

**USE OF INFORMATION COMMUNICATION TECHNOLOGIES IN
EDUCATION AND TRAINING OF UNDERGRADUATE LIBRARY AND
INFORMATION SCIENCE STUDENTS IN TWO SELECTED KENYAN
UNIVERSITIES**

BY

ELISHA ONDIEKI MAKORI

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INFORMATION STUDIES
MOI UNIVERSITY, ELDORET**

NOVEMBER, 2012

DECLARATION

Declaration by the Candidate

This thesis is my original work and has not been presented for a degree in any University.

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Elisha Ondieki Makori

IS/DPHIL/09/07

Signature:..... **Date:**

Declaration by the Supervisors

This thesis has been submitted for examination with our approval as the University Supervisors.

Professor Cephas Odingi
Department of Library, Records Management & Inf. Studies
School of Information Sciences
Moi University.

Signature:..... **Date:**

Professor Joseph Ojiambo
Department of Library, Records Management & Inf. Studies
School of Information Sciences
Moi University.

Signature:..... **Date:**

DEDICATION

The thesis is dedicated to all my family members: parents, Francis Makori and Jane Kemunto; brothers and sisters; dear wife, Zipporah Obutu; and the children, Salome Gesare, Chelsea Nyanchama and Kelly Dennis. Many thanks for helping, supporting and assisting me throughout my study.

ABSTRACT

Library and information science education and training is rapidly changing due to modern information work and activities that have made traditional methods ineffective and inefficient. This development indicates that the modern technology revolution has transformed the information environment leading to new information products and services and emerging competencies and skills in ICT. As a result, there have been growing concerns about the appropriateness of ICTs education and training of library and information science students in the universities. The purpose of the study was to establish the use of ICTs in education and training of undergraduate library and information science students in two selected Kenyan universities and suggest recommendations to improve ICT education and training in the country. The objectives of the study were to establish the extent to which ICTs have been integrated in the education and training of undergraduate library and information science students in two selected Kenyan universities, examine the perceptions of the stakeholders towards the adequacy of the current ICT education and training of undergraduate library and information science students in the selected universities, establish critical ICT competencies and skills in the current labour and job market that are essential for the education and training of undergraduate library and information science students in Kenya, establish the challenges that face ICT education and training for undergraduate library and information science students in the selected universities, and suggest recommendations on how to improve ICT education and training in the country. The study is guided by the diffusion of innovation theory which highlights the need for the students to acquire appropriate ICTs knowledge, competencies and skills for purposes of employment and career development. The study utilized a qualitative method. A survey research design was used to collect data from various categories of respondents in library and information science including lecturers, undergraduate students, information professionals and employers. The study used interview guides and document analysis to gather and collect data from the respondents. Findings from data drawn from various universities and other organizational libraries as well as library and information science teaching departments in the two selected universities show that the graduates lack preferred ICTs knowledge, competencies and skills in web technologies, information programming skills, software development, distributed systems, virtual libraries and digital information systems. The study recommends that library and information science education in Kenyan universities and other institutions of higher learning need to review the curriculum and provide ICT education and training that address the needs and demands of the current job market and performance requirements. The study recommends full integration of ICTs education and training of undergraduate library and information science programmes at all levels in the universities and other institutions of higher learning in the country.

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LIST OF ABBREVIATIONS

The section explains the abbreviations used in the study.

AMREF	Africa Medical Research Foundation
BSLADS	Bagamoyo School of Library, Archives and Documentation Studies
DPHL IS	Doctor of Philosophy in Information Sciences
DoI	Diffusion of Innovation
EASL	East African School of Librarianship
ICT	Information Communication Technology
ICTs	Information and Communication Technologies
ILRI	International Livestock Research Institute
IHL	Institutions of Higher Learning
IS	Information Sciences
ISs	Information Systems
IOL	Institute of Open Learning
IT	Information Technology
ITAA	Information Technology Association of America
JKUAT	Jomo Kenyatta University of Agriculture and Technology
KARI	Kenya Agricultural Research Institute
KENGEN	Kenya Energy Generation Company
KNCST	Kenya National Council for Science and Technology
KU	Kenyatta University
KSVA	Knowledge, skills, values and attitudes
LIPER	Library and Information Professionals and Educational Renewal

LIS	Library and Information Science
MCSE	Microsoft Certified Systems Engineer
MDGs	Millennium Development Goals
MIS	Management Information Systems
MoARD	Ministry of Agriculture and Rural Development
MU	Moi University
SPSS	Statistical Package for the Social Sciences
SU	Strathmore University
TAM	Technology Acceptance Model
UK	United Kingdom
USA	United States of America
UoN	University of Nairobi
UNISA	University of South Africa
WWW	World Wide Web

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CHAPTER ONE

INTRODUCTION

1.0 Introduction

The chapter provides introduction and background information to the study including the statement of the problem, purpose or aim and objectives of the study, research questions, assumptions, significance of the study, scope and limitations of the study, summary of the chapter and definition of terms and concepts. The chapter also describes the rationale for the study of the use of ICT in education and training of library and information science programmes. There is an overview of the development and trend of ICT training in library and information science education programmes in Kenya.

1.1 Background to the Study

1.1.1 Overview

In the knowledge-based economy of the 21st century, information communication technology (ICT) is one of the emerging factors that has not only great and growing influence in the society, organizations and institutions but also on all aspects of people's lives. Owing to the central and critical role they play in the management and handling of information and knowledge, ICTs have become extremely important in library and information science education. Developments in ICTs have affected all fields of knowledge including library and information science (Babu et al. 2007). This trend is evident in institutions of higher learning (IHL) where universities seem to be advocating, embracing and integrating ICTs education and training at all levels of knowledge and learning. Training programmes at all levels are re-inventing themselves and developing

new innovative curricula to educate and train information professionals with knowledge and skills to manage and handle information in various sectors and to use modern information and communication technologies (Kavulya, 2007; Hjørland, 2002; Juznic & Badovinac, 2005). This is response to new career opportunities, job market, performance requirements and pressure to balance between the core objects of library and information science education and training in attracting new topics (Kavulya, 2007). As a result, it is imperative that the education and training of library and information science professionals in general and of undergraduate students in particular reflects this important component that enable graduates obtain adequate mastery of relevant competencies to be able to work effectively and efficiently.

In the modern information environment, ICT revolution is the backbone of quality delivery of information services (Minishi-Majanja, 2007; Ocholla & Bothman, 2007; Ocholla, 2005; Laudon & Laudon, 2000). Minishi-Majanja (2004a) observes that information and communication technologies have become central in the education and training of library and information science professionals because of the great influence these technologies have on the profession. The current knowledge-based economy is increasingly witnessing ICT developments in internet, web technologies and multimedia systems that have great influence not only on the information environment but also on the library and information science education. In particular, there is need for library and information science education in universities to address this critical component of the knowledge and learning society.

Modern information services depend upon the use and application of ICT systems. Minishi-Majanja (2007) notes that there are significant patterns of change because ICTs are impetus for change in traditional concepts of teaching and learning, as well as a prime motivation behind the change in scholarly and professional activities in higher education. Recent studies have highlighted emerging factors that are directly linked to ICTs and are critical in the education and training of undergraduate library and information science. These include the: knowledge society, modern technology revolution, modern information environment and megatrends (globalization and global competition) (Abuhmaid, 2008; Amiree, 2009; Hedman, 2005; Mahmood, 2007; Pugh, 2007; Ramzan, 2004).

In the recent past, modern technological revolution has led to the development of a digital information environment, virtual libraries, library 2.0, web 2.0 technologies, new communication media, evolving technologies and social networking systems. The digital information environment has led to new practices of managing, handling and supporting information and knowledge, consequently affecting the roles and responsibilities of information professionals in general and the education and training of undergraduate students in the universities particular. Library 2.0 and web 2.0 technologies involve the use of social media software and networking sites (Facebook, YouTube, MySpace and Twitter) to handle and support information services. In the current knowledge society, these technological solutions are critical in the management and handling of information. This implies the need for information professionals and students of library and information science to master the use of ICT systems in handling digital information.

Related studies in United Kingdom (UK) (Shoniwa & Hall, 2008), United States of America (USA) (Marouf, 2004) and Canada (Ajiferuke, 2003) indicate a deep involvement of information professionals in library 2.0 initiatives in terms of design of information architecture, development of knowledge taxonomies, content management, internet and intranet systems, and intelligence information systems. In African countries and Kenya in particular, application and use of library 2.0 and web 2.0 technologies is hampered by numerous factors including inadequate knowledge and skills among information professionals (Munatsi 2010). Information professionals need to acquire knowledge and skills on how to manage and handle technological systems in order to work effectively and efficiently. The changing information landscape lays great emphasis on high technological solutions that library and information science education in the universities must provide.

Recently, Kavulya (2007) indicated that library and information science graduates lack ICT competencies and skills that have a bearing on practice of information work and which are critical to the education and training of library and information science professionals. Kenyatta University and Moi University have integrated ICT courses in library and information science education programmes (Kenyatta University, 2010 & Moi University, 2010). There are strong indications that the changing information environment and modern technological developments have occasioned the need for library and information science education that is rich in terms of ICT knowledge, competencies and skills. Of critical concern is the relevance of ICT education and training for undergraduate library and information science programmes in relation to

handling and supporting information work and activities. Against these developments, a study to establish ICT competencies and skills required for the education and training of undergraduate library and information science students in the modern information environment is extremely important. The current ICTs education and training practices in the profession must match the modern information requirement.

1.2 University Education in Kenya

1.2.1 Kenyatta University and Moi University

In the last two decades, Kenya has experienced tremendous growth in university education leading to increased growth of public and private universities. Currently, Kenya has seven and twenty seven public and private universities respectively. The public universities are: University of Nairobi, Moi University, Kenyatta University, Egerton University, Jomo Kenyatta University of Agriculture and Technology, Maseno University and Masinde Muliro University of Science and Technology. These universities also have fifteen university colleges, mostly former teacher training colleges and national polytechnics. The private universities include the: University of Eastern Africa – Baraton; Catholic University of Eastern Africa; Daystar University; United States International University; Africa Nazarene University; and Kenya Methodist University among others. These universities also have affiliate campuses or colleges in major towns in the country (Commission for Higher Education, 2008).

Kenyatta University is one of the oldest universities offering of library and information science education in Kenya. The department of library and information science falls within the School of Education and offers undergraduate and postgraduate degree programmes. The undergraduate programmes are: Bachelor of education in library science and Bachelor of library and information science. The postgraduate studies are: Master of education in library and information science; Master of library and information science; Master of information science in records and archives management; and a Doctorate programme in library and information science (Kenyatta University, 2010).

Moi University is the other leading university offering information sciences education and training in Kenya through the School of Information Sciences. The school consists of three departments: Library, Records Management and Information Studies; Publishing and Media Studies; and Information Technology. The Moi University School of Information Sciences is one of the leading schools in Eastern, Central and Southern African. It offers various academic programmes at bachelors, masters, and doctorate levels. The bachelors' level has five programmes: Library and information science; Information technology; Publishing and media studies; Informatics; and Records and archives management. The Masters of philosophy programmes are: Library and information studies; Publishing studies; Information technology; and Records and archives management. The school also offers a Doctor of philosophy programme in library and information studies (Moi University, 2010).

1.3 Statement of the Problem

ICT education and training is extremely important and critical in library and information science programmes. This is in response to rapid changes in the information environment, modern technology developments, labour market requirements, Millennium Development Goals and Government Vision 2030. The prevailing competitive job market, employment and new career opportunities favour information professionals with relevant ICT knowledge, competencies and skills. Modern library and information services exist in high dynamic environments. In the current knowledge society, ICTs are central in the management and handling of information. Recently, there has been a paradigm shift in library and information science education marked by technological innovations such as: library 2.0, web 2.0, social networking, virtual libraries, digital services and digital information systems which have created a need for re-assessment of library and information science education. Particularly, there is need to provide adequate ICT mastery knowledge and skills to enable LIS graduates to work effectively and efficiently in various library and information science sectors.

Empirical studies have pointed out inadequacies in the library and information science curricula in terms of ICT content at undergraduate education and training (Kavulya, 2007; Minishi-Majanja, 2007; Ocholla & Bothman, 2007; Juznic & Badovinac, 2005; Mutula, 2005; Ocholla, 2005). As a result, it becomes crucial to examine the potential of library and information science education in producing competent information professionals with knowledge and skills to use modern ICTs in information work and activities in relation to job requirements and career opportunities. This study sought to

ascertain the extent to which the universities in Kenya are proactively involved in producing competent undergraduate library and information science professionals with knowledge, competencies and skills to use ICTs. Specifically, the study also analysed current trends in ICTs education and training for undergraduate library and information science students in two selected Kenyan universities. The study also examined the extent to which these ICT courses produce quality professionals in relation to market needs and performance requirements.

1.4 Purpose of the Study

The purpose of the study was to establish the use of ICTs in education and training of undergraduate library and information science students in two selected Kenyan universities; and suggest recommendations to improve ICT education and training in the country.

1.4.1 Objectives of the Study

This study was guided by the following:

- i. Establish the extent to which ICTs have been integrated in the education and training of undergraduate library and information science students in two selected Kenyan universities.
- ii. Examine the perceptions of the stakeholders towards the adequacy of the current ICT education and training of undergraduate library and information science students in the selected universities.

- iii. Establish critical ICT competencies and skills in the current labour and job market that are essential for the education and training of undergraduate library and information science students in Kenya.
- iv. Establish the challenges that face ICT education and training for undergraduate library and information science students in the selected universities and suggest recommendations on how to improve the same in the country.

1.5 Research Questions

The following research questions guided the study:

- i. What is the current status of ICTs education and training for undergraduate library and information science students in the two selected Kenyan universities?
- ii. What are the perceptions of the stakeholders towards the current ICT education and training of undergraduate library and information science students in the selected universities?
- iii. Which ICT competencies and skills are critical for the education and training of undergraduate library and information science students in relation to current job market and career development?
- iv. What are the challenges facing ICT education and training for undergraduate library and information science students in relation to current job requirements and modern information environment?
- v. How can ICT education and training of undergraduate library and information science curriculum be improved?

1.6 Assumptions

The study was based on the following assumptions:

- i. Although appropriate ICT education and training is essential for information professionals in Kenya, this is not adequately provided to undergraduate library and information science students, owing to the fact that ICT competencies and skills required are not well understood and documented.
- ii. Lack of adequate components of ICT education and training in library and information science curricula may hinder or affect LIS undergraduates' competitiveness for career opportunities since their competence in handling information work and activities is challenged.
- iii. While there is a growing consensus that ICT education and training can empower undergraduate library and information science students with knowledge, competencies and skills in the use of modern ICTs, library and information science teaching departments in the universities have not been in a position to strike a balance between appropriate ICT courses and modern information requirements.
- iv. There is no consensus among experts on critical and essential ICT knowledge, competencies and skills in library and information science education and training programmes in Kenya leading to universities offering different ICT courses to the undergraduate students.

1.7 Significance of the Study

The study sought to provide information on the preferred ICT knowledge, competencies and skills needed for undergraduate library and information science education. Library and information science education needs to empower students with sufficient ICT knowledge, competencies and skills not only to enable them function effectively and efficiently in work and career development but also because of their central role in the management, handling and supporting of information and knowledge. The modern information environment and technological developments have created the need for library and information science programmes to re-assess ICT education and training and ensure that their graduates obtain and leave with adequate mastery knowledge, competencies and skills.

The study sought to address the issue of ICT education and training in the library and information science programmes for undergraduate students in Kenya. In particular, this study advocates the inclusion of appropriate ICT programmes in the library and information science education in line with the goals of the global knowledge society, Millennium Development Goals and Government Vision 2030. This study therefore aimed at filling a gap in the area of ICT education and training, by providing relevant information on the nature and extent of integration of ICTs education and training for undergraduate library and information science students in the universities, and adequately addressing the required needs and demands of the current job market and performance requirements. The study also aimed at making valuable contributions for the need of ICT education and training in library and information science programmes.

The study highlights the need to update the library and information science education curriculum due to the dynamic nature of the information and knowledge environment. This is to ensure that emerging ICT knowledge, competencies and skills (web 2.0 technologies, social media, evolving technologies and social networking) are integrated in the curriculum. It is believed that the new knowledge created in this study is of interest to curriculum developers in educational systems (universities and other institutions of higher education) in the country in improving ICT curriculum in the library and information science education, and thus, increase career opportunities, job market and performance requirements for the graduates. In addition, the study provides library and information science teaching departments, lecturers, students, sponsors and employers with information on appropriate ICT courses for the purpose of producing quality library and information science graduates. The study also points out suggestions to factors hindering or obstructing ICT education and training of undergraduate library and information science programmes in the universities.

1.8 Scope and Limitations of the Study

This study sought to establish the extent to which ICTs have been integrated in the education and training of undergraduate library and information science students in the selected Kenyan universities, and to suggest recommendations for improving ICT education and training in the country. The study focused on undergraduate library and information science students, since this forms the foundation of the information profession. The bachelor's degree level lays a firm foundation that prepares and ensures

that undergraduate students receive adequate ICT knowledge, competencies and skills to enable them function effectively in information work.

The study involved the two public universities leading in offering of library and information science education and special organizational libraries. In this respect, respondents included undergraduate library and information science students from Kenyatta and Moi Universities. Library and information science education is also offered in other institutions of higher learning but due to some constraints this study was only limited to the above mentioned two institutions. The constraints included long distance covered by the researcher in travelling to the universities, university libraries and special organizations; interviewing process was labour-intensive, tasking and involving; busy schedules; and limited financial resources.

1.9 Summary

Chapter One provides a review of the area under study. The areas covered include: introduction and background to the study; statement of the problem; purpose or aim and objectives of the study; research questions; assumptions; significance of the study; scope and limitations of the study; summary of the chapter; and definitions of terms and concepts. The evolving paradigm of ICT education and training has been examined in the context of the present and future challenges facing undergraduate library and information science education.

1.10 Definition of Terms and Concepts

In getting the definitions of terms and concepts used in this study, different sources were consulted and evaluated. The operational terms used in this study include the following:

Diffusion of Innovation

The process by which an innovation in the form of new ideas, practices or products and services is adopted and communicated through certain channels over time among the members of a social system or certain community.

ICT Diffusion

Innovation process that involves invention, introduction, diffusion or assimilation and permeation of technology based information systems (ISs) in the organization.

Information

Processed or refined data put into context and used as a basis for reasoning, discussion or calculation.

Information Communication Technology

The application and use of computer systems, telecommunication systems and networking technologies for acquisition, creation, storage, processing, retrieval and dissemination of information and communication services.

Information Management

The planning, organizing, directing/leading, staffing, controlling, budgeting, implementing and exploiting of information resources – from internal and external environment (information content, information systems, information infrastructure,

information processes and information human resources) and communication in achieving the missions (goals and objectives) of an organization.

Information Science Professional

Professionals in the library and information science field of study with education and training from an institution of higher learning who manage information and knowledge.

Information Sciences

Education and training programmes leading to specialization in library and information science, publishing and media studies, information technology, or records and archives management.

Information Society

A society is a society where everyone (individuals, communities and people) can create, access, utilize, share and exchange information and knowledge, to achieve full potential and improve the quality of life for sustainable development. In an information society information or knowledge is the primary or basic production resource essential for political, economical, social, cultural and technological development of the society.

Information Technology

The study, design, development, implementation, support or management of computer-based information systems, particularly software applications and computer hardware to acquire, create, store, protect, process, transmit and retrieve information and knowledge.

Innovation

The adoption of a new idea, practice, object, product or service among members of a society or community.

Knowledge

The combination of data and information to which expert opinion, skills and experience have been added, and therefore, the result of knowing something, to have actionable understanding.

Knowledge Economy

The use of knowledge technologies such as: knowledge engineering and knowledge management in production of wealth and job creation.

Knowledge Management

An umbrella term that involves proper utilization of human knowledge that exists within the organization. This involves the process of identifying, gathering and using both tacit and explicit knowledge (documents, reports and other sources) for meaningful relationships. In addition, it involves setting an environment that allows the organization to create, capture, share and use knowledge to improve efficiency, effectiveness, innovation and performance in fulfilling institutional missions.

Knowledge Society

Broadly speaking, the term knowledge society refers to any society where knowledge is the primary production resource instead of capital and labour. In the knowledge society, knowledge is the basic need which is essential for the creation of wealth and prosperity.

Library and Information Science

These are educational and training programmes that focus on information and knowledge management. The programmes in library and information science produce graduates with expertise in managing information and knowledge.

Megatrend

The social, economic, political, environmental and technological developments that influence a wide range of activities, processes and perceptions in the society such as: globalisation, global competition and technological developments.

Professional

A disciplined group of individuals who adhere to high ethical standards and uphold themselves to, and are accepted by the public as possessing special knowledge and skills, in a widely recognized body of learning derived from education and training at a high level, and who are prepared to exercise these knowledge and skills for the interest of others.

