

INFORMATION AND COMMUNICATION
TECHNOLOGIES IN TEACHING AND LEARNING:
A COMPARATIVE EVALUATION OF TWO
UNIVERSITY LIBRARIES IN KENYA

by

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A DISSERTATION

Submitted to University of Pretoria
In partial fulfillment of the requirements for the degree of

MASTER OF INFORMATION SCIENCE

Department of Information Science

2008

ABSTRACT

Information and Communication Technologies (ICTs) play a crucial role in creating access to information sources through the library networks. When academic libraries integrate ICTs in their services they play an important role in teaching and learning. It is for such reasons that KENET sought to establish an ICT infrastructure to network Higher Education Institutions (HEIs) in Kenya, and to facilitate the use of Internet Technology in teaching, learning, research and sharing of information resources at an affordable cost. The University of Eastern Africa, Baraton (UEAB) and Kenyatta University (KU) libraries in Kenya are both members of the Kenya Education Network (KENET).

This study investigates the main features of ICT use by a public and a private university library in Kenya in support of formal and informal teaching and learning. The study includes three target groups, namely: third year undergraduate students, library committee members, and library managers. Data was collected through self-administered questionnaires, interviews, and site visits. The four main issues considered were: ICT infrastructure, access and use of ICTs, ICT usage patterns, and students learning outcomes.

The study concludes that:

- There is inadequate ICT infrastructure, specifically library networks and computers, at Kenyatta University.
- Access to and use of ICTs is affected by the lack of access skills, and there is a need for training in this area.
- ICT usage differs, with Kenyatta University students lagging behind UEAB students.
- Student learning outcomes are diverse; UEAB students benefited from the use of library e-resources to meet their formal and informal learning needs, and Kenyatta University students did not benefit at all.

The study also concludes that the implementation of ICTs in Kenyan HEI libraries, through the provision of adequate infrastructure and funding, the development of ICT policies, and the development of Information Literacy (IL) programmes for students, will ensure that ICTs play an important role in academic support for formal and non-formal

teaching and learning. A model for the implementation of an IL programme is proposed as a means to advance the process.

Keywords: ICTs, Academic libraries, Information Literacy, Public universities, Private universities

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ACRONYMNS

African Regional Center for Computing	ARCC
African Virtual University	AVU
American Library Association	ALA
Association for College Libraries	ACRL
Communications Commission of Kenya	CCK
Council of Australian University Librarians	CAUL
Database for African Thesis and Dissertation	DATAD
Deputy Vice-Chancellor Academic Affairs	DVCAA
Global Information Society	GIS
Gross Domestic Product	GDP
Higher Education Institution	HEI
Information and Communication Technology	ICT
Information Infrastructure	NII
Information Literacy	IL
Information Technology	IT
International Federation for Library Associations	IFLA
International Telecommunications Union	ITU
Kenya Education Network	KENET
Kenya Posts and Telecommunications	KPTC
Library and Information Science	LIS
Lifelong Learning	LLL
Local Area Network	LAN
Millennium Development Goals	MDG
Ministry of Education Science and Technology	MOES&T
National Information Policy	NIP
Networked Readiness Index	NRI
Organization for Economic Cooperation and Development	OECD
Online Public Access Computers	OPAC
Post Graduate Diploma in Library and Information Science	PGDLIS

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Program for Enhancing Research Information

PERI

Statistical Package for Social Science

SPSS

University of Eastern Africa, Baraton

UEAB

Very Small Aperture Terminal

VSAT

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Chapter 1

Introduction

“Information and Communication Technologies are changing the world. We are now in the Information Society, a society in which information is an essential and valuable commodity that one can buy, sell, store or exchange. We not only want an information society, but also a knowledge society in which knowledge can be shared and distributed all round the world enabling people to access knowledge and benefit from being educated. Education is therefore a key issue in the knowledge society and educators have a major role and mission.”

Educators of the world—2005

1.1 Background

Information and Communication Technologies (ICTs) continue to revolutionize education worldwide. They are a major driving force of globalization, with a profound impact on teaching and learning in Higher Education Institutions (HEIs). According to Tinio (2003:3), globalization and technological change have created a new ‘global economy’ powered by technology, fueled by information and driven by knowledge. As a result, HEIs in developing countries must play a major role in supporting these knowledge driven economies (Juma, 2003:207). A knowledge-driven economy can be achieved through training of competent and responsible professionals needed for sound public and private sector management. A World Bank report indicates that a knowledge based economy rests on four pillars:

- A supportive economic and institutional system that provides incentives for the efficient use of existing and new knowledge;
- An educated and skilled population to create, share and use knowledge;
- An information infrastructure to facilitate the dissemination and processing of information; and
- An effective innovation system of institutions such as universities, firms, research centers and consultants to utilize the growing supply of global knowledge, assimilate and adapt it to local needs and create new technology (World Bank Institute, 2001).

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Investment in a country's HEIs, especially in ICTs will benefit the country economically. An HEI system that allows for the use of knowledge to create new technology can achieve economic growth (Okuni, 2001:1; Nwuke, 2003:22). Empirical support for the importance of ICTs in education is found in a study of 58 developing countries by Lau, Jamison & Loutat (1990) who found positive and statistically significant estimates of output with respect to levels of education.

