitor		

Other technologies \_\_\_\_\_

### F) Use of the Internet

15. Do you use the internet for any of the following? (Tick all relevant boxes)

(SA- Strongly Agree, A- Agree, U- Unsure, D-Disagree, SD-Strongly Disagree)

Use of Internet	SA	A	U	D	SD
i) Sharing information on a joint research project					
ii) Enhance collaborative research					
iii) Submission of research papers					
iv) Distance tutoring					
v) Timely access to relevant content for your lectures					
vi) Receiving student assignments/reports					
vii) Communicating with students					

Other uses of Internet (Please specify) \_\_\_\_\_

\_\_\_\_\_

### G) Attitudes towards ICTs

16. Which of the following statements best describes your attitude towards the use of ICTs:

(SA- Strongly Agree, A- Agree, U- Unsure, D-Disagree, SD-Strongly Disagree)

Attitude	SA	A	U	D	SD
i) I enjoy using ICTs and like trying new applications					
ii) I am comfortable using ICTs as long as I know what I need to do					
iii) I find ICTs frustrating					
v) I don't like using ICTs					

### H) Constraints on usage of ICTs

17. Please indicate the extent to which you think that the following factors limit your use of



ICTs:(SA- Strongly Agree, A- Agree, U- Unsure, D-Disagree, SD-Strongly Disagree.

Please tick the appropriate box)

Lecture	SA	A	U	D	SD
i) Lack of your own computer					
ii) Lack of computers in your institution					
iii) Unreliable electricity					
iv) Unreliable connectivity					
v) Lack of your training					
vi) Lack of interest among staff in your institution					
vii) Low connectivity speeds to the internet					
viii) Lack of e-learning policy in your institution					
ix) Lack of technical support					
x) Ease of use of software					
xi) Class size too large					

Any Other Constraints: \_\_\_\_\_

### J) Recommendations/Suggestions

18. To what extent do you think your institution has been able to provide ICTs for effective

study purposes? \_\_\_\_\_

Please explain your answer \_\_\_\_\_

**END**

**Thank you for taking your time to fill this questionnaire.**

# EGERTON

Tel: Pilot: 254-51-2217620  
254-51-2217877  
254-51-2217631  
Dir. line/Fax: 254-51-2217847



# UNIVERSITY

P.O. Box 536 - 20115  
Egerton, Njoro, Kenya  
Email: eugradschool@wananchi.com  
www.egerton.ac.ke

## OFFICE OF THE DIRECTOR, GRADUATE SCHOOL

Ref:.....ED17/0185/07....

Date:.....16 July, 2009

Mr. George Makori,  
Department of Psy. Coun. & Edfo.,  
Egerton University,  
P.O. Box 536,  
**EGERTON.**

Dear Mr. Makori,

### RE: ADMISSION INTO PH.D. PROGRAMME

I am pleased to inform you that on behalf of the University Senate and the Vice Chancellor, the Board of Postgraduate Studies has offered you admission into a **Ph.D. (Educational Foundations)** programme in the Department of Psychology, Counseling and Educational Foundations, Faculty of Education and Community Studies.

The admission is offered on condition that you will be in a position to meet the full cost of undertaking the programme. You will be registered as a student only after paying all the required first year fees as per fees structure attached.

In addition, each student will be responsible for his/her own subsistence, accommodation, Field trips, the necessary reading materials and stationery, and research funds. The fees structure (attached) may also change from time to time as may be determined by the University Senate.

Yours sincerely,

Prof. Robert K. Obura, PhD  
DIRECTOR, BOARD OF POSTGRADUATE STUDIES

c.c. VC  
DVC (AA)  
DVC (A&F)  
DVC (R&E)  
Registrar AA } To see in file  
Dean, Fedcos  
Chairman of Psy. Coun. & Edfo.  
Finance Officer

RKO/qma



**EGERTON**

Tel. Pilot: 254-51-2217620  
254-51-2217877  
254-51-2217631  
Dir. line/Fax: 254-51-2217847



**UNIVERSITY**

P.O. Box 536 - 20115  
Egerton, Njoro, Kenya  
Email: eugradschool@wananchi.com  
www.egerton.ac.ke

**OFFICE OF THE DIRECTOR GRADUATE SCHOOL**

ED17/0185/07

16<sup>th</sup> July, 2009

Ref:.....

Date:.....

Mr. George Makori,  
Egerton University,  
Department of Psy. Coun. & Edfo.,  
P. O. Box 536,  
**EGERTON.**

Dear Mr. Makori,

**RE: CORRECTED PROPOSAL**

This is to acknowledge receipt of two copies of your corrected proposal, entitled  
"A Comparative Assessment of the Utilization of Information and Communication  
Technologies for Teacher Education in Universities in Kenya".

You are now at liberty to commence your fieldwork.

Thank you.

Yours sincerely,

Prof. Robert K. Obura, PhD  
**DIRECTOR, BOARD OF POSTGRADUATE STUDIES**

c.c. Supervisors

RKO/qma

REPUBLIC OF KENYA



## NATIONAL COUNCIL FOR SCIENCE AND TECHNOLOGY

Telegrams: "SCIENCETECH", Nairobi  
Telephone: 254-020-241349, 2213102  
254-020-310571, 2213123  
Fax: 254-020-2213215, 318245, 318249  
When replying please quote

P. O. Box 30623-00100  
NAIROBI-KENYA  
Website: www.ncst.go.ke

Our Ref: **NCST/5/002/R/756/5**

Date: **21<sup>st</sup> August 2009**

**Mr. George Makori**

Egerton University

P.O. Box 536

**NJORO**

### **RE: RESEARCH AUTHORIZATION**

Following your application for authority to carry out research on '*A Comparative Assessment of the Utilization of Information and Communication Technologies for Teacher Education in Universities in Kenya*'

I am pleased to inform you that you have been authorized to undertake your research in Public and Private Universities for a period ending 30<sup>th</sup> June 2011.