Technology

The process of systematic application of scientific or other organized knowledge to practical tasks. Can also be defined as a product that comprises of computer hardware and software systems that result from the application of technological processes.

Theory

The set of general principles that underlie and provide a holistic view of a subject matter, as distinguished from the methods of the subject's practice. Theory is also a doctrine, or scheme of things that terminate in speculation or contemplation, without a view to practice, hypothesis or speculation.

CHAPTER TWO

LITERATURE REVIEW

2.0 Introduction

This chapter presents the literature review based on background information and knowledge on library and information science education, and various attempts made to integrate the use of ICTs in education and training curriculum of undergraduate library and information science students in Kenya. The review used the research questions as a framework in exploring ICTs education and training needs and demands for library and information science education. These include the: theoretical and conceptual framework, ICT diffusion and utilization, perspectives on ICT education and training, global trends and developments of ICT education and training, context of library and information science education in Kenya, and academisation of ICT education and training in the universities.

The review covers in detail emerging factors that have necessiated a change in education and training of the incoming information professionals leading to new and different ICT competencies and skills currently being taught and required, and modern aspects of information work expected of current and future library and information science graduates. The discussion also includes the response of universities to issues of modern technological innovations that have great influence in information work such as: web 2.0, web 3.0 technologies, internet and related technologies, social media and networking systems, digital librarianship, digital information systems, virtual libraries and digital information environment.

2.1 Theoretical Framework

2.1.1 ICT Diffusion of Innovation Theory

This study adopted ICT diffusion of innovation theory that has deep roots in diffusion of innovation theory (DoI) (Rogers, 2003). In discussing the ICT diffusion of innovation theory, it is important to understand the general diffusion theory. Diffusion of innovation theory is widely used in many disciplines such as: education, health, communication, business, general sociology, economics, agriculture, marketing, ICT and library and information science to explain aspects of adoption of innovative products and services. Diffusion of innovation theory is the process by which an innovation in the form of new ideas, practices or products and services is adopted and communicated through certain channels over time among the members of a social system, society or community (Minishi-Majanja & Kiplang'at, 2004 & Rogers, 2003).

Diffusion of innovation theory is basically a social process primarily concerned with the integration, adoption and communication of new ideas in the society or community. The theory is built on the premise that new ideas have perceivable channels, time and mode of being adopted by individuals or organizations based on various elements or attributes. Multiple authors highlight various elements of the diffusion of innovation theory (Al-Mobaideen, 2009; Minishi-Majanja & Kiplang'at, 2004; Rogers, 2003). These are innovation, communication channels, time, social system, organizational structure, leadership, and innovative decisions in the organization. Innovation is an idea, practice or object that is perceived as new by the members of a social system. In a social system or community, certain characteristics such as: relative advantage, compatibility, complexity,

trialability and observability determine the rate at which the innovation is adopted. Information regarding the innovation has to be disseminated so as to introduce the new change and this involves the element of communication. Communication is the process in which ideas or messages are created, exchanged and shared from one person to another through a medium or channel of exchange.

Time dimension is involved in the decision making process, individual innovativeness and rate of adoption. The social system is defined as a set of interrelated units that are engaged in joint problem solving to accomplish a common goal. The members or units of a social system include the: individuals, informal groups, organizations and subsystems. The social system or unit has norms, opinion leaders and change agents that variously influence the diffusion process. In addition to the above, there are other features unique to the diffusion of innovation in the social system such as: centralization, leadership characteristics and innovation decisions (Lundblad, 2003). The higher education social system in many Sub-Saharan African countries including Kenya is often full of bureaucracies that have been accused of being more of impediments rather than facilitating the adoption of innovations (Minishi-Majanja & Kiplang'at, 2004).

There are also other theories that have been used to explain aspects of ICTs adoption and integration in organizations like technology acceptance model (TAM). The technology acceptance model is similar to diffusion theory in the sense that it places emphasis on psychological predilection and social influences. Like the diffusion of innovation theory, technology acceptance model developed in the United States of America. The theory has

been widely applied and adopted in investigating, explaining and predicting computer users' behaviour towards new technology and application (Al-Mobaideen, 2009). The concern of the study is the suitability of the theory in explaining and predicting all aspects of ICT education and training in library and information science. In diffusion of innovation theory, many factors play critical roles in ensuring successful adoption and development of new ideas such as: human, social, economic, organisational, technological and environmental factors. Al-Mobaideen (2009) postulates that when studying technology in organisations it is important to not only concentrate on technology alone, but to also focus on other related or associated factors.

2.1.2 Application of the Theory in the Area of Study

The study established the use of ICTs in education and training of undergraduate library and information science students in the selected universities as an example of innovation. ICT education and training involves the process of ensuring that undergraduate library and information science students acquire adequate knowledge and skills essential in the modern information environment. Universities are supposed to integrate and adopt appropriate ICT education and training so as to produce quality library and information science graduates with high technological abilities for employment purposes and career development.

In today's knowledge society, ICTs have become important and central in the library and information science profession because of their impact not only in management and handling of information and knowledge but also in all aspects of human development. Technological innovation and integration in library and information science education provides the best means of making graduates relevant in career opportunities and for the job market. Information professionals face the big task of handling information services and activities in a society that has been transformed and polarized by technological innovations. Library and information science teaching departments in the universities are supposed to produce graduates with high technological abilities because all aspects of information work are extensively linked to ICT and related systems.

The integration of technology in library and information science education and training is essential in addressing the issues facing the information profession such as: pedagogical, social, vocational and equity (Abuhmaid, 2008; Maddux & Cummings, 2001; Flanagan & Michele, 2003). Pedagogical issues equally involve the lecturers, educators, students and technology in improving and enhancing the teaching and learning process in the university. ICT education and training is essential to the society at large and to the student in particular. Information work is now purely defined along the lines of modern technology revolution making ICT education and training in the information profession a basic need and demand, hence the need for the graduates to qualify with sufficient orientation, knowledge and skills.

Vocational issues involve the necessity of the society to have skilled workers in the information profession, hence the need for the graduates to acquire high technological abilities for employment purposes and career progression. Technological integration also involves the issue of equity. In contemporary society, technological literacy symbolizes access to the high technology job market, participation in the global economy and success in the new information age (Flanagan & Michele, 2003). Library and information science teaching departments in the universities need to educate and train students in relevant ICT knowledge, skills, abilities and attributes needed to fully participate in the present and future knowledge society. The departments also need to ensure that the learning and teaching environment has adequate infrastructure and facilities needed to provide decent ICT education and training for the students.

In the increasingly knowledge-based society, there has been demand for educational systems to undertake changes that embrace ICT in order to stay abreast of emerging and new development (Abuhmaid, 2008). Globally, education and training programmes including library and information science are upgrading the courses in order to be compliant with the knowledge age. The process of innovation involves getting new ideas accepted and new technologies adopted and used (Tatnall & Davey, 2003). The use and application of information and communication technologies in learning and training has great potential of producing significant changes in the education system (Tatnall & Davey, 2003; Naidu, 2002; Ben-Jacob, 2000). Library and information science professionals need to be proactively involved in planning and implementing educational practices that bring real positive change. In the current digital environment, information

professionals need adequate knowledge and skills in the use of ICTs since efficient delivery and support of information services highly relies upon technological solutions.

In the specific field of ICT education and training, there are four main stages of diffusion and integration of innovation in organizations. These include: initiation, implementation, continuation and outcomes (Abuhmaid 2008 & Rogers, 2003). These four stages underlie the principle of innovation theory in implementation of ICT education and training. In the process of initiation the library and information science teaching departments in the universities have to carry out a needs assessment on the new innovation. This is to ensure that the new innovation is in line with the missions of the department, learning needs and experiences of the students and career opportunities and the job market. Based on the results of the needs assessment, the departments should then make plans for adoption and implementation of the innovation.

The needs assessment is based on a particular problem that needs to be solved like the one addressed by this study. Undergraduate library and information science students need to acquire appropriate technological abilities for employment purposes and career development. In the knowledge and learning society, education and training in the information profession must take into consideration the needs of the students and the employers. Planning is fundamental not only in ensuring that the process of innovation is implemented successfully in solving the problem identified but also in laying the foundation for the implementation stage.

The implementation stage involves the processes of reinventing and restructuring of the innovation so as to meet the needs and demands of the organisation and department (Abuhmaid, 2008). In this stage, the innovation is assimilated into mainstream objectives and goals of the department. A number of activities are initiated to ensure the success of the innovation such as: training, communication, monitoring and evaluation. The last stage involves the process of planning and management to ensure continuation and outcomes of the innovation. This is closely related to the sustainability of the intervention after the initial efforts for the adoption are complete. The implementation process involves routinizing the innovation as a regular activity of the organization and department (Rogers, 2003). Implementation of innovation in universities also fails if sufficient measures are not taken into consideration to institutionalise the process. The success of ICT based projects depends on the recognition of the need to understand innovation, identification of the need to recognise and effect cultural change and provision of comprehensive staff development and support structure (Al-Mobaideen, 2009). Normally, the decision to adopt the innovation tends to start with unrealistic optimism, followed by hasty and widespread adoption (Maddux & Cummings, 2004). As a result, the innovation fails to meet the initial expectations leading to premature abandonment.

The process of diffusion of innovation and integration of ICT involves five main categories: early adopters, early majority, late majority and laggards. Innovators are those obsessed with new ideas and trying to find better ways to do things. Early adopters include those who are the first to adopt new innovations and facilitate the same to others. Early majority is made up of those who do not lead in the adoption process but take longer than early adopters in deciding and making the decision. Late majority is made up of those who adopt ICT after the average members of the organization due to pressure or fear of being left behind. Laggards include those who firmly believe in the past and see no need to change (Abuhmaid 2008 & Rogers, 2003). In higher education, library and information science education is early adopters, since in most cases library and information services were first in adopting computerisation (Minishi-Majanja & Kiplang'at, 2004).

ICT teaching and learning in the university environment involves various elements: library and information science teaching departments, lectures, educators, undergraduate library and information science students, university, information professionals and resources. Education and training is the best method to influence diffusion and integration of ICT. In the present knowledge society, the critical concern is for the library and information science teaching departments in the universities to address issues facing the students in relation ICT courses. The other major concern is for the departments to act as agents of change to ensure that the graduates leave with adequate orientation, knowledge and skills to function effectively and efficiently in information work. The

change agents are the lecturers, undergraduate students and other stakeholders who play important roles in ensuring successful adoption, integration and implementation of ICT.

Innovation and integration of ICT needs the cooperation and support of all stakeholders in the education and training of undergraduate library and information science students. This is because the library and information science education and training is operating in extremely dynamic and high competitive environments. The information profession is undergoing radical changes due to the emergence of the knowledge society leading to new areas of information specialization especially in ICT programmes. There is need for undergraduate library and information science students to receive adequate education and training in ICT knowledge and skills in relation to modern information requirements. This will help produce undergraduate library and information science students with high technological abilities for purposes of employment, professional growth, and development. Receiving adequate ICT education and training that prepares the graduates for the workplace is not only seen as the best strategy in the information profession but also a means of survival in the ever changing information landscape.

Universities must provide quality and adequate education and training opportunities to library and information science undergraduate students. This implies the need to provide facilities, resources, personnel and conditions necessary for adequate ICT education and training so as to avoid discontent and dissatisfaction from the students. Measures to improve library and information science programmes are fundamental in enhancing the much needed change in ICT education and training, and must equally involve library and

information science teaching departments in the universities, lecturers, students and information professionals. This can only be achieved if library and information science programmes in Kenyan universities take into account the current evolving ICT knowledge and skills in relation to job requirements and the modern information environment in implementing innovative approaches to address the issues.

The diffusion of innovation theory is important in understanding and explaining ICT education and training in library and information science programmes. The application and use of this theory provides useful insights into the need for ICT education and training in universities. The diffusion of innovation theory is the best approach and strategy for understanding and explaining all aspects of ICT education and training. Against this background, this study adopted the diffusion of innovation theory as the best method for explaining ICT education and training for undergraduate library and information science students in two selected Kenyan universities.

2.1.3 Justification of the Diffusion of Innovation Theory as Applied in this Study

ICT education and training is inherently an innovation-based process that keeps on changing. In particular, education and training in ICT has all the characteristics of innovation: innovation, communication channels, time, social system, organizational structure, leadership in the organization, and innovative-decisions in the organization. Diffusion of innovation theory involves various stages such as: invention, introduction, diffusion or assimilation and permeation (Bell & Bell, 2005; Boris, 2001; Rogers, 2003). The study looks at diffusion of innovation theory as a process of communicating and

spreading ICT innovation through certain channels over time to the undergraduate library and information science students in the universities. Integration and diffusion of innovation involves the process of imparting and developing ICT knowledge, skills, abilities and attributes to the students.

ICT education and training keeps on changing in relation to emerging knowledge and skills required of information workers. Information workers need to acquire sufficient knowledge, competencies and skills in order to work in modern information and communication environments. ICT knowledge and skills need to be introduced and diffused into the educational and training system. Factors that hinder adoption of innovation include: resistance to change; bureaucracies; and lack of funding. Multiple authors suggest that in education and training, with respect to ICT consideration and the technological impact on cultural change, innovations often fail in 70% of cases as compared with 47% in the public sector and 30% in business (Bell & Bell, 2005; Boris, 2001; Collins & Moonen, 2001; Rogers, 2003). The most important factor in implementation of ICT projects is the recognition of the need to understand innovation. Educational technologists should study the diffusion theory so as to understand the process of adoption of technological innovations. This helps to understand, explain and predict the factors that influence or impede ICT diffusion, adoption, acceptance and implementation (Al-Mobaideen, 2009 & Surry & Farquhar, 1997). The best strategy and method to present innovations for potential adoption in learning and academic institutions is through understanding.

Research discloses that the diffusion of innovation theory has been used extensively in explaining aspects of ICT innovation and integration in information science and technology. The theory has been applied as a suitable theoretical framework for explaining all aspects of ICT diffusion of innovation process in library and information science education. There are recent studies that have used the diffusion of innovation theory to study the adoption of ICTs in organizations in Sub-Saharan Africa and Kenya in particular. Minishi-Majanja's study on information and communication technologies in library and information science in Sub-Saharan Africa which arrived at establishing the nature and types of ICT knowledge, skills and resources that have been incorporated in library and information science education (2004b). Similarly, Kiplang'at's study investigated the diffusion of information and communication technologies in the communication of agricultural information among agricultural researchers and extension workers in Kenya in reference to Kenya Agricultural Research Institute (KARI) and Ministry of Agriculture and Rural Development (MoARD). The study used the diffusion of innovation theory to find out the nature, types, distribution and extent of the use of ICTs by agricultural researchers and extension workers in knowledge acquisition and dissemination process (Kiplang'at, 2004).

The theory provides a sound base for descriptive research, although a number of writers (Kiplang'at, 2004; Lundblad, 2003; Minishi-Majanja, 2004b) have noted the inadequacy of the theory. The theory does not adequately provide the basis for predicting outcomes or providing guidance for accelerating adoption rates. There is also doubt about the extent to which the theory gives rise to readily refutable hypotheses, since it focuses mainly on

socio-economic issues. It provides the opportunity of extending Rogers' work into organizational setting, some of which may be accomplished through additional research from other scholars. There is need to explain how the various elements involved in the interaction process such as: innovation, adopter, social system and other influencers relate to diffusion of innovation within organizations. The theory provides a platform for studying library and information science innovations, even in unique social systems like the Sub-Saharan Africa. Diffusion of innovation theory provides the best approach for understanding and describing ICT education and training in library and information science. The theory takes into account all the aspects related to the education and training of ICT in terms of initiation, implementation, continuation and confirmation.

2.2 Conceptual Framework

Using diffusion of innovation theory approach the study highlighted various issues regarding ICT education and training of undergraduate library and information science students in the universities. This generated a conceptual framework of understanding and explaining the relationship involving the various elements in the study such as: library and information science teaching departments, lecturers, educators, undergraduate students, university environment, information professionals and resources. These elements are directly connected and linked to the education and training of undergraduate library and information science students. The conceptual framework is based on the diffusion of innovation theory and the researcher's professional working knowledge and experience in information work and teaching.

From the foregoing, the main components in ICT education and training of undergraduate library and information science students include the: library and information science teaching and learning departments in the universities, ICTs knowledge and skills, and modern information environment as indicated in Figure 1, pg. 35. Library and information science teaching departments provide education and training opportunities, adequate infrastructure, facilities and resources. Lecturers impart ICT knowledge and skills to the students that are essential in career opportunities, job market, performance requirements and competence in information work. This helps in assessing the value of ICT education and training in relation to modern information practices, career opportunities, job market, professionalism, globalisation and knowledge economy.

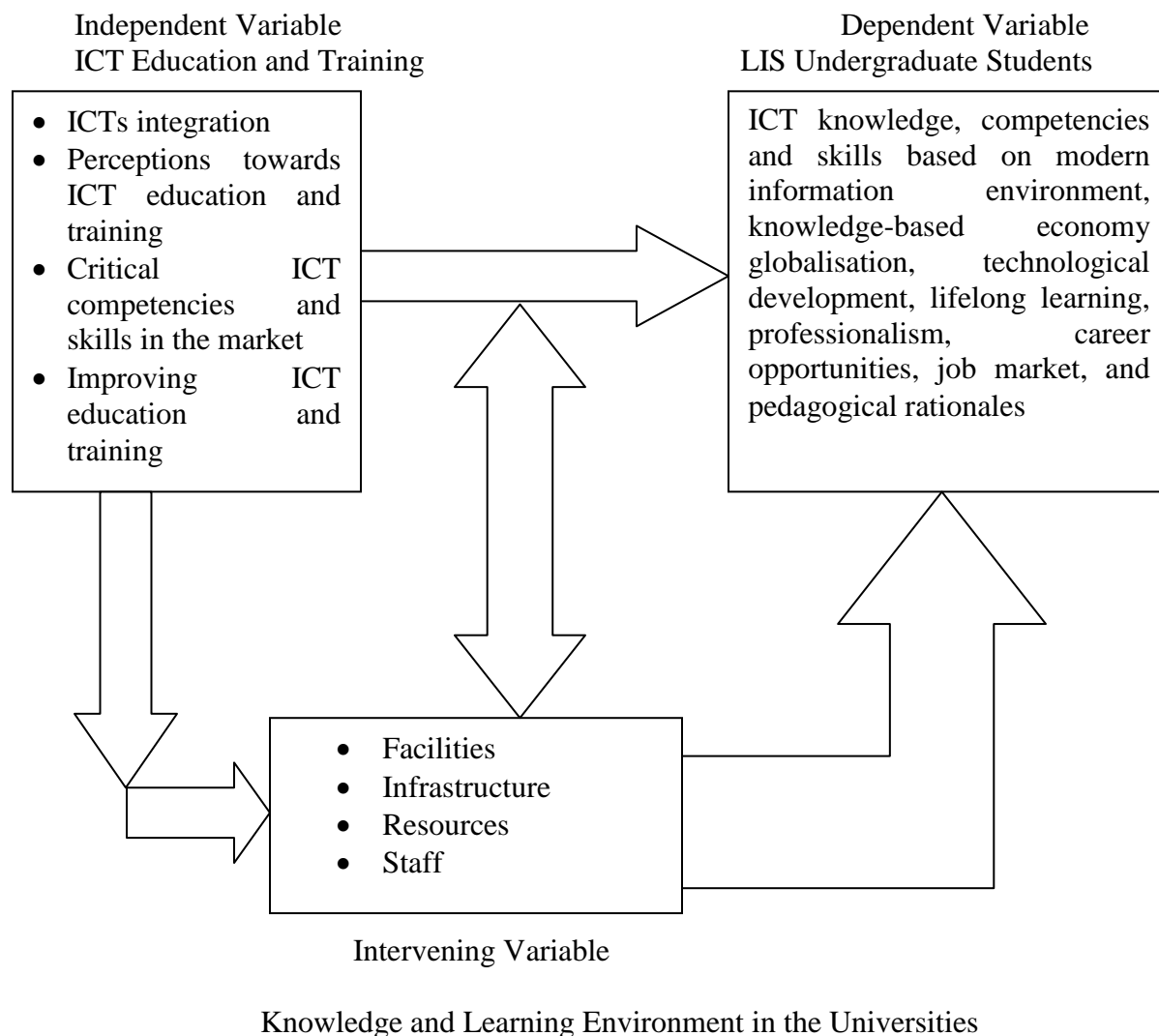
Library and information professionals provide a direct link between the information industry and the universities in regard to the education and training of library and information science students and information professionals in general. Universities offer education and training opportunities to the students that involve various pedagogical issues: lecturers, educators, students and technology. Education and training in universities is expected to produce students with high technological abilities for employment purposes, career opportunities, job market, professionalism, globalisation and knowledge economy. In the literature review, the negative consequences of lacking ICT knowledge and skills in the context of information work are well documented. In the increasingly knowledge-based society, information professionals face numerous challenges in the process of managing and handling information services and activities. New areas of information specialization in the field of library and information education

have emerged occasioning the need for a new kind of information professionals with ICT competencies, knowledge and skills.

Preparing students to meet the challenges of the knowledge-based society is a fundamental responsibility and duty of the library and information science teaching departments in the university. The university environment may face numerous problems in relation to ICT education and training but has to provide adequate infrastructure, facilities and resources for proper teaching and learning to be realized. All these elements work towards the mission statements of the universities in achieving the goals and objectives of teaching and learning process. If the library and information science teaching departments in the universities are to accomplish the mission statements of producing quality and competent library and information science graduates, then challenges facing ICT education and training should be given top priority.

In the context of university education, library and information science teaching departments, undergraduate students, lecturers and educators are equally involved in the learning process. Teaching and learning is the process of acquiring ICT knowledge and skills. The student acquires knowledge gained from previous learning experiences and situations which in turn influences new knowledge and skills. The final year undergraduate library and information science students interviewed helped to gauge the value of ICT knowledge, competencies and skills gained over the years.

Figure 1: Conceptual Framework for Understanding and Explaining ICT Education and Training of Undergraduate Library and Information Science Students in the Universities



Source: (Researcher, 2010)

Figure 1 shows the relationship among the various issues regarding ICT education and training of undergraduate library and information science student in the university. The figure also indicates that ICTs knowledge, competencies and skills form the basic and fundamental requirements necessary in the modern knowledge environment. These skills directly related to the pedagogical rationale are quite essential in the current knowledge

society. ICT education and training depend upon adequate facilities, resources, infrastructure and staff. In the knowledge-based economy, ICT education and training has become an extremely important aspect in library and information science because of the critical impact of modern technological innovations not only on the managing and handling of information and knowledge but also on employment opportunities, career development and competitive job market requirements.

2.3 Development and Trend of ICT Education and Training

Globally, there has been debate on the relevance of ICT courses in the field of library and information science education. Recent studies in the United States of America, Britain, Asia, Australia and Africa have been carried out and reported various trends affecting library and information science education and training especially ICT courses. In the United States of America, library and information science programmes in universities have aligned their curricula to the current academisation environment. Recent reviews of the curricula indicate a trend characterized by ICT courses in library and information science education (Ariyo, 2000 & Pettigrew & Durrance, 2001). Hedman (2005) observed that implementation of ICT was identified as one of the central themes emerging in the study of librarianship in Scandinavia since lack of ICTs was widely emphasised as a major factor inhibiting education and training of library and information professionals. As a result, changes in the library and information science curriculum called for a deep understanding of the social dynamics of libraries and librarians. In India and many developing countries, majority of the library and information science teaching schools and departments are concentrating more on traditional library positions ignoring

a long list of other information careers especially in ICTs (Siddamalliah & Karisiddappa, 2003).

There is a lot of information on the development and current state of ICT education and training for undergraduate library and information science students in Africa. Recent surveys on trends in library and information science education in Eastern, Central and Southern African region have identified the integration of appropriate ICTs programmes as important in the education and training of information professionals in general and undergraduate students in particular (Wilson, 2001; Drexel University, 2000; Gorman & Corbitt, 2002; Ocholla & Bothman, 2007; Mutula, 2005). Of all the countries in Africa, South Africa is ahead of the other countries in terms of library and information science education and training. Universities in South Africa have also gone a step ahead in the continent in terms of integrating ICT courses in library and information science education as characterized in the curricula (UNISA, 2007). Ocholla (2000) observes that library and information science education in South Africa has gone through tremendous changes, resulting to mergers of schools, introduction of new courses to integrate ICT programmes, distance learning options and closing of library and information science schools.

In East Africa, there are various institutions offering library and information science education and training programmes at different levels. In Uganda, Makerere University offers library and information science programmes at undergraduate and post graduate levels. Library and information science education and training in Tanzania is still developing, with Bagamoyo School of Library, Archives and Documentation Studies (BSLADS) providing a bachelor's degree in library and information science. In the Kenyan context library and information science education and training is offered in various institutions of higher learning including Kenyatta and Moi Universities.

Library and information science programmes in Africa emphasize the need for increased investment on ICTs education and training, and continued professional development (Minishi-Majanja, 2004a). Job opportunities are increasingly becoming available outside the traditional settings of the information profession such as: cybrarians, website coordinators, webmasters, database consultants, metadata specialists, digital literacy managers, information literacy coach, corporate information officers and knowledge managers (Babu et al. 2007). There is need to review the library and information science curriculum so as to incorporate emerging and new areas in modern information and communication technologies. Siddamallaiah and Karisiddappa (2003) suggest that in order to bridge the gap between theory and practice, library and information science education requires these three main components: core knowledge of library science, application of information communication technology, and knowledge of organization behavior and management including domain knowledge of the host organization. The authors also add that in today's knowledge society, other fields of study such as:

computer science and information technology have well established curriculum in ICT programmes. If information professionals and undergraduate students in particular are to acquire adequate ICT knowledge and skills, library and information science education needs total reorientation and evaluation.

2.4 Library and Information Science Education in Kenya

2.4.1 Historical Perspective

The development of library and information science education in Kenya began in 1950 when the Royal Technical College (now University of Nairobi) started providing its employees with in-service training in basic library and information skills (Shiholo & Ocholla, 2001). Later on, Kenyans started to pursue correspondence based library and information science courses organized by United Kingdom institutions including City Guilds and British Library Association. Formal training in library and information science in the region started with the establishment of the East African School of Librarianship (EASL) at the Makerere University in Uganda to train various cadres of information professionals (Kavulya, 2007).

With the realization of the need to provide training for the library and information sector, formal education in the country began in 1974 at the Nairobi Polytechnic. Later on, various studies were carried out with the aim of trying to establish full training programs in library and information science education (Ojiambo, 1983 & Osundwa, 1975). The library and information science education and training at Kenyatta University began in 1984 with the sole aim of training lecturers for the country's diploma teachers (Ocholla, 2005). The programme was a postgraduate course that admitted graduate teachers to

teach and train library and information skills to teacher trainees at tertiary colleges. Initially, the demand for information professionals in the country led to the need to expand the available education and training programmes. This demand led to the development of the School of Information Sciences at Moi University in Eldoret and other places.

Rosenberg (1989) carried out a detailed study on library and information science education and training, which formed the basis for the information sciences programmes of the School of Information Sciences in Moi University. Rosenberg's study identified the type, nature and range of information handling skills required by library and information science professionals in Kenya, so as to match the curricula with the required professional competencies. This led to the establishment of the School of Information Sciences at Moi University in 1988. At present, the school is one of the leading institutions of educating and training information professionals in Eastern, Central and Southern African. In 1994, Rosenberg again carried out a review of information sciences education and training at Moi University to determine which additional courses were required. The findings indicated the need for new areas of study such as: software management, storage and retrieval, publishing and media, computer programming, newspaper and magazine publishing, management, human communication, information society, communication of information, computer applications, information storage and retrieval, language skills, media technology and office management. Issues such as these occasion the need for the review and updating of the curriculum accordingly to reflect the changes affecting the information profession.

There are also other academic institutions in the country both public and private offering library and information science education and training at different levels. The public academic institutions include the: Kenya Polytechnic University College, Kenya Science Teachers College, and Kenya Technical Teachers College. The private academic institutions are Inoorero University and Kenya Methodist University. Education and training in the country has also expanded and opened new frontiers that including open, distance and e-learning programmes offered by foreign institutions like the University of South Africa. Many other institutions of higher learning are planning to start library and information science programmes at bachelor's level and above. The Kenya Methodist University has already started a bachelor's degree in information science (Kenya Methodist University, 2010), while the Catholic University of Eastern Africa is offering Bachelor of Science in library and information science (Kavulya, 2007).

2.4.2 ICT Training in Library and Information Science Education

Library and information science education and training has been undergoing tremendous transformations across the world. In Kenya, the debate continues on the current state of library and information science education and training. A number of authors (Ocholla, 2000; Shiholo & Ocholla, 2001) agree that the debate has generated many concerns regarding library and information science education in the country, in addition to maintaining that this is not a new discussion as the likelihood of the continued existence of this situation has been debated since the 1980s. Across the country there is great concern for what should constitute appropriate ICT education and training of undergraduate library and information science students. Of major concern is the emerging

role of ICTs in information work and activities, leading to the need to review library and information science education programmes with the aim of increasing the integration of ICT courses in the curriculum.

There is evidence of increased integration of ICT courses in library and information science programmes in Kenyan universities. Kenyatta University's department of Library and Information Science offers various ICTs courses to the students: information technology I and II, automation in library and information centres, systems analysis and design, database management systems, web design for information centres, electronic information sources, media studies, digital libraries, and desktop publishing and technical writings (Kenyatta University, 2010). At the School of Information Sciences in Moi University, ICTs courses provided to undergraduate library and information studies include: basic elements and use of computers, computer programming, computers for information resource management, operating systems theory, data structures and algorithms, computer architecture, management information systems, data communication, electronic publishing, library automation, systems analysis and design, advanced information retrieval, database construction and management, and selection of hardware and software (Moi University, 2010).

Table 1: ICT Courses for Undergraduate Library and Information Science Education in Kenyatta University

YEAR OF STUDY	COURSE TITLES
1.	1. Information Technology I
2.	1. Information Technology II
3.	1. Web Design for Information Centers 2. Systems Analysis and Design 3. Database Management Systems 4. Digital Libraries
4.	1. Automation in Library and Information Centers 2. Advanced Web Design 3. Electronic Information Sources 4. Introduction to Computer Programming 5. Desktop Publishing and Technical writings

Table 2: ICT Courses for Undergraduate Library and Information Science Education in Moi University

YEAR OF STUDY	COURSE TITLES
2.	1. Basic Elements and Use of Computers 2. Computer Programming
3.	1. Operating Systems Theory 2. Computer Architecture 3. Data Structures and Algorithms 4. Data Communication 5. Electronic Publishing
4.	1. Management Information Systems 2. Systems Analysis and Design 3. Database Construction and Management 4. Library Automation 5. Selection of Hardware Software

2.4.3 Teaching and Learning Resources

Mambo (2000) postulates that the education and training of library and information professionals in developed countries has been made important over a number of years due to the continued development and updating of the curriculum to address the challenges of the information environment. Such education and training has enabled students from Africa to gain experience of libraries of developed countries, although there has been challenges regarding appropriate application. This has been due to the low level of development of libraries in most African countries. The most recent aspect has been the diminishing role of library and information professionals in areas of ICT knowledge and skills. There is need to pay special attention to library and information science schools in Africa so as to offer adequate and effective training within existing resources and conditions (Mambo, 2000).

Library and information science schools in Africa and Kenya in particular, have been experiencing numerous problems in regard to low student numbers and withering of the information profession. This has been occasioned by the inability of the schools to look at the real issues affecting education and training programmes, and hence take drastic steps to improve the situation. In order to offer excellent education and training programmes, universities have to provide the necessary resources in terms of facilities, infrastructure, computers and teaching staff. Teaching and learning of ICT courses depends upon resources, interests and opportunities that the universities have to provide so as to adequately prepare the students in asserting themselves in the information environment.

2.5 Perspectives on ICT Education and Training

Recent developments indicate that the transition to the information age has been characterized and shaped by the emergence of ICT (Castells, 2000). The knowledge age has resulted in ICT having growing influence in transforming people, organizations and societies and impacting on education, training and research. Educational and training programmes including library and information science programmes have experienced many changes in recent years due to this development. Education and training is needed at all levels of the population in the society to facilitate familiarity with the use and potential of ICTs as the fundamental goal and objective of institutions of higher learning (World Information Society, 2007).

In the current digital information environment, developments of ICTs systems have had a great influence not only on library and information establishments but also on the education and training of information professionals. The role of information professionals continues to evolve as electronic content and digitization of print materials create virtual libraries, digital services and digital information systems. This has created the need for information professionals to acquire adequate knowledge and skills in computer hardware and software systems, information management systems, database management systems, networking administration and management, information retrieval systems, information literacy skills and ability to teach the same. Information professionals need to have good understanding of ICT knowledge and skills if the information needs and demands of organizations and customers are to be efficiently satisfied.

In the 21st century, there is a growing realization of the importance of ICT as the emerging new tool for the knowledge economy. The fact that ICT is one of the Millennium Development Goals underscores its importance in transforming organizations and societies into efficient service providers. The changing demands of the workplace have continued to be a driver for change in library and information education and training, and have rapidly or extensively affected the information profession (Missingham, 2006). In the modern knowledge environment, ICT knowledge, competencies and skills is given top priority in the information profession. New career opportunities in the job market favour graduates in information technology or computer science specialization. Tahourie (2006) has defended ICT education and training in the information profession. The author argues that librarians should acquire ICTs knowledge, competencies and skills before entering the job market; library and information science education system must prepare librarians through proper college curriculum; and if library and information professionals are to be the first to use new technology, then the professionals must have adequate knowledge, competencies and skills.

There are various rationales for integrating ICT education and training in library and information science programmes. Three main rationales that a number of authors agree on are: social; vocational; and pedagogical (Abuhmaid, 2008; World Information Society, 2007; Maddux & Cummings, 2001). The vocational rationale considers the necessity for the society to have skilled technological workers and relates learning to future job market and career opportunities. This rationale has a direct bearing on the education and training of the incoming library and information professionals since students need to acquire

adequate knowledge and skills in ICT courses in order to manage and handle information services effectively and efficiently. The social rationale for integrating ICT education and training is important in preparing students for active roles in the society in relation to information work. The pedagogical rationale emphasizes the role of ICT in improving and enhancing teaching and learning in higher education. Lecturers also need to be knowledgeable in order to impart knowledge and skills in ICT related areas.

Recent studies indicate the increasing nature of ICT in information work posing the greatest challenge for information professionals (Minishi-Majanja, 2007; Miwa, 2006; Mutula, 2005; Pettigrew & Durrance, 2001). In the constantly changing information environment, library and information science education should offer appropriate ICT knowledge, competencies and skills in order to suit the modern job market requirements. Emerging and new areas of information work have rapidly developed outside the traditional librarianship. Such include the: information systems, software development and digitalization of information services. This is in response to modern technological innovations affecting all practices of managing and handling information work in the current digital environment. Revision of library and information science education curricula is necessary if the undergraduate library and information science students are to be equipped with the knowledge and skills necessary for achieving effectiveness in information services (Matersk, 2004; Ocholla, 2003; Omekwu, 2006; Siddamallaiah & Karisiddappa, 2003; Singh, 2007). Library and information science programmes have to develop innovative curricula to educate and train undergraduate students on appropriate ICT knowledge and skills so as to suit current job market and performance requirements.

ICT has proved important in the information and knowledge society is based on its potential role in narrowing the digital gap in higher education institutions. The ICT divide between library and information professionals who are technologically empowered and those who are not is wide and real. Education and training of undergraduate library and information science students seem to be facing multifaceted challenges, yet one of the solutions to revamp and enhance the profession seem to go unnoticed. Against these developments, there is no doubt regarding the importance of ICT training for undergraduate library and information science education in the country. Library and information science no longer has the monopoly over education and training of information professionals (Raju, 2009).

2.6 Emerging Factors Critical in ICT Education and Training

2.6.1 Knowledge Society

The concept of information society dates back to the 1970s and has continued to develop and change. A number of authors highlight various issues that affect information professionals as well as library and information science education and training programmes (Pugh, 2007; World Information Society, 2007; Wood & Walter, 2000). In the modern information environment, library and information work is undergoing tremendous change leading to emerging and new services and systems such as: knowledge economy, digital libraries, virtual information systems, online information, globalization, technological solutions and library mergers. Change became evident in the 1980s when the society began to apply and use computers and telecommunication systems in information and knowledge work. This was the biggest turning point in the

history of information society which has progressively continued to change depending on the dictation and demands of the information environment. It is clear that information and knowledge are extremely important for the development and survival of human beings in the society.

In the information profession, ICT development has led to the emergence of new areas of specialization to serve societal needs for information and knowledge access. Such areas include the: management information systems, knowledge management systems, digital library systems and information communication technology (Laudon & Laudon, 2000). In the initial stages of evolution, the main focus was information economy. In the recent past, there has been a paradigm shift from information economy to knowledge economy. Knowledge society is characterized by various elements, which include the: development of ICT systems; knowledge professionals; value of knowledge to generate and create economic wealth and social services in the community; and role of knowledge to bring societal change and empower citizens in the society (Abuhmaid, 2008 & Mackay et al. 2001).

The current knowledge-based society needs new kinds of information professionals with novel skills of locating, organizing, repackaging and disseminating information for the user population (Kavulya, 2007). In the midst of plenitude, there is a real likelihood of particular segments of the society not being able to access the requisite information, hence the emergence of yet another dimension to the gap between the rich and the poor (Gore, 2000). This underlines the need for ICT education and training to address the

challenges facing information professionals in designing, implementing and managing information systems to meet the rapidly changing needs of the knowledge society. These developments point to the need for education and training in modern information and communication technology (Hedman, 2005; Hjørland, 2002; Juznic & Badovinac, 2005).

Transition into a knowledge-based society affects information professionals due to the increasing tendency to link development with the ability to function effectively and efficiently in work places and career development. Factors at the centre that need to be addressed include the: emergence of ICT and its application in all sectors of life; modern technology revolution; demand for information literacy; professional development; and digital information systems. The knowledge-based society has brought modern information services with better means of managing and handling information work. This can be clearly seen in the current economic revolution where ICTs solutions are central in managing and handling information and knowledge services. Such solutions include: digital information systems; web technologies; integrated information systems; internet based information services; software development; and information programming skills.

In the information based and technology driven economy, no organization or individual can effectively claim to succeed in solving management and quality related problems unless strategically driven by ICT (World Information Society, 2007). The need for a paradigm shift in ICT education and training in library and information science curriculum in the universities becomes not only important in the wake of the modern knowledge environment but also a competitive strategy if the graduates are to stay on top

in the information business. This brings into focus the competence of library information science undergraduate students in managing and handling information work and services. Admittedly, these developments raise the issue of how far undergraduate library and information science education should learn from the information and knowledge environment.

2.6.2 Knowledge Economy

The concept of a knowledge-based economy or new economy is used to describe the economy, in which the generation and exploitation of knowledge are important and critical in the creation of wealth in the society (Ariyo, 2000). The current modern society is increasingly witnessing a new dispensation, where knowledge is not only important in the society but also the information economy is slowly being replaced with the knowledge economy (Omekwu, 2005; Scammel, 2001 & Singh, 2007). Knowledge is useful in creation of wealth in the society and affects all aspects of human life.

Emergence of the knowledge economy and commoditization of knowledge are driving library and information professionals to learn and honour varied sources of knowledge (Siddamalliah & Karisiddappa, 2003). The pervasiveness of information work and activities has also made the information landscape very diverse with incoming information professionals graduates taking up positions beyond the traditional boundaries of libraries and information centres (Raju, 2009). The emerging information market in which library and information science graduates are pursuing careers outside the traditional setting of librarianship indicates the need for the integration of ICTs

programmes in the curriculum so as to appropriately prepare the graduates for the workplace (Todd & Southon, 2001 & Brine & Feather, 2002). Library and information science schools no longer have a monopoly over education and training of professional information workers. In this knowledge environment where information is extremely important in many kinds of work, individuals working with the creation, diffusion and utilization of information do not necessarily regard themselves as information professionals belonging to a specific profession (Raju, 2009).

2.6.3 Modern Information Environment

Technological revolutions have created a modern information and social environment, fundamentally different from that of traditional librarianship. This fact has changed all aspects of information work in the new environment and introduced new and different types of competencies and skills that are important and required for the education and training needs, employment opportunities and performance requirements of the incoming information professionals. In the modern information environment, information professionals must be competent and skilled in information resource management, knowledge management, communication skills, information literacy, modern technology solutions, customer needs and demands, digital information systems, digitization of information and knowledge resources, web publishing techniques and virtual libraries (Cheng, 2001 & International Federation of Library Associations and Organizations, 2000). Majority of these core competencies and skills are directly related to ICT education and training and require continuous updating because of the rapid rate of technological development. Modern librarians should be professionals who possess

standards and values that function effectively and smoothly in the technological environment, and understand and know sufficiently the conventional library practices (Gerolimos & Konsta, 2008). To be competent in a digital culture environment library and information professionals must acquire the relevant skills and expertise (Singh & Shahid, 2010).

In the modern technological environment, library and information agencies are passing through challenging phases threatening the existence of information professionals. Library and information professionals need to invent and adopt innovative ways to survive in this dynamic and competitive environment. Information professionals should also equip themselves with new skills and competencies to enable them remain relevant in the mainstream of information work and activities. This requires that library and information professionals have a strong background in information management, communication skills, and understanding of human behavior and cognitive science (Singh, 2007). The present library and information science job market requires graduates who are highly knowledgeable and skilled in technological systems such as: computer literacy; word processing systems; database management and construction systems; online information retrieval and dissemination systems; multimedia services; digital or electronic current awareness services; automatic indexing and abstracting; text digitization; desktop publishing; electronic publishing; library automation systems; telecommunication systems; web design, management and administration; archiving of audio visual and electronic documents; computer hardware and software systems; and information systems (Ocholla, 2003).