You are advised to report to the Vice Chancellors of the Universities you intend to visit before embarking on your research project.

Upon completion of your research project, you are expected to submit two copies of your research report/thesis to our office.

A handwritten signature in black ink, appearing to read 'Shaukat A. Abdulrazak'.

♂ **PROF. SHAUKAT A. ABDULRAZAK Ph.D, MBS**  
**SECRETARY**

Copy to:

**The Vice Chancellors**

**Public/Private Universities**



CONDITIONS

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



REPUBLIC OF KENYA

RESEARCH CLEARANCE PERMIT

GPK 6055-3m-10/2009

(CONDITIONS—see back page)

PAGE 2

PAGE 3

THIS IS TO CERTIFY THAT:

Prof./Dr./Mr./Mrs./Miss. GEORGE MAKORI

of (Address) EGERTON UNIVERSITY PO BOX 536 NJORO

has been permitted to conduct research in PUBLIC AND PRIVATE UNIVERSITIES

ALL District, ALL Province,

on the topic A COMPARATIVE ASSESMENT OF UTILIZATION OF INFORMATION

AND COMMUNICATION TECHNOLOGIES FOR TEACHER EDUCATION IN

UNIVERSITIES IN KENYA

for a period ending 30TH JUNE 2011

Research Permit No. NCST/5/002/R/756

Date of issue 5.08.2009

Fee received SHS 2000



*George Makori*  
 Applicant's Signature

Secretary  
 National Council for  
 Science and Technology

**EGERTON**

P.O. BOX 536  
EGERTON



**UNIVERSITY**

Tel: (051) 2217987, 2217781, 2217892  
Fax: (051) 2217805, 2217827  
Email: [radmin@egerton.ac.ke](mailto:radmin@egerton.ac.ke)

**OFFICE OF THE REGISTRAR  
(ADMINISTRATION)**

**EUNJ/21358/153**

**23/11/2009**

George Makori  
Psychology, Counselling & Educational Foundations Dept.  
Egerton University

Dear Mr. Makori,

**RE: PERMISSION TO COLLECT DATA**

Reference is made to your letter dated 7<sup>th</sup> October, 2009 addressed to the Deputy Vice Chancellor (Academic Affairs) on the above subject.

Approval has been granted for you to carry out Ph.D. research between 20<sup>th</sup> October, 2009 and 31<sup>st</sup> December, 2009.

I wish you well as you collect the data.

Yours sincerely,

**J.K. Kairu**  
**FOR: REGISTRAR (ADMINISTRATION)**

c.c Chairman, Psychology, Counselling & Educational Foundations Department

JKK/cko





## KENYATTA UNIVERSITY

OFFICE OF THE DEPUTY VICE-CHANCELLOR, ACADEMIC

Tel: (+254-20) 810901-19  
Fax: (+254-20) 811380  
Website: www.ku.ac.ke

P. O. Box 43844-00100  
Nairobi, Kenya  
Email: dvc-acad@ku.ac.ke

Ref: KU/R/AD/127/VOL 1

11<sup>th</sup> November 2009

George Makori  
Egerton University  
Department of Psychology, Counseling and  
Educational Foundations  
P.O. Box 14581-20100

Dear Mr. Makori

**RE: AUTHORITY OF CONDUCT RESEARCH**

Your letter dated 7<sup>th</sup> October 2009 on the above subject refers.

This is to inform you that your request to conduct research on '**Comparative Assessment of the Utilization of Information and Communication Technologies for Teacher Education in Universities in Kenya**' has been approved.

However, you are advised to share your findings with the University and avail a copy of your final report to the Director, Institute of Research, Science and Technology.

Thank you.

  
**PROF. P.K. WAINAINA**  
**AG. DEPUTY VICE-CHANCELLOR (ACADEMIC)**

cc: Director, Institute of Research, Science and Technology

/jww



Kenyatta University..ISO 9001:2000 Certified



# MOI UNIVERSITY

OFFICE OF THE DEPUTY VICE CHANCELLOR  
RESEARCH AND EXTENSION

Tel: (053) 43355  
(053) 43620  
Fax: (053) 43355  
Email: [dvcre@mu.ac.ke](mailto:dvcre@mu.ac.ke)

P.O. Box 3900  
Eldoret - 30100  
Kenya

Ref No. .... MU/DVC/REP/27B

30<sup>th</sup> October, 2009

George Makori  
Egerton University  
Department of Psychology, Counselling and  
Educational Foundations  
P. O. Box 14581-20100  
**NAKURU**  
Email: [georgemno@yahoo.com](mailto:georgemno@yahoo.com)

Dear Mr. Makori,

RE: PERMISSION TO CARRY OUT PHD RESEARCH

Reference is made to your letter dated 7<sup>th</sup> October 2009 in which you requested to be allowed to carry out PhD research at Moi University between 20<sup>th</sup> October 2009 and 31<sup>st</sup> December 2009.

I am pleased to inform you that authority has been granted to you to carry out the research in this university.

May I also take this opportunity to wish you success in your research.

Yours sincerely,

**PROF. B. E. L. WISHITEMI**  
**DEPUTY VICE CHANCELLOR**  
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