Technological developments have rapidly re-invented and expanded the role of library and information professionals. The expanded role requires library and information professionals to acquire adequate ICT competencies and skills through education and training, and also continuous professional development. Raju (2009) observes that although librarians and related information professionals including archivists, records managers and documentalists can contribute valuable expertise and competencies to the emerging information market, they are not the only ones in the field. The author adds that since information communication technology, specifically computers and data communications is extensively used in organizations in processing and dissemination of information (web-enabled information delivery), computer scientists are well placed to work in the information environment.

ICT competencies and skills require continuous updating because of the rapid rate of technological development, and library and information science schools should regularly review the curricula and update the content (Minishi-Majanja, 2004b). Transferring of library and information science education and training should involve continuous infusion of ICT content into programmes that support the needs of the students and the employers (Manmart, 2001 & Ocholla, 2003). Minishi-Majanja (2004b) highlights that library and information science schools have the task of not only equipping library and information science graduates with current competencies and skills, but also of offering firm and flexible base for learning or acquiring newer skills and competencies as the need arise in the working environments.

Transition into the modern information environment implies the need for library and information science graduates to have adequate ICT education and training that is crucial to the success and competitiveness of contemporary knowledge environment. In the present knowledge age, information professionals ought to possess multifaceted skills so as to handle and manage information services and activities efficiently and effectively (Varalakshmi, 2006). Such skills include: information communication technology, knowledge management, content management, organization of information, research services, and developing and maintaining digital libraries. The information job market has become more competitive and technologically-reliant to the extent that library and information professionals have to acquire the right knowledge and skills in order to meet the needs of such an environment.

Appropriate curriculum should be adoptable and applicable to the many different subjects and situations in the field of library and information science (Singh, 2010). As Ocholla (n.d.) notes, in an education and training programme, a curriculum is a fundamental requirement because it not only provides a list of courses or modules offered in a programme, but also gives information on content, purpose, method, time, trainers and location of a programme. The complete curriculum should include all aspects of the profession including traditional and modern information courses. Library and information professionals must constantly monitor the needs and demands of the information industry in the process of developing a complete and competitive curriculum.

The intellectual content of the curriculum for any programme has to keep pace with the demands of the profession (Edzan & Abdullah, 2003). Library and information science education programmes have been revising their curricula to cater for more ICT oriented courses due to new career opportunities and job market requirements in the modern information environment as shown elsewhere. There is need to balance between core information courses and ICTs programmes that are important in the modern information environment. Pors (1994, p. 17) affirms that there is no doubt that the development of information communication technology systems and inherent changes in the labour market conditions leads to the need to review the contents and organization of library and information science education. With the new curriculum structure library and information science education adapts and becomes flexible to new needs and demands in the labour market and workplaces.

In addition, the proliferation of other professionals into the information profession especially from computer science, information technology and commerce shows the decreasing perceptions of the education and training status of library and information science in the universities. More alarmingly, there is a rapid increase and enormous mass exodus of information professionals to other professions that are market oriented and technology driven. Even in the information profession, there is evidence of job discrimination merely because of lack of appropriate ICT competencies and skills. Due to this, ICT education and training becomes essential in preparing the graduates to face the competitive job market.

2.6.4 Digital Information Environment

The present information environment is rapidly changing from conventional to digital information systems. This particular aspect of technological innovation seems to be posing the biggest challenge to libraries and librarians in developing countries. In the transition to digital information systems, library and information professionals must come to the frontline and provide the much needed leadership for successful implementation of ICT innovative systems. Discussion on the skills and expertise required for the “the librarian of the twenty-first century” within various information sectors and professional associations indicate that the use of new technologies is important in terms of the education required – both through library and information science education and continuing professional development (Missingham, 2006). Information professionals should acquire appropriate ICT knowledge and skills through continuing education and training programmes, and revision of library and information science curricula (Ramzan, 2004).

Ultimately, digital information environment depends on information and communication technology infrastructure to facilitate information processing and distribution; sharing and networking; information access and retrieval systems; and online information services (Chowdhury & Chowdhury, 1999). In the changing information landscape, information professionals must be actively involved in development and creation of digital information systems so as to provide competitive services to the customers in the current digital age. Empirical studies indicate that library and information professionals lack the necessary ICT competencies and skills needed for successful development and

implementation of digital information projects (Rosenberg, 2005). In particular, many skills have been identified for preparing incoming information professionals for tasks such as: programming languages; software development; web management systems; content management; and database management systems. Issues such as these have an influence on the philosophy for acculturation of graduates into the information environment, and the curriculum for supporting the preparation process (Middleton, 2010).

2.6.5 Web Technologies

In the digital age, rapid advances made in modern technological solutions such as: web technologies, internet and World Wide Web have enhanced information and knowledge use, access, exchange and distribution. In the last two decades, rapid technological developments have transformed library and information services all over the world, with the recent innovation being web technologies, second generations of the World Wide Web that have had significant impact on the higher education (Arif & Mahmood, 2010). Information professionals need to keep on top of technology issues that directly affect exchange and distribution of information and knowledge (Broady-Preston, 2009). Review of library and information science curricula in response to the changing information environment in the USA, indicate that library and information science schools have done little to embrace education and training programmes in library 2.0 and web 2.0 technologies (Foo & Ng, 2008). Similar international studies in Australia, Ireland, Lithuania, Slovenia and the United Kingdom indicate that Web 2.0 tools for LIS education is at the introduction stage (Bawden et al. 2007). In Pakistan, twenty percent of

library and information professionals are generally less inclined toward adoption and use of web 2.0 technologies, with the study advocating the need for education and training programmes in higher education (Arif & Mahmood, 2010).

In the digital environment, the paradigm shift or transition from the industrial age to the knowledge age has brought new technological innovations – library 2.0 and web 2.0. Munatsi (2010) observes that it is regrettable that library 2.0 and web 2.0 systems, not quite new dispensation in the information environment have not been overly embraced in a good number of African academic and research universities libraries. The development of library 2.0, web 2.0 technologies as well as related systems puts library and information agencies at the modern level or platform of socialization that is critical in the emerging knowledge society. Information professionals in the country face many challenges in regard to these technological solutions with the biggest hindrance being inadequate knowledge and skills. In the modern knowledge and learning environments, it is important that library and information science education in the universities integrates library 2.0 and web 2.0 systems into mainstream curriculum, since information and knowledge services are managed and handled in terms of changes, developments and issues brought by these innovations.

2.6.6 Emerging and New Trends in the Information Profession

Technological innovation has rapidly expanded the role of library and information professionals leading to the development of new information services and emergence of new labour markets for library and information professionals (Callison & Tilley, 2001).

The field of library and information science in Africa has been characterized by inadequate or outdated ICT competencies and skills among the staff. Information professionals were inadequately prepared to function in the present dynamic digital or electronic knowledge environment (Raseroka, 1999 & Rosenberg, 2005). Digital libraries also represent a new paradigm that challenges information professionals to rethink and reinvent information services in the networked environments (Zhou, 2005). The nature of digital libraries envisions the library and information science education to impart and develop competencies, skills, attitudes and values that enable information professionals to manage digital libraries (Kavulya, 2007).

Developments of ICT systems are transforming the global information environment and creating huge opportunities for information professionals to develop and increase access to information services as well as expand the customer base. It must be recognized that the traditional markets for information skills and services are changing as new skills and services are being developed (Gerolimos & Konsta, 2008). With ICT, new and challenging information roles have come up for the incoming information professionals. Modern library and information professionals should focus attention on evolving technology solutions. Biddiscombe (2000) highlights that alongside the traditional skills, ICT skills are essential requirements for learning, educational or research procedure in virtual environments for modern library and information science professionals.

Developments in the field of ICT have also made tremendous changes in the profession. These changes are clearly evident as information professionals are trying to adjust to new current needs and demands of managing information and knowledge. A broad range of information professionals whose unifying qualifications include ICT knowledge and skills now exists. This trend demonstrates clearly the increasing nature of ICT in information services and activities. ICT systems are rapidly increasing accessibility to information and information professionals are adapting to the evolving needs of users that emerge from the adoption of evolving technologies. ICT revolution has brought emerging and new trends in the information environment that call for appropriate ICT knowledge and skills if graduates are to function effectively and efficiently in the modern knowledge-based economy. These developments illustrate the need for library and information science programmes to integrate ICT education and training.

2.6.7 Hybridization in the Information Profession

In the modern information environment, library and information science education should put emphasis on ICT competencies and skills that form the corner stone of progress for managing, handling and supporting information products and services in library and information establishments. Kavulya (2007) indicates that there is debate as to whether it is possible to create a curriculum that enables information professionals to work in diverse information sectors such as: libraries, information institutes, archives, publishing houses, newspaper or journal offices and technology related work. In addition, the author argues that these subject areas are autonomous or independent, hence making it very hard to tell which area one is training in and difficult to produce information workers who are

suited in all those fields. Information profession is a convergence of information science, records and archives management, publishing and media studies, library science and information technology (Juznic & Badovinac, 2005). Specialization in library and information science education has been a matter of debate for a long time. Agha (2001) argues that the process needs to be viewed from the integrated perspective; merging trends; proactive and evolutionary approaches in the information environment; market needs and requirements; and professional intent. Constant review of balance and harmony of the profession in maintaining relevance to society is important for growth, survival and perpetuation.

Library and information science education and training ends up producing different professionals in respective fields, since specialization in one field is different from another. As a result, library and information science training institutions have to be selective about which application areas to undertake, depending upon resources, interests and opportunities (Kavulya, 2007). In order to raise the standard and status of library and information science professionals, it is essential to adequately develop and prepare them to work as efficient information solution providers (Siddamalliah & Karisiddappa, 2003). In the current digital environment, information professionals are expected to undertake tasks of information and knowledge management in relation to modern technology solutions.

2.6.8 Leadership in Technological Solutions

Leadership is one of the contemporary issues important for information professionals in the current digital knowledge environment. Technological innovations in web technologies, social media, internet and related systems are changing delivery and provision of services in information centers. Technological advancements that have come with the development of the internet and related systems have brought stiff competition in the way information is acquired, harvested, obtained, managed and disseminated. Contemporary trends in information management practices such as: consumption and use of information pose the biggest challenges to library and information professionals, and many of the basic tenets of information management must be consequently reviewed and refined in line with modern trends (Wei, 2004). Fundamental issues in information and knowledge management practices are strategic and operational planning, evaluation and marketing processes, ethical and legal decisions, development and implementation of essential information policies and procedures, effective human resource management, motivation, ICT competencies and skills, and interpersonal communication techniques (Kavulya, 2007).

Leadership in technological solutions is extremely important and critical in the management of library and information services in the knowledge-based economy. The incoming information professionals must exhibit quality leadership practices in implementation of technological projects in information work. Information professionals should be well educated and trained with standards and values that function effectively and efficiently in a modern technological environment, knowledgeable in contemporary information management practices, and readily embrace new knowledge and skills in the

profession (Gerolimos & Rania, 2008). Leadership in information work implies the practice of implementing modern technological solutions to achieve effectiveness and efficiency in managing and handling knowledge.

Fisher (2004) believes that in the present knowledge age, information professionals should have quality leadership skills in order to function effectively in work places, create efficient organizational information management systems, adequately use contemporary practices to provide and transfer information products and services, manage and handle access in digital information systems, and effectively support learning procedures. Many writers believe that modern academic courses in library and information science education and training programmes should aim to create “complete librarians”, while acknowledging that knowledge and learning practices in library and information science education and training should converge with those found in actual modern information environment (Audunson et al. 2003 & Missingham, 2006).

Information practices have drastically changed to the extent that ICT competencies and skills are fundamental and mandatory to library and information education and training. In the present knowledge and learning society, if information professionals have to maintain and sustain relevance in the modern information environment, they should be highly intelligent and competent in technological systems. Library and information science education and training should ensure that students receive and leave with adequate knowledge and skills that are crucial in providing effective and efficient leadership qualities in implementation of technological solutions.

2.6.9 Continuous Professional Development

Omekwu (2006) agrees on the changing nature of the information environment that requires adequate ICT knowledge, competence and skills on the part of information professionals. In addition to core information management and organization skills, library and information professionals are expected to be highly knowledgeable in technological competencies such as: computing skills, web design, internet searching and evaluation of digital information (Bawden, 2005). Information professionals should be ready to move with the challenges of digital systems, globalization of information products and services, networked resources, knowledge economy, new learning and research systems, and increased demands of the user communities for information services (Omekwu, 2006). This can be efficiently achieved and implemented through continuous professional development in ICT programmes.

Globally, information and communication technologies have transformed library and information services. These technologies are important in education and training of students universities. In the current knowledge and learning society, it is imperative that the education and training of undergraduate library and information science students reflects the importance of obtaining adequate mastery knowledge and skills in ICT programmes. In the information environment, successful provision of information products and services simply means combination of information, technology, people and planned activities that provide individuals with relatively easy access to data or information (Ju, 2006). Development of technological solutions including internet and web technologies have not only globally expanded access to information products and

services but also increased the rate of conversion of knowledge, information and data into digital or electronic formats. Developments in ICT have changed and expanded information services although many information professionals still lack relevant skills required for the modern knowledge environment, a requirement that the knowledge society is trying to overcome through modernized education and training practices.

Technological innovations have transformed traditional library practices leading to new information products and services, emerging roles and responsibilities of information professionals, and changed working relationships and communication patterns. Emerging and new information services have developed and expanded the roles of information agencies as mass centers of information and knowledge as well as communication services. Users' expectations of library and information professionals have also gone high. Omekwo (2006) points out the impacts of information communication technology revolution on libraries such as: globalization of information services and development of digital libraries. ICT education and training is too strong to ignore, hence library and information Science schools and departments in Kenyan universities must constantly monitor developments in the field. In the present knowledge age, ICT education and training is important for undergraduate library and information science students and the teaching and learning processes should ensure that graduates are equipped with adequate knowledge and skills.

2.7 Summary

This chapter has presented a detailed and in-depth review of the literature on the various issues arising from the area of study. Rise of the knowledge society and emergence of knowledge-based economy in readiness for the information age, has made profound changes in library and information science education. With ICT, emerging and new challenging information roles have come up in response to new job opportunities, labour market requirements and knowledge society. In the present knowledge age, library and information professionals require adequate ICT knowledge and skills that focus on satisfying the needs and demands of the users in the provision and delivery of information services. The review has also discussed reports touching on other sensitive issues affecting the information profession.

The premise of ICT education and training in library and information science programmes is based on various factors such as: the modern information landscape; technological development; social; vocational; and pedagogical issues that have direct bearing on the education and training of library information science students. The issues of understanding the competencies and skills needed by library and information science professionals are important for educators, students and employers. Digital information services in the 21st century indicate that information services and activities depend upon technological solutions resulting to the need for emerging and new skills for library and information professionals.

Library and information science education in Kenya has witnessed a dramatic transformation over the last four decades. In the early stages of library and information science education, there was passion and enthusiasm as the course was introduced. With time, the passion faded as the universities continued experiencing lower enrollments of students over the years. Significant efforts have been made to integrate ICT component in the undergraduate library and information science education programmes. In the recent past, global development in ICT systems such as: web technologies, social media and networking technologies have created the need for the library and information science curriculum to ensure that the graduates from these programmes are well equipped with adequate knowledge, competencies and skills. With all these developments, there is no doubt that ICT education and training is a fundamental component of library and information science programmes that is critical in the labour market and as performance requirements for information professionals.

CHAPTER THREE

RESEARCH METHODOLOGY

3.0 Introduction

The chapter presents the research methodology used in this study. The chapter commences with a discussion of the qualitative and quantitative methods, and a justification for the adoption of the research methods. The chapter also discusses the study's research design; selection methodology; sampling strategy; data collection approaches and instruments; pilot and pretesting of instruments; reliability and validity; and data analysis. The research methodology adopted for the present study was appropriate to the research questions indicated in Chapter One section 1.5. In addition, the research methodology used enabled the respondents to provide relevant data, opinions, suggestions and thoughts on issues regarding ICT education and training of undergraduate library and information science student in two selected Kenyan universities.

3.1 Research Design

3.1.1 Qualitative Method

There are two fundamentally different and competing schools of thought or inquiry paradigms in research such as: logical positivism and phenomenological or interpretive science (Amaratunga, 2002). Logical positivism uses quantitative and experimental methods to test hypothetical-deductive generalizations, searches for explanations and fundamental laws, and generally reduces the whole to simplest possible elements in order to facilitate analysis. Phenomenological or interpretive science inquiry uses qualitative

approaches to inductively and holistically understand and explain human experience or phenomenon, rather than search for external causes or fundamental laws. The two main paradigms to orient research are positivism or scientific enquiry (represented through quantitative methods) and interpretive enquiry (represented through qualitative methods) (Abuhmaid, 2008).

In research design, therefore, the issue becomes not whether one has uniformly adhered to prescribed canons of either logical positivism or phenomenology, but whether one has made sensible methods and decisions given the purpose of the study, research questions and available resources (Then, 1996). The qualitative research concentrates on words and observations to express reality and attempts to describe people in natural situations. In contrast, the quantitative approach grows out of a strong academic tradition that places considerable trust in numbers that represent opinions or concepts (Amaratunga, 2002). Qualitative method as a research process involves various stakeholders working together to achieve a common goal and objective. The main purpose of qualitative research is to understand the investigation process from the participants' perspectives.

Naturalist approach examines natural settings and emphasizes that meanings arise from social situations and are handled through interpretive processes (Abuhmaid, 2008 & Marshall & Rossman, 2006). Qualitative methods are meant to help researchers to understand the social and cultural contexts of the subjects (Myers, 1997). Qualitative approach is the most commonly used for needs assessment studies (Kavulya, 2007). Qualitative approach is suitable for studies that are in early or formative stages, and

where the experiences of the subjects are important or vital within the research context (Benbasat et al. 1987).

Creswell (2003) observes that qualitative study is the primary tool for data collection and analysis, since data are mediated through human instruments, rather than through inventories, questionnaires or machines, where researchers are involved in fieldwork by physically administering or going to the sampling units (organizations or institutions) and respondents (subjects). Qualitative research is also useful in investigating the process, meaning and understanding through words or pictures rather than outcomes or products. In a nutshell, qualitative research helps to build hypotheses, articulate expectations, concepts and theories, and uses data collection methods that are useful in gathering, collecting and interpreting data.

There is a strong suggestion within the research community that the best strategy is the mixed or balance approach that incorporates the combination of quantitative and qualitative methods (Amaratunga, 2002). The concept of mixed approach is also reinforced due to the growing attention of triangulation in research (Yin, 1994). Triangulation approach combines multiple observations, theoretical perspectives and methodologies as well as research strategies that incorporate quantitative and qualitative research (Amaratunga, 2002). In general, triangulation method involves a combination of research methods that uses qualitative and quantitative techniques to study the topic in gaining insights and results, making inferences and drawing conclusions. The assumption in effectiveness of triangulation rests on the premise that the weaknesses in each single

method are compensated by the counter-balancing strengths of another. The qualitative approach has been deemed appropriate for in-depth investigations requested in this study.

Based on the above explanations, this study used the qualitative research approach. Interview guides were used to get ideas and suggestions from lecturers, students, library and information professionals, and other stakeholders. In addition, the study used document analysis to collect data and information. The qualitative approach provided excellent opportunities of collecting data and getting in-depth information from the respondents. The broad qualitative approach was useful in understanding the real issues affecting or facing ICT education and training of undergraduate library and information science students in the universities.

3.1.2 Survey Research Design

In survey research, a representative sample of respondents is selected from the population or universe, and data collected and gathered through interviews and questionnaires administered using online, face-to-face or telephone methods. Survey research provides detailed and in-depth data and information that is accomplished by following well established methods such as: collecting, coding, analysing of data and reporting of the results. Survey methodology is the most popular, quick and straightforward research method that allows one to extend the results obtained from the sample of respondents to the larger population, thereby permitting more global statements (Chauvel & Charles, 2002). The study adopted survey research design to collect data from lecturers, students, information professionals and employers. The respondents were drawn from various

universities and other special organizational libraries as well as from library and information science teaching departments in Kenyan universities.

3.2 Population and Study Sample

The primary focus was to get relevant data and information regarding the area of study from all the stakeholders in the education and training of undergraduate library and information science students. The sample was drawn from the two public universities leading in offering of library and information science education (Kenyatta and Moi Universities), public and private university libraries as well as special organizations libraries. The respondents were: lecturers, library and information science undergraduate students, and library and information professionals. Three categories of interview guides were used to collect and gather data from the respondents. In total, the sample size for the study was 120 respondents distributed as follows:

- i. 20 lecturers
- ii. 90 final year undergraduate library and information science students
- iii. 10 library and information professionals

Lecturers are proactively involved in the education and training of undergraduate library and information science students, and therefore, were centrally placed to offer valid information regarding the issues of the area of study and the information profession in general. Undergraduate library and information science students training as the incoming professionals were instrumental in providing first hand information in regard to the issues of ICT education and training in the universities. The students acquire ICT knowledge, competencies and skills that have a direct bearing to the information profession and can

assess the value of the education and training received in the courses. The study involved finalist undergraduate library and information science students in order to get a complete picture of the current ICT education and training in the universities.

Library and information professionals consisted of library professional managers or leaders occupying senior positions like heads of libraries and sections with doctorate and masters in library and information science and those who advise respective organizations in terms of recruitment process. They manage information services and know quite clearly the possible challenges facing information professionals; and provide a direct link between the information industry and training institutions or organizations in the information profession. Professional working experiences, ideas and opinions directly reflect the demands and desires of employers in terms of career opportunities, job market, performance requirements, and competence in information work and activities. As practitioners, information professionals provided vital information and knowledge, and shared personal experiences and opinions regarding ICT education and training in the modern information environment. Universities are the leading educational and training organizations or institutions and employers of information professionals in the country. Special information service organizations also employ a sizable number of information professionals.

3.3 Sampling Strategy and Techniques

Sampling is the process that involves the selection of a sample of the whole population through methods such as: random and stratified methods (Bakenman & Bell, 1992).

Random sampling procedure involves the random selection of subjects from the whole population of the study. This seems the appropriate method of subject selection, although there is great discussion as to the extent to which it is possible to select a truly random, and therefore, a representative sample. Stratified sampling aims at combating some of these criticisms by providing a more representative selection of the general population. This method involves random sampling within the restricted categories of the population in order to try and represent subgroups within the population.

In the study, simple random and stratified sampling procedures were used to select the units and respondents for data collection purposes. In descriptive or qualitative research with large population, the sample size should be 10% to 20% of the population (Gay & Airasian, 2003). Grinnell and Williams (1990) argue that a 10% sample in qualitative or descriptive research is sufficient in sampling if the population is large. In this regard, given the nature of the study, total population and study units, the researcher decided to use 20% sample size of the whole population. The researcher hoped that the sample selected for the study had sufficient experience to enable them answer questions regarding ICT education and training for undergraduate library and information science students in the universities. It was therefore hoped that the sampled respondents were better placed to provide in-depth and detailed information in the area of study.

In total, there are 13 public and private universities in Kenya (Commission for Higher Education, 2008). Simple random and stratified sampling procedures were used to select the universities and respondents to be included in the study. Respondents included the:

lecturers, final year undergraduate library and information science students from Kenyatta and Moi Universities; and library and information professionals from selected public and private university libraries (University of Nairobi, Kenyatta University, Moi University, Jomo Kenyatta University of Agriculture and Technology, Catholic University of Eastern Africa and Strathmore University); and library and information professionals in special organizations (International Livestock Research Institute, Capital Markets Authority, AMREF International and Kenya Electricity Generating Company (Kengen)).

Kenyatta and Moi Universities being the leading universities in offering of library and information science programmes in Kenya, were purposively selected for the study. The university libraries selected are within Nairobi city where the use of ICT in handling and supporting information services is in practice. Special libraries in international organizations reflect the modern trends of managing information services in the current knowledge-based society. These included: 10 library and information professionals from public and private university libraries and special organizations; and 10 lecturers from each university selected using simple random sampling as well as 90 undergraduate library and information science students from Kenyatta and Moi Universities selected through stratified random sampling. A total of 120 respondents were selected for inclusion in the study.

3.4 Data Collection Methods and Approaches

The study used various data collection methods and approaches including empirical, qualitative and grounded theory. Empirical data was collected from primary sources using interviews and document analysis. This helped to provide a true picture of the events on the ground. In addition, various secondary sources were reviewed to provide current information on ICT education and training of undergraduate library and information science students.

3.4.1 Interview Guides

Interview guides are widely used instruments for data collection because the method allows participants to provide detailed and in-depth information or descriptions of events (Amaratunga, 2002; Byrne, 2009; Kvale, 1996; McNamara, 1999). In this study, the use and application of interview guides as instruments for data collection process provided an excellent opportunity for gathering and collecting ideas and information from the respondents on a wide range of issues. The most important aim of the study was establish how ICT education and training or lack of it was affected undergraduate library and information science students in relation to the job market and career development. Questions were generated by brainstorming on the various aspects related to the area of study. A mind map was drawn and using multi-nodal links, a gamut of topics and questions of interest was produced. These topics were then “siphoned” off into relevant categories for question generation.

Three interview guides (Appendix II, Appendix III and Appendix IV) were used to obtain data and information from the respondents. In this case, the researcher personally visited Kenyatta and Moi universities with the intent of establishing the extent of the use of ICTs in education and training of undergraduate library and information science students. The researcher also personally visited selected public and private university libraries as well as special organizations. The respondents (information professionals) in these institutions provided useful information and knowledge on personal working experiences and opinions regarding the effectiveness and efficiency of the graduates in information work and activities.

These identified categories: contextual information concerning extent of use of ICTs in education and training needs; critical ICT competencies and skills in relation to current labour and job market opportunities; and suggestions for improving ICT education and training in the universities provided a broad range of topics discussed and covered during visits and interviews. The categories matched the themes identified in the literature review. Within these categories, questions requiring ideas and opinions from the respondents were identified and used in open-ended interviews. Using these techniques for question generation, several areas of interest became apparent as indicated in the literature review. Answers to questions of this nature helped to provide a gestalt overview of the relationship between ICT education and training and undergraduate library and information science students.

In the interview guides, respondents were expected to provide brief answers to the questions. Answers were sought through open-ended interviews with lecturers, final year undergraduate library and information science students, and library and information professionals. The researcher conducted the interviews through the face-to-face technique at the interviewees' workplaces and universities. The interview guides were handed to the interviewees prior to the interviews to enable time for preparation and reflection. The interviews were geared towards obtaining detailed information or seeking for more clarification as well as obtaining information which would otherwise not be adequately obtained through the other data collection procedures. Three interview guides used for gathering and collecting data from the respondents include:

- Interview guide for lecturers
- Interview guide for undergraduate library and information science students
- Interview guide for library and information professionals

3.4.1.1 Interview Guide for Lecturers

Lecturers of undergraduate library and information science students are better placed to offer informed advice in regard to the area of study. Interview guides were used to collect data from lecturers with the aim of getting personal experiences and opinions in a very in-depth manner. In recognition of this fact, interviews were administered to the lecturers to collect data on all aspects of ICT education and training covered in the identified categories or themes.

3.4.1.2 Interview Guide for Undergraduate Students

Undergraduate library and information science students or incoming information professionals stood a good chance of providing first hand information in regard to the area of study. In this respect, interviews were administered to students with the aim of obtaining in the identified categories.

3.4.1.3 Interview Guide for Library and Information Professionals

Library and information professionals are entirely responsible for managing information work and activities. In view of this fact, adequate ICT education and training is useful in meeting the demands of the modern information requirements. In this case, interviews administered to library and information professionals were helpful in obtaining information on use of ICTs in education and training needs, benchmarks of ICT in information work, ideas regarding ICT competencies and skills required in the current labour and job market, suggestions for improving ICT education and training, and sharing professional experiences and opinions in regard to the area of study.

3.4.2 Document Analysis

The researcher's examination of available literature on the area of study was done. Documents examined or analysed included library and information science education curriculum which indicated among others the available ICT education and training programmes in the universities (Tables 1 & 2). In addition, other related information sources consulted include the: current leading texts for library and information science education; ICT education and training; and conferences and workshop proceedings.

3.5 Data Collection Procedure

The study was carried out at Kenyatta University and Moi University, the two universities leading in offering of library and information science education programmes in Kenya. In addition, public and private university libraries as well as special organizations as identified in section 3.2 above were involved. Data was collected from the different categories of respondents in those institutions or organizations.

In order for the researcher to successfully conduct research in those institutions, it was imperative to get permission from the relevant authority. After obtaining the authority to conduct or carry out research from the School of Information Sciences Moi University, the researcher then applied for permission from the Government of Kenya through the Kenya National Council for Science and Technology (KNCST). After complying with the requirements the researcher was issued with a research permit. The researcher embarked on the process of collecting and gathering data from those institutions. The Letter of Introduction in Appendix I introduced the researcher to carry out research on the mentioned institutions. The researcher sought the necessary information from the universities regarding library and information science students in terms of population, programmes offered, number of lecturers, ICTs courses taught and any other information relevant to the study.

In the process of data collection, the respondent was introduced to the study and assured of confidentiality of the information provided (Appendix I). Interview guide questions were open-ended. This was meant to enable the respondent formulate own response. In addition, the respondent was free to provide any relevant information and knowledge useful to the study. Interview guides provided a unique opportunity for the respondent to provide insights and relevant information. This enabled the researcher to get accurate information and knowledge of events and context from the field. Document analysis or desk review provided documentary evidence and information in regard to the various aspects of ICT education and training in relation to job market, career development and modern labour information requirements. In all these instances, the qualitative approach used in this study enabled the researcher to get detailed and in-depth information from the respondents.

The researcher made appointments with the undergraduate library and information science students for the purpose of interviewing them. The process was really a tiresome exercise given the nature of making the appointments and visiting the universities. On a number of occasions even the planned appointments would abort or be cancelled due to reasons beyond the control of the researcher and the respondents. New appointments were fixed and the interviewing process continued on successfully.

The researcher also interviewed the lecturers on a face-to-face basis. This meant several visits to the universities in order to conduct the interviews. The process of interviewing the lecturers was labour-intensive, since some of the lecturers were really very busy. This meant cancelling and rescheduling the appointments a new. The researcher also visited public and private university libraries as well as special organizations to interview the library and information professionals. This exercise was relatively easy, since the interviews were only 10 in number. At times, problems of being busy, cancelling of planned appointments and fixing of new dates were also experienced. The data collection process lasted for six months. Generally, the process of data collection using interviewing process is quite involving, tasking and needs passion, personal commitment and sacrifice.

3.6 Test for Reliability and Validity

In research, issues of reliability and validity are important in enhancing and achieving the objectivity and accuracy of the results and findings (Trochima, 2006; Shenton, 2004; Riege, 2003; Perakyla, 1997; Guba & Lincoln, 1994). This study collected data and information from the respondents who provided sufficient information on issues regarding ICT education and training for undergraduate library and information science students.

Content validity was effectively done by experts in the library and information profession who helped and assisted in looking at the relevance of the study issues and ensured accurate information. Experts in the field of library and information science were involved to provide professional guidance and advice. The comprehensive literature

review and proofreading done helped in incorporating relevant issues in the study. These issues helped the researcher in gathering and collecting relevant data from the various categories of respondents. The researcher carried out a pilot survey before the actual research process. This helped in establishing whether the research process would work well. This process entailed using the same subjects or respondents that would be used for the actual data collection and gauging the responses to the study. Validity is a much more complex concept than reliability and there are many variations and subdivisions to which researchers can investigate attempts at ensuring validity of the results. The researcher hopes that the study findings are valid within the context of the research discussion.

The reliability of the research results entailed whether or not the same findings would occur if the study was repeated in the same manner. In addition, there were difficulties in assessing and testing this stipulation because of the nature of information collected and rapid change in the area under investigation. In the present study, great care was taken at the planning, implementation and analysis stages to ensure reliability. In the research process, proper description and explanation of the data collection methods and approaches including the manner in which the procedures contribute to the overall findings of a study is an important aspect of reliability and validity of results. In this regard, the literature review was comprehensively done based on the various research issues. This helped the researcher to address the various pertinent research issues raised in the study. A review on previous researches was also done in line with the study so as to address the missing gaps. In all these developments, the research methodology used was found to be reliable and dependable.

The research methodology adopted in this study was relevant to the research questions. The various data collection methods and approaches utilized in the present study are clearly described and explained. Interview guides for the various categories of respondents were carefully selected and successfully used to gather and collect data and information from the respondents. The respondents provided relevant data and suggestions exhaustively and comprehensively in regard to the research questions. Most important, the reliability of the data collection instruments was assessed during the pilot testing stage before the final research process was conducted to ascertain the effectiveness in the data collection process. Data collected using interviews was open to problems such as: interview bias, misdirected prompting and issues of question wording. These issues were noted during the interview process and attempts were made to minimize the effects although it is unlikely that interference was eradicated completely. In particular, the researcher carried face-face interviews.

Qualitative method tends to assume that each researcher brings a unique perspective to the study. Confirmability refers to the degree to which the results could be confirmed by others. There are a number of strategies for enhancing confirmability. The researcher can document the procedures for checking and rechecking the data throughout the study. The researcher can take a "devil's advocate" role with respect to the results, and this process can be documented. The researcher can actively search for and describe negative instances that contradict prior observations. After the study, one can conduct a data audit to examine the data collection and analysis procedures and make judgments about the potential for bias or distortion. The interview guides utilized in the study offered the

participants the opportunity to provide in-depth and detailed insights on a wide range of issues involving ICT education and training in the information profession.

3.7 Data Analysis

Qualitative data analysis is the process of examining data. Data analysis is crucial in any research work because it helps the researcher to process raw data into meaningful information. The study gathered, collected and produced large amounts of data from the research participants using interviewing process and document analysis methods. After a successful data collection process, the resulting data were pared or sieved down to represent the major themes or categories of the study using thematic or categorization analysis. In addition, the study used cross-case analysis to analyze the data from the respondents.

In order to make sense of the data collected during interviews and observations from the respondents, the researcher used thematisation and categorization approaches. This provided the opportunity to analyze, interpret and present the data into meaningful information. The responses from the respondents were organized and matched into themes and categories generated from the research questions. This involved the process of analyzing each question, identifying the themes, concepts or categories and coding them appropriately. The data in each question from each interview were thoroughly analysed so as to get the right information related to this study. Using Statistical Package for the Social Sciences (SPSS) data was analysed, coded and translated into meaningful

information. The SPSS system helped in producing meaningful tables and charts as will be seen in the subsequent chapters.

3.7.1 Interview Data

The process of data analysis involved noticing, identifying, categorizing, and coding steps. The notes made and materials collected during the visits were marked and labeled for later use. During the process of data analysis, the researcher carefully recorded down ideas and suggestions of the respondents. This helped the researcher gain new ideas and insights in the data collection process. The data derived from interviewing the participants and documentary analysis were pared into themes or categories. The next activity involved the analysis of the interviews and information collected from the participants through a transcription process. After transcribing, the data was organized and categorized into themes for easy analysis. Transcribing involved the process of typing the responses into word processing documents. Later, the researcher analysed the transcriptions using the SPSS computer programme.

From the experience of the researcher, preliminary exploratory was a major step of the data collection analysis process. The researcher carefully went through the data looking for pertinent or relevant information to answering the research questions, while noting and labeling them. In this respect, the researcher read the transcribed data by word, line, sentence, phrase, heading or label, and divided the data into meaningful segments for easy coding. The researcher applied coding to all segments of data using symbols, descriptive words or category names.

Coding refers to the process for both categorizing qualitative data and describing the implications and details of these categories (Trochim, 2006). In the initial stages of the process, the researcher adopted open coding and later on used selective coding that involved systematic coding of core concepts of the data analysis process. During the coding process, the researcher directly examined the data and developed and used inductive codes. Analysis of data process used facesheet codes. The purpose of using the codes was to help summarize, synthesize, and sort many observations regarding the data. Coding becomes the basic or fundamental means of developing the data analysis. In data analysis, codes are used to bring together and categorize series of otherwise discrete events, statements and observations identified in the data. Initially, the data may appear to be a mass of confusing and unrelated accounts or events. Organization in the data analysis process is created through careful studying and coding of the data and information.

On completion of data coding the researcher sought the views of other researchers who were conversant with qualitative research evaluation methods in order to check consistency of the coding process. This involved seeking the views of other researchers with similar experiences and opinions. Each researcher consulted reviewed the transcript and used the coding scheme to code the data. Results were then shared and any discrepancies discussed and resolved. The process of coding involved making changes in terms of additions, deletions and clarifications.

Once the data was successfully coded, the researcher organized the data into themes or categories. The researcher then reviewed the themes and categories of the results. This process of qualitative analysis was repeated with each type of qualitative data that was collected. Literature documents reviewed were also examined and sorted using the same process. The results of the interpreted findings were then summarized and organized into topics. In this, the process of organizing, eliminating and searching of relationships was used. The researcher then wrote the analysis based on the conceptual schema, and eventually the thesis.

3.7.2 Document Analysis

Documents were also sampled to provide any relevant information. This was to ascertain the relevance of information provided.

3.8 Research Questions vis-à-vis Research Methods

Interview guides were used to generate themes and categories for data coding process. The research questions were organized, arranged and numbered appropriately. The responses through the interview guides were carefully noted down, labeled, analysed and coded. In addition, data segments with similar or closely related labels were put together in respective themes or categories. In analyzing the interview guides, the research questions were carefully studied to identify and generate the themes and categories of the study. The researcher scrutinized all statements, concepts, phrases, words and sentences from the respondents to determine the exact theme and category. In addition, the

responses from the respondents were compared so as to ensure that similar answers or replies were grouped in the right theme or category.

The themes had a number of categories or subcategories, as follows: *ICT education and training needs and requirements* theme had the following categories; views and comments on ICT in education and training needs and requirements; and adequacy of teaching and learning of ICT courses. *ICT education and training in the modern information environment* theme had the following themes; perceptions on current education and training in relation to career opportunities, job market, performance requirements and competence in information work; role of ICT competencies and skills in the job market; and usefulness of ICT education and training in relation to competence in information work. *Critical ICT competencies and skills required in the modern information and knowledge environment* theme produced categories such as: critical ICT competencies and skills essential for undergraduate library and information science education; and essential ICT courses in the information and knowledge environment. *Challenges facing ICT education and training for the undergraduate library and information students* theme involved issues obstructing ICT education and training; and significant changes regarding ICT education and training in the universities. *Suggestions or recommendations to improve ICT education and training* included recommendations to improve ICT education and training in the universities.

After carefully identifying and analyzing the themes and categories of the study, the researcher prepared a final list of major themes as indicated in Table 3, pg. 92 that were frequently occurring across the interview, thus representing commonly held views whilst recognizing that the same may be valid in the particular experience of one individual. These themes have been used as the framework for data presentation, analysis and interpretation in the subsequent chapters.

Table 3: Major Themes or Categories of the Study

THEMES/CATEGORIES OF THE STUDY	
1.	ICT Education and Training Needs and Requirements
2.	ICT Education and Training in the Modern Information Environment
3.	Critical ICT Competencies and Skills Required in the Information Environment
4.	Challenges Facing ICT Education and Training for LIS Undergraduate Students
5.	Suggestions to Improve ICT Education and Training in the Universities

These themes and issues identified during the process of data analysis are discussed in the subsequent chapters under the following headings: extent of use of ICTs in education and training needs and demands; ICT education and training in the modern environment; critical ICT competencies and skills required in the modern knowledge and learning environments; and suggestions to improve ICT education and training for undergraduate library and information science students. The thematisation and categorization approach involved the process of developing a conceptual schema and coding data. The conceptual schema helped the researcher in typing together and answering the research questions in a coherent and organized manner. Critical to the step was the process of making original contribution to the study. This study used the process of coding and analyzing data that

helped to produce meaningful and relevant information. The clarity and applicability of the findings, however depended on the analytic intellect of the researcher. In general, the greatest strength or weakness of qualitative research study is dependence on the human factor. The researcher applied and followed all the processes and procedures of data analysis process accurately, honestly and truthfully.

3.9 Summary

The chapter is a comprehensive review of the research methodology utilized in this study. The areas covered include: research and survey design paradigm; qualitative method; population of the study; sampling strategy and techniques; data collection methods; approaches and procedures; qualitative reliability and validity; data analysis; and connecting research questions vis-à-vis research methods. The research design predominantly used the qualitative approach. Sampling strategy was carefully done and justified for the present study. The study utilized triangulation method (various data collection methods and approaches) to gather, collect, analyze, interpret and present the data into meaningful information. Using 120 interview guides, the researcher collected relevant data, ideas and suggestions from the respondents resulting in a 100% response rate. The suitability of each method of data collection is highlighted alongside other issues related to this study. The research methodology adopted for the present study was relevant and successfully applied and used.

The study utilized various primary and secondary data collection approaches. Primary data collection approaches used interview guides. Participants were interviewed between May and October 2009 in the two identified universities i.e. Kenyatta University and Moi University; public and private university libraries of the University of Nairobi, Kenyatta University, Moi University, Jomo Kenyatta University of Agriculture and Technology, Catholic University of Eastern Africa and Strathmore University; and special organizations of the International Livestock Research Institute, Capital Markets Authority, AMREF International and KENGEN. The interview guides were effective in the data collection process. Secondary data collection approaches included document analysis or review of relevant information sources. In general, all other aspects of grounded theory approach as applied in the study have been well discussed.

CHAPTER FOUR

DATA PRESENTATION, ANALYSIS AND INTERPRETATION

4.0 Introduction

This chapter presents the results of the study that examined issues directly related with ICTs education and training, and especially for a bachelor's degree in library and information science. In achieving the objectives of the study, the researcher designed and used three interview guides for the various categories of respondents: lecturers, undergraduate library and information science students, and library and information professionals. Questions designed for the various categories of respondents covered a number of issues as already indicated in Chapter Three. The research questions formed the basis of data analysis and interpretation.

Research question one examined the application and suitability of currently offered ICTs courses in the education and training of undergraduate library and information science students. The study sought views and comments on application of ICT education and training needs and requirements; and adequacy of teaching and learning of ICT courses. The second research question examined the perceptions of the respondents towards the adequacy of the current ICT education and training of undergraduate library and information science students. Issues discussed included: perceptions on current ICT education and training in relation to information work; role of ICT competencies and skills in the job market; and usefulness of ICT education and training in relation to competence in information work.

Research question three examined critical ICT competencies and skills necessary for undergraduate library and information science students in information work and activities. The study sought views and comments on essential ICT courses; and ICT competencies and skills necessary in the modern information and knowledge environment. Research question four examined the challenges that face ICT education and training for the undergraduate students in relation to current job requirements and modern information environment. The study sought views and comments on key issues affecting or obstructing ICT education and training; and significant changes regarding ICT education and training in the universities. Research question five examined the measures to improve ICT education and training in the universities. Issues discussed involved suggestions to improve ICT education and training of undergraduate library and information science students in the universities.

This chapter focuses on the presentation, analysis and interpretation of the data gathered from the three categories of respondents (lecturers, students and information professionals) through interview guides. The results have been analysed in relation to the research questions. From the research questions the following areas of study were developed: ICT education and training needs and requirements; ICT education and training in the modern information environment; critical ICT competencies and skills essential in the labour market; challenges facing ICT education and training in library and information science education; and measures to improve ICT education and training in the universities.

4.1 Distribution of Respondents by Institution Category

Data was collected from three categories of respondents in the library and information profession, that is: lecturers, undergraduate library and information science students, and library and information professionals. Respondents were drawn from 6 university libraries (University of Nairobi, Kenyatta University, Jomo Kenyatta University of Agriculture and Technology, Moi University, Catholic University of Eastern Africa and Strathmore University) and 4 organizational libraries (International Livestock Research Institute, Capital Markets Authority, AMREF International and Kenya Energy Generation Company) as well as library and information science teaching departments of Kenyatta and Moi Universities as shown in Table 4.

Table 4: Distribution of Respondents by Institution Category (N=120)

ORGANIZATIONAL CATEGORY	LECTURERS	UNDERGRADUATE STUDENTS	LIBRARY AND INFORMATION PROFESSIONALS
Teaching Library and Information Science Departments in Universities	20	90	
University Libraries			6
Special Organization Libraries			4
Total	20	90	10

4.2 Response Rate to Interview Guides

As shown earlier in Chapter Three, stratified and simple random sampling methodologies were adopted and utilized in the study. The sample size for this study was 120 respondents including lecturers (20), library and information professionals (10) and undergraduate library and information science students (90). The two universities leading in offering library and information science education in Kenya - Kenyatta and Moi Universities were purposively selected in this the study. In addition, as mentioned earlier in Chapters One, Two and Three library and information science education and training programmes have always attracted low numbers of students. In descriptive or qualitative research with large population, the sample size should be 10% to 20% of the whole population (Gay & Airasian 2003). In particular, the study utilized 20% of the whole population representing lecturers, final year library and information science undergraduate students, and library and information professionals.

Using 120 interview guides, the researcher collected data from the respondents. Three types of interview guides were used for the three categories of respondents. The study sought to examine the situation that is facing ICT education and training of undergraduate library and information science students, since the programme forms the core of the degree in library and information science. The aim was to have an in-depth, detailed and comprehensive study involving relevant respondents directly related in the information profession. Using this cross-study practice, a unique opportunity was provided for the respondents to provide opinions and thoughts. Each of the 3 categories of respondents yielded 100% response rate.

4.3. ICT Education and Training

4.3.1 Views on ICT Education and Training Needs and Requirements

The first research question sought the respondents' views regarding the needs and requirements of ICT education and training of undergraduate library and information science students. The question sought the views of all the respondents of the study including lecturers, undergraduate library and information science students, and library and information professionals. The respondents among them lecturers gave different views on the needs and requirements of ICT education and training for undergraduate library and information science students. The lecturers for example observed that:

In the modern knowledge environment, rapid technological developments and solutions have changed the information landscape in information centers to the extent that education and training programmes in universities have to provide the necessary facilities and requirements in relation to ICT courses. The needs and requirements for ICT education and training include: practical courses in ICT and computer based subjects, computer hardware equipment or facilities, computer software packages, qualified teaching staff, curriculum to provide ICT courses that are market oriented, and computer fundamentals literacy. Over half of the students in one of the universities understudy stated that: There is need for the library and information science education to provide adequate training in modern ICT courses in web technologies, social media and networking systems to enable the graduates to stay on top of technology in relation to the information environment.

The respondents also provided additional information in accurately describing ICT education and training needs and demands in Kenyan universities. From the responses, over half of the lecturers in one of the universities understudy highlighted that: *Library and information science curricula have not addressed the important issues of the modern information environment especially web 2.0 and library 2.0 that seem to be crucial in education and training of undergraduate students in the country. Hence the need for*

undergraduate library and information science students to be educated and trained in modern ICT courses to enable them acquire ICT competencies and skills necessary in the modern information environment. There is also need to update the library and information science education curriculum especially in relevant emerging ICT issues.

In one of the universities under study, some of the Bachelor of library and information science students pointed out that: *The application of ICT in information handling activities is one way of taking information services closer to the user population, that is, information audience in library and information centers. The development and use of internet and digital libraries are some of the useful innovative initiatives of marketing and promoting information services in the global society, hence, the need to update the undergraduate library and information science education and training curriculum in order to reflect the reality of the changes facing the information environment. Library and information professionals who included library managers and librarians noted that: ICT courses in library and information science programmes need to be in line with modern information management practices. The graduates are not familiar with web technologies and social media applications as these relate to modern information environment. Lack of appropriate ICT courses in library and information science programmes affect undergraduate students especially in career opportunities, job market and performance requirements.*

4.3.2 Adequacy of Teaching and Learning of ICT Courses

The research aimed at finding out the adequacy of teaching and learning of ICT courses for undergraduate library and information science students in the universities. The rationale is that teaching and learning resources are important in acquiring adequate ICT education and training. Data for this aspect was gathered from respondents in the lecturers' and students' category for they are believed to be better placed to understand the challenges facing the teaching and learning of ICT courses in library and information science programmes. The lecturers can also use their professional and working experiences to improve the quality of teaching and learning of ICT courses for undergraduate library and information science education and related programmes in the information profession in general.

The respondents interviewed gave various issues central to the teaching and learning of ICT courses. In particular, views from two thirds of the respondents indicated that: *Teaching and learning of ICT courses is purely theoretical. This shows that the theoretical approach seems to be the most preferable method of teaching and learning of ICT courses.* More than half of the Bachelor of library and information science students pointed out that the: *The practical approach is the other method of teaching and learning of ICT but give less attention.* Over half of the respondents interviewed also gave various reasons affecting the adequacy of teaching and learning ICT courses such as: *inadequate computer hardware facilities, information software programmes, and inadequate ICT courses not relevant to the modern information environment requirements are taught.* When propped further the respondents affirmed that: *Teaching and learning of ICT*

courses depend upon various factors including relevance to the job market requirements, relevant ICT courses in relation to modern information environment, depth of the courses, and teaching and learning resources.

4.4 ICT Education and Training in the Modern Information Environment

One of the objectives of the study was to examine the perceptions of the various respondents on adequacy of the current ICT education and training of undergraduate library and information science students in relation to the modern information and knowledge environment. In this respect, the study sought to find out the role of ICT education and training in the current job market of undergraduate library and information science students. Two thirds of the respondents noted that ICT knowledge, competencies and skills play key roles in the information profession careers. Particular issues highlighted by the respondents include ICT courses and new opportunities in the job market, and ICT education and training in relation to competence in information work and activities.

4.4.1 Perceptions on Current ICT Education and Training in Relation to Information Work

The second research question examined the perceptions of the respondents towards the adequacy of the current ICT education and training of undergraduate library and information science students. Respondents from the three categories (lecturers, library and information professionals, and undergraduate library and information science students) were involved. The respondents are relevant stakeholders in the information

profession, and therefore, their views on current ICT education and training in relation to competence in information work were important.

The respondents noted various observations on the importance of ICT education and training in relation to competence in information work. From the responses obtained, more than half of the respondents noted that: *ICT is essential in management of information services and activities*. The respondents also noted strongly that: *ICT education and training empowers the student with relevant competencies and skills*. Some of the library and information science students in one of the university understudy stated that: *ICT education and training provides essential skills in the modern information environment*. Two thirds of library and information professionals noted the followings: *ICT enhances effectiveness and efficiency in the provision and delivery of information services*, and *ICT makes information professionals competent in handling information services and activities*.

In regard to this question, more than half of the library and information professional interviewed noted that: *Undergraduate library and information science students do not perform well in information work and related services, due to inadequate ICT knowledge, competencies and skills*. In a related note two thirds of the library and information professional respondents noted that: *Undergraduate students lack essential ICT competencies and skills needed to function efficiently in work places and career development*. From the opinions presented, competence in ICT programmes is central in

defining employment opportunities and career development for undergraduate library and information science students and information professionals in general.

4.4.2 Role of ICT Competencies and Skills in the Job Market

The study sought to find out the role of ICT competencies and skills in addressing the current job market needs and requirements of undergraduate library and information science students. In this respect, the respondents were asked to describe the role of ICT competencies and skills in offering new career opportunities and performance requirements in the job market. The main purpose was to get views and ideas of the employers as represented by the respondents in the library and information professional category. This question was deemed important in view of the fact that training and education in developing countries and the world in general is mainly determined by the job market. The most striking thing is the extent to which the education and training provided is targeting the job market needs and demands of the library and information science graduates.

The respondents expressed various opinions in regard to this particular aspect which are presented as follows. The general view is that ICT courses play key roles in the library and information science programmes and other related areas of academic and professional development. Two thirds of the library respondents were of the view that *ICT provides better management of information skills*, while more than half felt that *ICT provides competitive advantage in the job market*. At the same time half indicated that *ICT leads to increased job opportunities*, while some were of the opinion that *ICT*

contributes to societal and economic development. In addition, some also thought that *ICT facilitates better communication and dissemination of information services.*

4.5 Critical ICT Competencies and Skills Essential in the Labour Market

4.5.1 Essential ICT Courses

Among the concerns of the study was to establish critical ICT competencies and skills in the education and training of undergraduate library and information science students in the modern information environment. In order to obtain views on these issues, the respondents in the three different categories: lecturers, undergraduate library and information science students and library and information professionals were interviewed. The respondents gave different views and ideas in relation to critical ICT competencies and skills essential in the labour market. From the analysis, two thirds of the respondents interviewed identified: *Computer hardware and software systems, advanced computer programming skills, server management systems, practical aspects of ICTs courses, and software engineering, digital or electronic libraries, web management, distributed systems, networking administration and management, and artificial intelligence* as being extremely important. Half of the respondents noted *computer security and content management, while less than half of the respondents indicated internet.*

In describing critical ICT competencies and skills essential for the education and training of undergraduate library and information science students, the respondents from the 3 categories provided additional comments. Half of the lecturers pointed out that: *A number of ICT courses that are not offered in the library and information science programmes*

although the courses are essential in the information profession. In addition, Kenyatta University and Moi University need to expand the ICT curriculum in order to include emerging and new areas in the information profession. Regarding the same issue the students in one of the universities understudy went on to argue that: The current ICT courses in the library and information science programmes need to be updated. Unless something is done, as a matter of fact, the training expectations are far below the requirements of modern information professionals. The library and information professionals noted that: Library and information science programmes concentrate mainly in information related courses as opposed to ICT courses.

4.6 Challenges and Measures to Improve ICT Education and Training

One of the objectives of the present study was to establish the challenges that face ICT education and training for the undergraduate students and suggest recommendations or measures to improve ICT education and training in the country. The aim was to get the respondents' ideas and opinions regarding the present curriculum vis-à-vis the contemporary issues affecting the information environment with a view to providing appropriate solutions for improving the education and training of undergraduate library and information science students. The study also sought to ascertain measures to be taken to improve ICT education and training of the undergraduate students. In particular, the fourth and fifth research questions of the study addressed the issues of challenges and measures for developing, preparing and improving ICT education and training for library and information science programmes. The respondents were asked through opened ended questions to suggest measures of improving ICT education and training.

4.6.1 Challenges Facing ICT Education and Training

In gathering data for this aspect, respondents in the lecturer and undergraduate library and information science students' categories were asked to identify key issues that they believed were obstructing ICT education and training. The data gathered identified the following reasons: *inadequate computer laboratories, inadequate computer hardware equipment, and inadequate relevant software packages*. Half of the respondents identified lack of relevant ICT courses in the modern information environment, inadequate qualified teaching staff, inadequate teaching of ICT courses in the universities, ICTs courses are not in line with markets needs, and inadequate infrastructure noted respondents.

Regarding the same issue two thirds of the students in one of the universities under study highlighted: *The need for library and information science teaching departments in Kenyan universities to provide quality education and training in ICT courses. Inadequate ICT education has forced some of the students to train again in information technology or computer science courses*. The library and information professionals further stated that: *Among the modern issues facing library and information science professionals in the job market is inadequate education and training in ICTs courses. A comprehensive review in ICTs courses is particularly important in addressing the modern information requirements*.

4.6.2 Measures to Improve ICT Education and Training in the Universities

The respondents suggested various measures for improving the state of ICT education and training for undergraduate library and information science students and related programmes in Kenyan universities. Their suggestion included: *updating of ICT education and training curriculum, acquisition of hardware and software systems, provide ICT facilities such as: computer laboratories, emphasis on practical aspects of ICT subjects, employing qualified lecturers, providing reading materials, and finally undertaking regular needs assessment to determine the market trends.* Other possible measures suggested include:

ICT courses be core in library and information science programmes, internship programmes for library and information science students be undertaken rigorously, linkages and collaboration between the university and the industry be established, adequate time be allocated for teaching and learning of ICT courses, professional courses in ICT related areas like Microsoft certified systems engineer (MCSE) and oracle be introduced, and lecturers to participate in continuing academic and professional activities such as: further studies in ICT courses and attending conferences and seminars.

The respondents also noted additional comments. Half of the lecturers noted that: *There is need to update the library and information science education and training curriculum especially in ICT courses because of the modern information environment that keeps on changing.* Two thirds of the students in one of the universities understudy commented that:

... although it is good to train as a librarian, the ICT courses do not adequately offer the necessary education to the students. ... the role of effective information professionals depends on adequate education and training in ICT courses that are not well integrated in the curriculum. Needs assessment in the field of library and information science is

important in identifying gaps in the profession to enhance adequate education and training programmes in order to address market requirements. Inadequate resources and conditions in the universities hinder ICT education and training for undergraduate library and information science students, and therefore there is need to improve the facilities. Library and information science programmes offer limited ICT courses, since technological infrastructure and access is poor to help achieve quality education and training.

4.7 Summary

The chapter has presented and analysed data gathered regarding the area of study. The need to improve ICT education and training programmes has been identified as a major issue that library and information science education in the universities in the country should address. As agents of change, library and information science schools and departments in the universities must play a crucial role in the education and training of undergraduate students by ensuring that the students are well versed with diversity of ICT knowledge, competencies and skills ideal in the modern information environment.

The entrance and growth of ICT in information organization and management has greatly influenced the education and training of information professionals. This has occasioned the need to improve library and information science education programmes in relation to the requirements of the labour market and knowledge society. Library and information science education and related programmes can preserve and improve the identity of one of the oldest profession on earth by updating the ICT curriculum. Respondents noted the crucial role of ICT education and training in the modern information environment since employment opportunities and career development tend to favour graduates with technological competencies and skills.

CHAPTER FIVE

DISCUSSION OF THE FINDINGS

5.0 Introduction

Based on various research developments and suggestions from the respondents, regarding ICT knowledge, competencies and skills for undergraduate library and information science students in relation to career opportunities, labour and job market as well as performance requirements in handling modern information services effectively and efficiently, this study examined the inadequacies of the library and information science schools and departments in the country with the view for improving the education and training of the students. This chapter discusses the various findings of the study, based on the data presented, analysed and interpreted as already highlighted in Chapter Four. The discussion includes information on interview guides conducted to the respondents in the library and information science profession.

5.1 Findings of the Study

5.1.1 ICT Education and Training Needs and Requirements

Education and training programmes in institutions of higher learning are offered on the basis of current demands and desires in the market environment. This basic requirement affects and determines the direction of the education and training programmes including library and information science programmes. Data collected from the respondents (as presented in section 4.3.1, pg. 97) indicated that the ICT education and training needs and requirements for undergraduate library and information science students is characterized by among others: *the need for practical courses in ICT and computer based subjects;*

computer hardware equipment, computer software packages; qualified teaching staff; market oriented ICT courses, computer fundamentals literacy; and modern information education programmes in web 2.0, library 2.0, information 2.0 and social media. The respondents noted these as important requirements for the teaching of ICT education and training in the modern information environment.

This clearly demonstrates the need to change the way ICT courses for undergraduate library and information science education and other related programmes in the universities are taught. This change can be effected through sufficient practicals in ICT subjects and computers, provision of adequate computer hardware and software systems, teaching relevant and market oriented ICT courses, qualified teaching staff, and the need to improve the ICT curriculum. This is to ensure that the education and training at each level is relatively inclusive and comprehensive. The current status of ICT education and training for undergraduate library and information science students has to reflect the modern information environment. This is to ensure that the graduates are familiar with modern information management practices in terms of library 2.0, web 2.0 and information 2.0.

The respondents in the three categories provided additional information in accurately describing ICT education and training needs and requirements in the universities. Over half of the lecturers in one of the universities under study highlighted that: *In the knowledge environment, modern technology developments and solutions have changed the information landscape in information centers to the extent that there is need for*

undergraduate library and information science students to be educated and trained in modern ICT courses (web 2.0, social media and library 2.0) to enable the incoming professionals acquire ICT competencies and skills essential in the modern information environment. In order to produce quality undergraduate library and information science students, then the education and training programmes must consider the aspect of ICT courses as fundamental to the information profession. If library and information science teaching departments in the universities are to produce quality graduates then there is need to update the curriculum so as to include emerging areas in the information profession more so in the ICT aspect.

In one of the universities understudy, some of the Bachelor of library and information science students pointed out that *the application of ICT solutions in information handling activities is one way of taking information services closer to the user population in information centers. Development and use of internet, web technologies, social media and digital libraries are some of the useful modern technology innovative initiatives of marketing and promoting information services in the global society.* In general, the views of the respondents indicated the need to update the library and information science curriculum in order to reflect the reality of the changes facing the modern information environment.

Library and information professionals also indicated that: *ICT courses in library and information science programmes are not in line with modern information management practices. The graduates are not familiar with education and training programmes in modern aspects of information handling practices including web technologies, social media applications and library 2.0. The courses offer limited education and training opportunities to the undergraduate library and information science students. The end result is that library and information science graduates are not well educated and trained in modern technological solutions or systems.* Modern technology revolution has changed the information environment to the extent that lack of appropriate ICT courses in library and information science programmes affect undergraduate students in relation to career opportunities, job market and performance requirements. Updating of the ICT curriculum is extremely important in the Bachelor of library and information science and related programmes in the universities. This will enable undergraduate students acquire ICT knowledge and skills central in managing and handling information and knowledge services effectively and efficiently.

The increasing importance of ICT in library and information science cannot be overemphasized because of the obvious fact that development of technology is transforming the global information environment. ICT provides huge opportunities to develop library and information services especially in ICT areas so as to match the modern information environment. From these views, it can be deduced that education and training fundamental to the teaching and learning of undergraduate library and

information science students ought to emphasize the need for appropriate ICT courses for undergraduate programmes.

The above discussion, is in line with the views of the authors who suggest the need to adopt and embrace ICT courses in the library and information science programmes, in order to train and empower undergraduate students with knowledge, competencies and skills to use and apply modern ICT in information work and activities (Babu et al. 2007; Kavulya, 2007; Hjørland, 2002; Juznic & Badovinac, 2005) since the curriculum offers limited education and training opportunities (Minishi-Majanja, 2007 & Mutula, 2005); information environment depends upon ICTs systems, and ICT is among the Millennium Development Goals that is important in education and training (World Information Society, 2007 & Cheng, 2001); and ICT education and training provides social, vocational and pedagogical rationales (Abuhmaid, 2008; World Information Society, 2007 & Maddux & Cummings, 2001). These indicate the need and requirements for ICT education and training of undergraduate library and information science students (Hedman, 2005; Hjørland, 2002; Juznic & Badovinac, 2005). If the LIS undergraduate students are to use ICT solutions efficiently in information work, then the education and training programmes must provide the knowledge, competencies and skills through adequate curriculum.

5.1.2 Adequacy of Teaching and Learning of ICT Courses

The study established that availability of resources normally influences the nature of teaching and learning of ICT courses. The views of the respondents interviewed are as presented in section 4.3.2, pg. 99. Two thirds of the respondents noted that *teaching and learning of ICT courses is purely theory based, and resources are extremely important*. Teaching and learning of ICT courses incorporates the combination of theory and practical aspects. Globally, this has been the trend for imparting and acquiring ICT knowledge, competencies and skills including teaching of library and information science education programmes. This may be different from one country to another, one university to another and depending on other factors like technological infrastructure.

Two thirds of the respondents attested that *the teaching and learning of ICT courses is purely theory based meaning that the theoretical approach has been the most established methodology in teaching and learning of ICT courses*. The practical approach is useful in imparting hands-on skills, competencies and experiences that are desirable in the job market, although the study revealed that less attention has been given to this method as noted by the respondents in the undergraduate students' category. There is a strong suggestion within the academic fraternity that the best strategy in teaching and learning of ICTs courses is to use the mixed or balanced approach that includes both theory and practical aspects.

Library and information science teaching departments should emphasize in equal measure the use of theoretical and practical methodologies in the teaching and learning of ICT courses. In particular, practical approaches should be emphasized so as to enable the graduates acquire hands-on skills and experiences useful in handling information services and activities. Library and information science education should emphasize adequate teaching and learning of ICT courses in relation to career opportunities, job market, performance requirements, professionalism and pedagogical issues. Generally, adequacy of teaching and learning of ICT courses for undergraduate library and information science students and related programmes, depend upon various essential factors such as: *adequate computer hardware and software facilities, relevant ICT courses in relation to modern information environment, depth of the courses, and teaching and learning resources.*

Library and information science teaching departments in the universities should implement and provide better platforms for learning practical ICT courses in order to serve the needs and demands of the information and knowledge society. There is need to review the nature of teaching and learning of ICT courses for undergraduate students so as to implement and provide better platforms for teaching the courses. Many authors argue that the present library and information science job market requires graduates who are highly knowledgeable and skilled in technological systems (Al-Mobaideen, 2009; Kavulya, 2007; Mutula, 2005; Ocholla, 2003). Modern information and knowledge environments have rapidly changed and created new areas of specialization that require knowledge, competencies and skills in ICTs.

5.1.3 Perceptions on Current ICT Education and Training in Relation to Information Work

With respect to the importance of ICT education and training in relation to competence in information work, the study established various views as presented in section 4.4.1, pg. 100. The respondents noted that: *ICT education and training is essential in management of information services and activities, empowers graduates with adequate competencies and skills, provides essential skills for handling information work, enhances effectiveness and efficiency in the provision and delivery of information services, and makes information professionals competent in managing information and knowledge services.*

In the current digital information environment, there is need for library and information science education and training to emphasize competence in ICT based programmes. Undergraduate students need adequate ICT knowledge, competencies and skills in order to function effectively in handling and supporting information work and activities. The incoming information professionals need adequate orientation in modern technological solutions in order to handle and support information services effectively and efficiently. The graduates also need to learn and acquire ICT knowledge and skills so as to meet the informational and technological needs and demands of the modern information environment. The students should be articulate regarding a host of intensive ICT issues involving information handling activities. Library and information science programmes must develop complete and appropriate ICT courses based on the needs and requirements of the modern information and knowledge environment. This implies that students need to be educated and trained in new emerging areas of the information industry especially in ICT courses.

From the research results, it can be deduced that ICT education and training is useful in imparting relevant competencies and skills essential in the job market and performance requirements. The modern knowledge environment is so challenging that undergraduate students need to have quality ICT education and training in relation to information practices. The students should acquire ICT knowledge, competencies and skills as a necessary requirement for the job market. This is in line with others authors as observed in the literature review as regards increased job opportunities outside the traditional settings of the information profession such as: cybrarians, website coordinators, database consultants, and corporate information and knowledge managers (Babu et al. 2007; Ocholla, 2003; Siddamallaiah & Karisiddappa, 2003; Singh, 2010).

The respondents' perception on current education and training of undergraduate library and information science students, in relation to information work and activities is aimed at providing novel competencies and skills in ICT. The students also need to learn and acquire ICT knowledge and skills, in addition to being competent. Students should be educated and trained in ICTs issues involving information handling activities. It is essential for the library and information science programmes to emphasis on competence in ICTs.

5.1.4 Role of ICT Competencies and Skills in the Job Market

The study established the extent to which ICT courses offered new opportunities for library and information science undergraduate students in relation to career opportunities, job market and performance requirements. The data gathered is as presented in section

4.4.2, pg. 102. The general view is that ICT courses are instrumental and essential in offering new and increased career opportunities in the job market. In particular, *ICT provides better management of information skills, while provides competitive advantage in the job market, leads to increased job opportunities, contributes to societal and economic development, and facilitates better communication and dissemination of information services.* This fact would be attributed to the trends in the current job market that are favouring those with ICT related qualifications. This may explain why education and training programmes are increasingly adopting and embracing ICT courses in the library and information science curriculum (Mambo, 2000; Minishi-Majanja, 2007; Ocholla, 2003).

The data also shows that ICT provides extremely important competencies and skills central in managing and handling information services in relation to competitive job requirements in the modern digital environment. ICT courses play key roles in the creation of job opportunities in the information profession outside the traditional library and information courses. Job opportunities are increasingly becoming available outside the traditional settings of the information profession such as: cybrarians, website coordinators, database consultants, metadata specialists, digital literacy managers, information literacy coach, corporate information officers and knowledge managers (Babu et al. 2007).

In the increasingly knowledge-based society, the emphasis is for library and information science education programmes to produce graduates with the right mix of knowledge and skills. ICT competencies and skills provide better management of information skills; competitive advantage in the job market; lead to increased job opportunities to the students; enable information professionals to contribute to societal and economic development; and facilitate better communication and dissemination of information. Periodical needs assessment by library and information science teaching departments is extremely important in determining areas of specialization and those that need special attention.

5.1.5 Critical ICT Competencies and Skills Essential in the Labour Market

In view of the above, the study established ICT competencies and skills that are essential in the education and training of undergraduate library and information science students in the country as presented in section 4.5.1, pg. 103. ICT courses essential for the education and training of undergraduate library and information science students that were identified by over half of the respondents include: *computer hardware and software systems, advanced programming skills, server management systems, practical aspects of ICTs courses, software engineering, digital libraries, web management, distributed systems, networking administration and management, artificial intelligence, computer security and content management*. The magnitude of the internet in the information profession is well documented, although the course was noted by some respondents.

ICT competencies and skills essential in the education and training of undergraduate library and information science students in the modern information environment center around two important notions, that is, changing information landscape and modern technology revolution. Traditional library and information science education are no longer meeting the needs and requirements of the undergraduate students in relation to labour and job market opportunities. Of critical importance is the role of ICT education and training in imparting relevant competencies and skills that makes the undergraduate students to be competitive in the rapidly changing information environment. Two thirds of the library and information professionals argued that:

The current crop of undergraduate library and information science students do not have the necessary ICT knowledge, competencies and skills needed in the modern information environment, and that the current library and information science education does not give them the opportunity to train in information demanding careers in programming and software development. In the current digital information environment, undergraduate students should be well educated and trained in ICT programmes in order to make a positive impact in knowledge work and services.

The views presented by the respondents on the preferred competencies and skills for undergraduate library and information science students are clearly a demonstration of how ICT education and training has changed the information profession. The core information competencies and skills much needed by undergraduate students are directly related to adequate ICT education and training and require continuous updating because of the rapid rate of technological development. This makes it necessary for library and information science schools and departments to regularly review their curriculum and update the content to reflect the modern information needs and requirements. The study

established critical ICT competencies and skills essential in the digital information environment. In general, ICT education and training is essential in the modern knowledge environment leading to creation of new emerging areas in the information profession.

Data collected from half of the lecturers indicated that *a number of ICT courses that are essential in the field of library and information science education and training are not in the current curriculum. These courses that enable students acquire adequate ICTs knowledge, competencies and skills in handling information services and activities. Library and information science programmes should give greater emphasis on ICT courses. This is the only best or sure way of producing competent information professionals who are well grounded in ICT aspects.* Over half of the students indicated that *the current ICT courses in the library and information science programmes need to be updated.* Information professionals need to acquire adequate ICT education and training group since the modern information environment depends upon highly technological solutions. This attests to the need for undergraduate library and information science students to be educated and trained in ICT subjects.

Information professionals indicated that *library and information science education programmes concentrate mainly on information related courses as opposed to ICT ones. As a result, undergraduate students end up disadvantaged in the current job market and in the information profession in general.* ICT invasion of the modern information environment has shaken the information profession and consequently transformed education and training programmes. Library and information science programmes need to

provide education and training that caters for the needs and requirements of the modern knowledge society. If information professionals are to be effective and efficient in information services then the incoming information professionals must be adequately educated and trained in ICT programmes that the requirements of the labour and job market.

The strongest deduction to be made is that the current crop of undergraduate library and information science students should have the necessary ICT knowledge, competencies and skills needed in the modern information environment. Current ICT courses offered in the universities should be updated to give the students the opportunity to train in various courses such as: computer programming skills, server management systems, software engineering and distributed systems. This is meant to address the labour market needs for library and information science students (Manmart, 2001 & Ocholla, 2003).

From the foregoing, many authors have noted various emerging factors such as: knowledge society, globalisation, global competition, technology revolution and modern information environment (Abuhmaid, 2008; Amiree, 2009; Fong & Naisbitt, 2000; Hedman, 2005; Mahmood, 2007; Pugh 2007 & Ramzan, 2004) that are directly linked to the need for library and information science programmes to develop innovative curricula to train information professionals in use of modern ICTs (Kavulya, 2007). This makes it necessary for library and information science education to regularly review the curricula and update the content (Manmart, 2001 & Ocholla, 2003). From the above observations,

one can conveniently conclude that ICT courses are quite important in the education and training of undergraduate library and information science students. ICT courses have led to the creation of new emerging areas in the information profession outside the traditional information courses.

5.1.6 Challenges or Issues Affecting ICT Education and Training

The research established numerous constraints that obstructed the education and training of ICT courses in library and information science programmes as presented in section 4.6.1, pg. 105. These *include: inadequate computer laboratories, inadequate computer hardware and equipment, inadequate software packages, lack of relevant ICT courses, inadequate qualified teaching staff, inadequate teaching of ICT courses, ICT courses that are not in line with market needs, and inadequate infrastructure. Inadequate computer laboratories, inadequate computer hardware and equipment, and inadequate software packages were therefore emerging as the biggest contributing factors and key issues obstructing ICT education and training for undergraduate library and information science students in the universities according to the respondents.*

From the data collected, there are other factors obstructing or affecting ICT education and training for students are as indicated in literature review. The review indicates that there are numerous constraints affecting the education and training of ICT courses in library and information science programmes such as: inadequate computerization, inadequate infrastructure and inadequate human capacity. Development of the knowledge-based society has extremely affected all aspects of education and training including library and

information science. In the library and information science programmes, the changes are meant to include modern ICT courses that are crucial in handling information work and services.

Two thirds of the students in one of the universities under study highlighted *the need for library and information science teaching departments in the universities to provide quality education and training in ICT programmes*. In the current digital environment, challenges facing library and information science students in the job market rotate around inadequate education and training in ICTs courses. Comprehensive review in ICT courses is essential in addressing these issues. Library and information science programmes in Africa are emphasizing on the need for increased investment in ICTs programmes in order to provide quality ICTs education and training to the students (Minishi-Majanja, 2004b; Minishi-Majanja, 2007 & Ocholla, 2003).

In view of the foregoing, it is clear that universities need to look at the emerging issues and address them in order to provide the students with quality education and training in ICT courses. Literature review indicates that current ICT courses are far below the expected standards of educating and training undergraduate library and information science students. This must also translate to the concern that employers have regarding the current crop of information professionals, especially in relation to achieving the required performance in information work and activities. From the results, it can be concluded that there is need to align ICT curriculum with modern information and knowledge requirements.

5.1.7 Curriculum

Regarding the current curriculum, over half of the respondents noted that it basically favours information courses at the expense of ICT courses. Results indicated that there was need to address this particular issue that has always affected the information profession. Typical responses from the lecturers indicated *the need to update the library and information science education and training curriculum especially in ICT courses as being critical in the modern information environment. This is to enable undergraduate library and information science students the opportunity to acquire ICT knowledge, competencies and skills. ICTs courses in library and information science programmes need to be offered as core subjects and not elective ones.* ICT education and training is the catalyst for enriching the learning process in the information profession. Review of the curriculum in relation to modern information requirements is extremely important in the education and training of the undergraduate students to enable them function effectively in work places and for their career development.

In addition, two thirds of the library and information professionals indicated that *undergraduate library and information science students do not have the necessary ICT competencies and skills needed in the modern information environment. The ICT education and training curriculum is not updated in order to enable the students to acquire ICT competencies and skills in computer programming, server management systems, software development, distributed systems and digital library systems. In the modern knowledge and learning environments, the students need to be educated and trained in essential ICTs courses.* The ICT curriculum must take into consideration the

modern information environment requirements regarding education and training of undergraduate students. Intellectual content of the ICT curriculum has to keep pace with the market needs and requirements in the information profession (Edzan & Abdullah, 2003). The curriculum should address the needs of the students in addition to being comprehensive and exhaustive in content and application.

Development of appropriate curriculum is fundamental and mandatory in ICT education and training (Mambo, 2000 & Ocholla, 2001). In addition, market needs and requirements for library and information science students favour graduates with strong ICT knowledge and skills and broad perspectives on information and knowledge management (Minishi-Majanja, 2007). The study identified many subjects suitable for ICT education and training for undergraduate library and information science programmes. This is in line with the core competencies and skills that are much needed by the present and future librarians (IFLA, 2000). Revised curriculum to empower undergraduate library and information science students with ICT knowledge, competencies and skills is imperative (Matersk, 2004; Minishi-Majanja, 2004a; Ocholla 2003; Omekwu, 2006; Siddamallaiah & Karisiddappa, 2003; Singh, 2007).

5.1.8 Professional Leadership in ICT Education and Training

This study established that professional leadership in ICT education and training is essential for the education and training of undergraduate library and information science students. Library and information science education must prepare the students to enter the job market with adequate ICT knowledge, competencies and skills so enable them work

in intensive technological environment effectively and efficiently. In the modern knowledge environment, students need adequate ICT education and training in areas of information programming, software development and digital libraries in relation to career or employment opportunities, job market and performance requirements as already noted.

Leadership in ICT education and training is among the issues that the respondents noted strongly as lacking among library and information professionals. In the current digital information environment, information services and activities depend on to a great extent upon technological solutions, that library and information science education and training programmes have to offer to the students. In the modern information environment, information professionals must have best leadership skills in technology in order to implement ICT based programmes in the modern information environment. Information professionals should have quality leadership skills to effectively and efficiently manage and handle information services (Fisher, 2004). This study also established that in the modern information environment, library and information professionals should be highly intelligent and competent in technological systems with strong drives to implement innovative library programmes and employ best leadership practices in information management practices (Biddiscombe, 2001). This is because of the dynamic electronic information environment (Raseroka, 1999 & Rosenberg, 2005), diversification of information work and emergence of ICT career job opportunities in library and information science (Callison & Tilley, 2001)

5.1.9 Adequate Resources

The study sought to establish the necessary resources, conditions and requirements for the provision and support of appropriate ICT education and training for undergraduate library and information science students in the universities. ICT education and training programmes need special attention because of the resources and facilities involved and required. Respondents noted that library and information science teaching departments can provide and support quality education and training if adequate resources are provided in terms of information infrastructure, human and financial resources. This calls for library and information science schools in Africa to provide adequate and effective training using existing resources and conditions (Mambo, 2000). Normally, adequate resources improve the teaching and learning of ICT education and training.

Inadequate resources negatively affect ICT education and training in the universities making it impossible for the library and information science education curriculum to match with the actual working environment that undergraduate students encounter. ICT education and training in the information profession needs to be given the necessary attention especially in emerging new areas that indicate undergraduate students have inadequate knowledge and skills in implementation of information projects. Information resources and conditions that hinder ICT education and training for undergraduate library and information science students such as: poor information infrastructure, inadequate computer facilities, inadequate software programmes and inadequate teaching staff must be addressed.

5.1.10 Technological Infrastructure and Access

The study established that library and information science teaching departments have inadequate technological infrastructure and access, thus, effectively affecting the quality of teaching and learning of ICT courses. This indicates the need for increased investment in ICT education and training for library and information science programmes in the universities. Two thirds of the students' respondents in one of the universities under study noted that *library and information science programmes offer limited ICT courses, since the technological infrastructure and access is poor hence hindering the achievement of quality education and training*. In particular, views of the students indicated that *technological infrastructure and access is characterized by inadequate computers facilities, inadequate software systems and poor connectivity*. From the foregoing, it is evident that technological infrastructure is a major challenge facing library and information science education in the universities. The schools and departments should provide and support adequate technological infrastructure and access in order to offer quality education and training to the incoming information professionals. In the 21st century, the core mandate of universities is to provide the necessary facilities and requirements required to support quality ICT education and training of students.

5.1.11 Library and Information Science Education

The study established that the number of students pursuing library and information science education has tended to decline gradually over the years, since employment opportunities favour graduates with a strong technological background. Particularly, this has forced library and information science students to enroll in other courses that are

technologically driven especially information technology and computer science. In general, there is need to improve the ICT curriculum in order to include emerging competencies and skills such as: library 2.0, web technologies, digital libraries and social media that characterize the digital information environment. The changing information landscape occasions the need to redefine and update the curriculum so that it reflects training programmes that match the needs and requirements of the modern working environment as well as enable students acquire the ICT knowledge, competencies and skills essential in handling information work and activities.

Library and information science education can also provide continuous professional development programmes to the students so as to address the market needs. This will also provide the students with the opportunity to grow and acquire the much needed emerging and new competencies and skills in ICT programmes. In addition, the departments can carry out a needs assessment to identify the emerging and new ICT competencies and skills in the labour market. Transforming undergraduate library and information science students in the modern knowledge and learning environment requires continuous professional efforts to revise and update ICT courses in the information profession. Modern technological revolution in internet, World Wide Web, web technologies, social media and digital libraries have occasioned the need for library and information science education to review the curriculum and pedagogy so as to enable the graduates leave with adequate knowledge and skills to function effectively in the information environment and career development. In the modern information environment, library and information professionals should be highly intelligent and competent in technological systems with

strong drives to implement innovative library programmes and employ best leadership practices in information management practices (Biddiscombe, 2001).

5.1.12 Integration of Degree and ICT Courses in Educational Systems

This study established that library and information science programmes in the country have adopted different names for the programmes such as: library studies, library and information science, and information sciences. Over half of the respondents noted that the use of different names creates a lot of confusion in the profession. In particular, there is need to bring together the various library and information science programmes for purposes of cohesion and harmonization in educational systems.

5.1.13 Needs Assessment

Modern information services and information professionals exist in a high dynamic environment that rapidly keeps on changing. Library and information science education and training needs and requirements also keep on developing and changing. This, in particular, implies the importance to regularly carry out needs assessment so as to review the curriculum needs and requirements in relation to labour market and modern information environment. Needs assessment provides an excellent opportunity for reviewing and redefining the curriculum in relation to the changing information landscape. Library and information science students need to acquire relevant ICT knowledge and skills so as to work in the modern information environment and adapt within the frameworks of the future direction. Needs assessment provides useful

information that could be used in aligning modern information and knowledge environment with the required ICT knowledge, competencies and skills.

5.1.14 Continuous Professional Development

The changing nature of the digital information landscape needs emerging and new ICT competencies and skills on the part of information professionals. Modern technology revolution in web technologies, library 2.0, social media and digital information systems have globally provided innovative methods to handle and support information services and activities occasioning the need for education and training programmes to integrate ICT knowledge and skills in the LIS curriculum. Continuous professional development programmes provide excellent education and training opportunities for students to acquire ICT knowledge, competencies and skills especially in emerging and new fields such as: software development and information programming skills. In particular, needs assessment can be carried out to identify the missing gaps and links in the modern information environment with the education and training programmes of the undergraduate students. It is imperative that in the changing information and knowledge environment continuous professional development be considered in identifying and imparting appropriate ICT knowledge and skills.

5.2 Summary

The chapter has highlighted key findings in the following aspects: ICT education and training needs and requirements, perceptions on ICT education and training in the modern information environment in relation to career opportunities, job market and

performance requirements, ICT competencies and skills that are essential for undergraduate students, challenges and measures to improve ICT education and training in the universities. Many authors have reinforced the necessity of improving ICT education and training in the universities (Kavulya, 2007; Minishi-Majanja, 2004b, Mutula, 2005; Ocholla, 2003; Singh, 2010; Tahourie, 2006). Addressing the problems hindering or militating against ICT education and training in the universities is the best strategy to bring quality education and training to the undergraduate library and information science students. In the knowledge age, library and information science undergraduate students need to acquire adequate ICT knowledge, competencies and skills so as to suit the labour and job market requirements. In this respect, a suitable curriculum for ICT education and training is essential for library and information science programmes.

CHAPTER SIX

SUMMARY OF FINDINGS, CONCLUSION AND RECOMMENDATIONS

6.0 Introduction

The chapter is organized into these sections: introduction; summary of the findings; conclusion; recommendations; and suggestions for further research. The first section provides a brief introduction of the aim of the chapter. The second section provides a summary of the findings from the study. In the third section, the conclusion regarding the study is made. In the fourth section, recommendations emerging from the study are explained. The fifth section highlights suggestions for further research. In a nutshell, the chapter presents the findings in relation to the objectives of the study. Suggestions and recommendations for addressing the challenges militating or inhibiting ICT education and training of undergraduate library and information science students and related programmes within the Kenyan context are provided.

6.1 Summary of the Findings

In this section, a summary of the findings arising from the study are presented. These are discussed and derived from the following themes of the study: teaching of ICT education and training needs and requirements; adequacy of teaching and learning of ICT courses; perceptions on current ICT education and training in relation to competence in information work and activities, career opportunities, job market and performance requirements; critical ICT competencies and skills that are essential in the modern information and knowledge environment; and challenges and measures to improve ICT

education and training for undergraduate library and information science students in the country.

From the study the following were established:

6.1.1 ICT Education and Training Needs and Requirements

Library and information science programmes need to review and design ICT courses to reflect the needs and requirements of the modern knowledge environment. In the current digital information environment, it is imperative that graduates get equipped with adequate ICT knowledge, competencies and skills to enable them function effectively in work places and for career development.

6.1.2 Adequacy of Teaching and Learning Resources

This study recognized the importance of ICT education and training although there are strong perceptions that library and information science schools and departments in the universities have inadequate facilities for supporting teaching and learning of ICT courses. In general, the teaching and learning of ICT education and training is characterized by inadequate practical in ICT or computer subjects, inadequate computer hardware equipment or facilities, and inadequate computer software packages. Adequate teaching and learning of ICT courses require huge investments in terms of financial resources for purchasing the necessary facilities or equipment in addition to hiring and developing needed human resources. Limited financial budgets affect the acquisition of ICT facilities or equipment, consequently, affecting the teaching and learning of the students.

6.1.3 Employment Opportunities and Labour Market Requirements

ICT courses in library and information science programmes do not match the modern information management practices. Bachelor of library and information science programmes curriculum should be updated in relation to labour market trends, career opportunities and modern knowledge environment requirements. In the modern information environment, employment opportunities and career development favour graduates with adequate ICT knowledge and skills.

6.1.4 Factors Affecting ICT Education and Training

Factors pointed out as hindering the education and training of ICT courses in LIS programmes include: inadequate computerization, poor information infrastructure and lack of qualified teaching staff. Of critical importance is the ability of the graduates to use and apply ICT competencies and skills in information work and related activities. Adequate resources and conditions are important in ICT education and training, and universities have to develop appropriate technological infrastructure.

6.1.5 Critical and Essential ICT Competencies and Skills

This study established a number of ICT courses that are essential in the education and training of undergraduate students in the current digital information environment. Library and information science education programmes need to be integrated with modern ICT oriented courses that are quite critical in the modern information environment. Emerging and new ICT oriented information roles in library 2.0, web 2.0 technologies, social media and networking systems have developed in the information profession. ICT courses are

instrumental in offering new and increased job opportunities outside the traditional information courses. Competencies and skills in ICT lead to better management and handling of information services.

6.1.6 Curriculum

The field of library and information science has been affected by developments in modern technological solutions and educational systems in the universities have to respond to the needs and demands of the knowledge society. The study established measures to address this imbalance that has always affected the information profession in the past through a suitable library and information education curriculum. In particular, the curriculum must take into consideration the contemporary issues affecting ICT education and training of undergraduate students in relation to knowledge society, Millennium Development Goals, globalization and labour market needs. If the incoming information professionals are to acquire the preferred ICT knowledge, competencies and skills, then the curriculum must provide ICT education that is relevant to modern information and knowledge requirements.

6.1.7 Library and Information Science Education

Library and information science education and training programmes in Kenyan universities have been experiencing a decline in terms of numbers of students. The trend hindering library and information science education in the country must be addressed for the benefit of the profession. In particular, inadequate ICT curriculum is affecting the education and training of undergraduate students as the students additionally train in

other fields of study that are technologically-reliant and compliant especially information technology and computer science. Designing market oriented ICT education and training programmes is the best strategy of addressing issues of the labour market, career opportunities, professionalism, globalization and Millennium Development Goals in the information profession.

Kenyatta and Moi Universities offer ICT courses for undergraduate library and information science students but there is need for improvement. The needed ICT competencies and skills can also be provided through continuous professional development programmes. In the modern knowledge society, transforming undergraduate students through appropriate ICT courses should be a top priority for library and information science education programmes in the country. Teaching departments in the universities must embrace change so as to cope with the emerging trends in the field of library and information science. In addition, schools, lecturers, information professionals and other stakeholders in the profession must be proactive in bringing change in the education and training of information professionals. In general, library and information science programmes must provide the much needed professional leadership in the education and training of undergraduate students and information professionals.

6.2 Conclusion

1. There is need to change the focus on ICT courses in library and information science education and other related programmes in the universities. Library and information science teaching departments should considerably monitor

developments in the modern information environment and play a great role in implementing positive change to ensure that the education and training needs of each level of training are inclusive and comprehensive. In the current digital information environment, ICT education and training has to reflect the requirements of the labour market. Library and information science programmes should offer quality ICT education and training opportunities befitting the academic and professional status of the 21st century graduates.

2. Teaching and learning of ICT courses should emphasize better instruction methods. Most important, the teaching and learning methods should always strive at achieving quality in imparting ICT knowledge, competencies and skills to the students. Modern information environment has rapidly changed to the extent that traditional librarianship courses cannot produce competent library and information professionals.
3. The respondents noted the following as the factors hindering ICT education and training of undergraduate students: inadequate computer laboratories, inadequate computer hardware and inadequate software packages. In particular, it is important to look at these challenges affecting library and information science education to ensure that undergraduate students are educated and trained in ICT courses.
4. Any education Curriculum should provide education and training that meets employment opportunities and labour market requirements for the students. Library and information science education programmes should ensure suitable

curriculum for ICT programmes is used and applied to give the students the opportunity to train in market oriented courses. The ICT curriculum should address the needs and demands of the students, in addition to being comprehensive and exhaustive in content and application. The students should learn and acquire ICT knowledge, competencies and skills through an updated curriculum to reflect the diversity of the modern information and knowledge environment.

5. In this knowledge-based society, where the knowledge environment is rapidly changing and expanding, it is essential for library and information science students to keep up with needs and requirements of the job market. In Africa and Kenya in particular, it is time to bridge the ICT gap in the education and training of information professionals. Kenyan universities, information services organizations, library and information professionals, and friends of the profession should join hands and ensure comprehensive updating of the ICT curriculum. ICT education and training is the first step in making the incoming information professionals effective and efficient information leaders.

6.3 Recommendations

One of the objectives of the study was to provide suggestions on how to improve ICT education and training of undergraduate library and information science students in the universities. In this respect, the researcher would like to make the following suggestions emerging from the study.

6.3.1 Review of ICT Education and Training Courses

There is need to review the current status and nature of ICT courses for library and information science programmes so as to provide and implement better platforms for the education and training of information professionals. ICT related courses seem to be affected at all levels of library and information science education and training. It is imperative for library and information science teaching departments in the universities to put in place the necessary arrangements to produce quality undergraduate graduates.

6.3.2 Library and Information Science Programmes

Development of ICT has changed and created modern information and knowledge environment that depend upon high technological systems. This development has also changed and affected the roles of library and information professionals including education and training programmes. This implies that library and information science programmes should lay emphasis on proper education and training in ICT related courses. Library and information science programmes should address the issue of new emerging areas in the information industry especially in ICT courses.

6.3.3 ICT Education and Training Curriculum

There is need for library and information science teaching schools and departments in Kenyan universities, to redefine and design adequate ICT curriculum in relation to career opportunities, job market and performance requirements. Library and information science programmes should look at the content and modern information requirements for appropriate curriculum design. The curriculum should address imbalances that have

always affected the field of library and information science in the past. In order to bridge the knowledge gap in the field of library and information science, the issue of alignment of the curriculum may require the concerted efforts of the teaching departments, lecturers, information professionals and employers. This is to facilitate development of the curriculum that includes wide range of ICT issues relevant in the information environment. Employers strongly require information graduates with adequate ICT competencies and skills as necessary requirement in the labour market and career development.

6.3.4 Adequate Resources

Library and information teaching departments ought to address issues of resources that hinder quality education and training of ICT courses. ICT courses have not been given the necessary attention especially in emerging new areas including web 2.0 technologies and social media applications. Due to financial constraints, universities have poor information infrastructure, thus, effectively affecting ICT education and training of undergraduate library and information students.

6.3.5 Professional Leadership in ICT Education and Training

Library and information professionals have to be assertive in providing professional leadership in ICT education and training. Modern knowledge environment require library and information professionals to have the right mix of knowledge, competencies and skills to function efficiently in information work places. This particular leadership trait seems to be missing in the information profession. Professional leadership in the field of

library and information science training can effectively be utilized to advocate for quality ICT education and training of undergraduate students. Information professionals must champion best leadership practices in order to implement ICT education and training programmes that suit the modern knowledge environment.

6.3.6 Emerging and New Information Roles

In general, traditional librarianship courses are well established in the field of library and information science education curriculum as opposed to modern information programmes in ICT courses. Library and information science education offer limited ICT programmes to the undergraduate students. The study provides relevant information on the need to change the library and information science curriculum due to the potential of ICT education and training in the modern information environment. Emerging ICT competencies and skills need to be integrated in the curriculum so as to increase career opportunities, job market and performance requirements for the graduates and information professionals in general. Emerging and new information roles are important in addressing the needs of the job market for undergraduate students.

6.3.7 Integration of Degree and ICT Courses in Educational Systems

Library and information science programmes in the universities have different names for the programmes such as: library studies, library and information science, and information sciences. In relation to advocacy and adoption of uniform degree names in educational systems, universities should consider the existing library and information science framework to facilitate cohesion and alignment in the profession. The ICT curriculum

should be redesigned with a view to adopting core uniform courses that not only addresses current competencies and skills, but also offers solid and firm flexible education and training. Implementation of ICT curriculum should address relevant job market needs beyond the generic office applications and basic computation skills. Universities should also address the issue of degree and programme names in order to bring uniformity in the information profession.

6.3.8 Needs Assessment

Information services exist in high dynamic environment that rapidly keeps on changing. ICT education and training needs and requirements also keep on developing and changing. This implies the need to regularly carry out needs assessment so as to review the curriculum requirement. Needs assessment provides the opportunity to align modern information working conditions with the required ICT knowledge and skills. Teaching departments, lecturers, administrators and managers, and other stakeholders in the universities, need to provide information that could be used in developing and planning ICT courses for the purposes of producing quality undergraduate library and information graduates.

6.3.9 Continuous Professional Development

Development of ICT has lead to the emergence of new areas of specialization in the information profession that needs continuous professional development to provide the much needed competencies and skills in the job market. Continuous professional development programmes also provide excellent education and training opportunities for students to be highly knowledgeable in ICT competencies and skills. Lecturers and

information professionals can effectively make positive contributions in the education and training process by developing appropriate continuous professional programmes. Keeping up with demands of the digital age presents excellent opportunities for transforming library and information science education programmes.

6.3.10 Measures to Improve ICT Education and Training

Teaching and learning of ICT programmes face numerous challenges and that measures need to be taken to improve the education and training in the universities. The study indentified factors that hinder ICT education and training, and suggested potential solutions for improving the state of the curriculum.

6.4 Suggestions for Further Research

6.4.1 Library and Information Science Education Programmes

The study provides useful information for future studies in library and information science programmes. Comparative studies of ICT education and training at master's and doctorate levels need to be carried out to ensure best practices in the information profession. In addition, studies in ICT education and training in library and information science programmes at all levels need to be carried out so as to understand and address the pertinent issues facing information professionals. Research addressing factors that hinder ICT education and training in the information profession are very essential for the growth and development of library and information science programmes in the country.

6.4.2 ICT Education in Library and Information Science for Postgraduate Studies

In the study, there are some basic questions that need to be explored further. First, since the study focused on undergraduate library and information science students, it is imperative that the current status of ICT education and training for postgraduate library and information science student in the universities in Kenya be investigated. ICT landscape is experiencing rapid changes that also affect library and information science education and training programmes. If library and information professionals are to work efficiently in ICT information environment then proper education and training in achieving positive results is extremely important. In particular, it is important to understand the ICT education and training needs and requirements of undergraduate library and information science students and related programmes in the digital age so as to provide quality education and training.

6.4.3 Barriers to Adoption of ICT Education and Training in Library and Information Science Programmes

Study on the barriers to the adoption of ICT education and training, and the means of identifying the factors or obstacles in the field of library and information science is important. Major obstacles identified in this study were inadequate alignment between ICT education and training and the information industry, poor information infrastructure, inadequate computer facilities, inadequate computer software programmes and inadequate teaching staff. All these and other related issues affecting the information profession would be investigated and the problems solved in order to ensure quality education and training for the students and information professionals in general.

6.4.4 Challenges of ICT Education and Training Curriculum in the Digital Information Environment

Research is needed into future implications of ICT education and training curriculum in the digital information environment. The importance of this study is to determine how to connect the students with the requirements of the digital information environment. Information work and technology are two sides of the same coin that keep changing rapidly. Library and information science education should research and develop longlife ICT measures to address career opportunities, job market, performance requirements and professionalism in the knowledge environment.

6.4.5 Investigation on the Declining Nature of Library and Information Science Education

Formal library and information science education and training in Kenya began in 1940. Since then, only few library and information science programmes are offered in Kenyan institutions. Of major concern is the declining nature of library and information science programmes instead of growing and expanding. There is need for a study to investigate the declining nature of library and information science students in Kenya with a view to addressing the problems facing the information profession.

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APPENDIX I**LETTER OF INTRODUCTION**

January 30, 2009.

Dear Sir/Madam,

RE: RESEARCH INTERVIEW GUIDE

I am a PhD student at Moi University carrying out a study on **‘USE OF INFORMATION COMMUNICATION TECHNOLOGIES IN EDUCATION AND TRAINING OF UNDERGRADUATE LIBRARY AND INFORMATION SCIENCE STUDENTS IN TWO SELECTED KENYAN UNIVERSITIES’**. The purpose of this letter is to kindly request you to assist me in terms of providing and sharing your knowledge, ideas, opinions, thoughts and any other relevant information useful to the study and the information profession in general. Your contributions and participation will go a long way in creating better understanding of the subject in the information profession.

The information you provide will only be used for the purpose of the study and be treated with strict confidence. Please do feel free to provide any other information that you think is important with regard to the area of study.

Best wishes,

Elisha Ondieki Makori
PhD Student
Moi University
Mobile: 0722926456
E-mail: elishaondieki@yahoo.com

APPENDIX II**INTERVIEW GUIDE FOR LECTURERS****GENERAL INSTRUCTION**

This is an interviewing process. Kindly feel free to give any other information relevant to the study.

BACKGROUND INFORMATION

1. Sex. _____
2. Name of the university. _____
3. Department. _____
4. Teaching subject or area of specialization. _____

ICT EDUCATION AND TRAINING NEEDS AND REQUIREMENTS FOR UNDERGRADUATE STUDENTS

5. Highlight the key ICT education and training needs and requirements for undergraduate library and information science students.

6. Describe the adequacy of teaching and learning ICT courses for undergraduate library and information science students.

ICT EDUCATION AND TRAINING IN THE MODERN INFORMATION ENVIRONMENT

7. How useful are the current ICT courses for undergraduate library and information science students in relation to competence in information work?

8. How is ICT education and training offering new opportunities to undergraduate library and information science students in the job market?

CRITICAL ICT COMPETENCIES AND SKILLS ESSENTIAL FOR CAREER OPPORTUNITIES, JOB MARKET AND PERFORMANCE REQUIREMENTS

9. Which ICT courses do you think are essential for undergraduate library and information science education?

10. What critical ICT competencies and skills are essential for undergraduate library and information science students in the labour market and performance requirements in the current digital information environment?

CHALLENGES AND MEASURES TO IMPROVE ICT EDUCATION AND TRAINING

11. Explain the key issues or factors obstructing or affecting ICT education and training for undergraduate library and information science students in the universities.

12. What are some of the measures that need to be undertaken to improve ICT education and training for undergraduate library and information science students?

13. What other comments can you give that you find relevant in improving ICT education and training for undergraduate library and information science students in Kenyan universities?

Thank you for your time, participation and contribution.

APPENDIX III**INTERVIEW GUIDE FOR UNDERGRADUATE LIBRARY AND INFORMATION SCIENCE STUDENTS****GENERAL INSTRUCTION**

This is an interviewing process. Kindly feel free to give any information that you find relevant to the study.

BACKGROUND INFORMATION

1. Sex. _____
2. Name of the university. _____
3. Department. _____
4. Undergraduate programme of study. _____

ICT EDUCATION AND TRAINING NEEDS AND REQUIREMENTS FOR UNDERGRADUATE STUDENTS

5. Describe the key ICT education and training needs and requirements for undergraduate library and information science students.

6. Highlight the adequacy of teaching and learning ICT courses for undergraduate library and information science students.

ICT EDUCATION AND TRAINING IN THE MODERN INFORMATION ENVIRONMENT

7. How useful are the current ICT courses for undergraduate library and information science students in relation to competence in information work?

8. Highlight the role of ICT education and training in career opportunities, job market and performance requirements for undergraduate library and information science students.

CRITICAL ICT COMPETENCIES AND SKILLS ESSENTIAL FOR CAREER OPPORTUNITIES, JOB MARKET AND PERFORMANCE REQUIREMENTS

9. Which ICT courses do you think are essential for undergraduate library and information science education?

10. What critical ICT competencies and skills are essential for undergraduate library and information science students in the labour market and performance requirements in the current digital information environment?

CHALLENGES AND MEASURES TO IMPROVE ICT EDUCATION AND TRAINING

11. Explain the key issues or factors obstructing or affecting ICT education and training for undergraduate library and information science students in the universities.

12. What are some of the measures that need to be undertaken to improve ICT education and training for undergraduate library and information science students?

13. What other comments can you give that you find relevant in improving ICT education and training for undergraduate library and information science students in Kenyan universities?

Thank you for your time, participation and contribution.

APPENDIX IV**INTERVIEW GUIDE FOR LIBRARY AND INFORMATION PROFESSIONALS****GENERAL INSTRUCTION**

This is an interviewing process. Kindly feel free to give any information that you find relevant to the study.

BACKGROUND INFORMATION

1. Sex. _____

2. Name of organization. _____

3. What is the nature of your work?

4. What is your highest qualification in the information profession?

ICT EDUCATION AND TRAINING NEEDS AND REQUIREMENTS FOR UNDERGRADUATE STUDENTS

5. Highlight the key ICT education and training needs and requirements for undergraduate library and information science students.

ICT EDUCATION AND TRAINING IN THE MODERN INFORMATION ENVIRONMENT

6. How useful are the current ICT courses for undergraduate library and information science students in relation to competence in information work?

- 7 Describe the role of ICT in career opportunities, job market and performance requirements for undergraduate library and information science students.

CRITICAL ICT COMPETENCIES AND SKILLS ESSENTIAL FOR CAREER OPPORTUNITIES, JOB MARKET AND PERFORMANCE REQUIREMENTS

8. Which ICT courses do you think are essential for undergraduate library and information science education?

9. What critical ICT competencies and skills are essential for undergraduate library and information science students in the labour market and performance requirements in the current digital information environment?

CHALLENGES AND MEASURES TO IMPROVE ICT EDUCATION AND TRAINING

10. What are some of the measures that need to be undertaken to improve ICT education and training for undergraduate library and information science students?

11. What other comments that you find relevant in improving ICT education and training for undergraduate information science students in Kenyan universities?

Thank you for your time, participation and contribution.

APPENDIX V
RESEARCH AUTHORIZATION LETTER

APPENDIX VI
RESEARCH PERMIT