Africa's HEIs need to generate new ideas, incubate the new technologies and produce skilled manpower so that their economies may grow (Nvuke, 2003:25). ICT is increasingly seen as a tool that enables the process of learning to be undertaken in more compelling, innovative and effective ways. If Africa's HEIs provide access to ICTs there will be improvements in the quality of human resources, which are important for growth. Lavin & Qiang (2004:61) affirm this and state that the use of ICTs in companies has contributed to economic growth by increasing labor productivity. It has been noted that the use of ICTs in education is likely to have the same effect it has had in technologically enabled companies (Loveless & Ellis, 2001:13). Worldwide, HEIs not only house the information infrastructure of each country but also play the role of repositories and channels of information communication (Divjak, 2004). Information is found in libraries, through computer networks and the internet. In developing countries, ICTs have the potential of increasing access to and improving the relevance and quality of education. The quality of education can be seen in the ability of graduates from developing countries to compete effectively in global job markets.

Developing countries such as Kenya need to develop their ICT component through the Networked Readiness Index (NRI) in order to offer quality education in their universities. According to statistics from the ICT rankings of 122 countries, Kenya ranks 95 (Dutta, Lavin & Paua, 2006). The NRI has three components, namely environmental, readiness and usage. Of the three, the readiness component, which is defined as the capability of principal agents of an economy to leverage the potential that ICT provides, measures the potential of ICT capability in:

- Individual ICT skills;

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- Access and affordability of ICTs; and
- Government use of ICTs for its own services.

Readiness is therefore an essential component in ICT development (Colle, 2005). In education, readiness can be achieved by developing students' individual ICT skills as well as providing access to ICTs. ICT skills may support national development priorities such as the United Nations Millennium Development Goals (MDG). The MDG is a set of development targets to be achieved by 2015. According to Lavin & Qiang (2004: 60), the MDG covers 8 goals, each goal has several targets. In summary, the goals can be identified as follows:

- Goal 1: Poverty eradication;
- Goal 2: Primary education;
- Goal 3: Gender equality;
- Goal 4: Child mortality reduction;
- Goal 5: Maternal health;
- Goal 6: HIV/AIDS;
- Goal 7: Environment; and
- Goal 8: ICT & partnerships.

MDG goal 8, which covers both ICT and partnerships, can increase efficiency so that goals 2-7, and ultimately goal 1 can be reached. According to Laving & Qiang (2004:61), ICTs can be used to achieve the MDG through social empowerment. ICTs are general-purpose technologies with features such as:

- Applicability across a broad range of uses;
- The internet, currently used as a tool for open access to information resources;
- Availability in a variety of formats; and
- Strong complementarities with existing technologies.

ICTs therefore play the role of enabling technologies, opening up new technologies rather than offering final solutions. There are many reasons why HEIs should invest in ICTs. One important reason is that HEIs are the 'assembly plant' of a country's intellectuals. It is here that the potential researchers, leaders, educators and workers in various fields are

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trained. When the finished product is of a high quality, performance in the market is also expected to be of a high quality. Providing an enabling environment where learners are exposed to ICTs and develop ICT skills can be of future benefit, especially in achieving some of the MDGs.

Many governments in developing countries have not yet made significant investments in ICTs at their HEIs. However, it is commendable that some developing countries are making remarkable progress in ICT investment in HEIs. Kenya is one such country making progress towards joining the 'Global Information Society' (GIS). The GIS is a society where the majority of people are engaged in creating, gathering, storing, processing or distributing of information (Feather & Sturges: 1997: 218).

The government of Kenya, through the Ministry of Education Science and Technology (MOES&T), has taken a significant step towards incorporating ICTs in education. The Report of the National Conference on Education and Training (2003), organized by MOES&T, marked a watershed for HEIs. The conference made strong recommendations to incorporate ICT in education. The report also recommended that MOES&T rephrase its mission statement to include an ICT component. Thus the new mission statement should read;

“To provide, promote and co-ordinate life-long education, training and research for sustainable development in the emerging Global Information Society” (MOEST 2003:43).

1.2 Rationale of the Study

In HEIs, teaching and learning take place in two modes, namely the formal and the informal. In both modes there is a need for and use of information. Academic libraries play an important role in connecting the two modes of learning. The primary obligation of academic libraries is in meeting the institution members' information needs. Information in the right quantities and of the right quality becomes a crucial ingredient for effective teaching and learning. John Feather and Paul Sturges (1997:3) affirm this by stating the three main purposes of academic libraries. First, academic libraries provide for

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the educational needs of students, both arising directly from curriculum and those of a more general nature. Second, they support the teaching staff in their need for up-to-date material required for their teaching role. Third, they provide for research resources both in higher-degree work and in research activities of academic staff.

ICTs play a crucial role in creating access to information sources through the library networks. When academic libraries integrate ICTs in their services they play an important role in teaching and learning. An early myth-breaker of the electronic library, Robert Taylor (quoted in Birdsall, 2001:32), states that traditionally the library is looked upon as a place surrounded by four walls where printed material and sometimes non-print materials are stored, organized and loaned. The availability of ICTs in libraries negates this view of the library. The library today is not just a physical place for warehousing reading materials but a 'place without walls'. The availability of ICTs has turned the library into a virtual place for information access. Campus access is not confined to the library building but extends to any point on campus with Internet connections. Libraries have also built their own Intranets that enable library processes to take place within an entire campus or campuses. According to Dowling (2001:250), when ICTs are incorporated into the development of a university, a university without walls is the result. He affirms (2001: 25) that the application of ICTs to libraries will represent a path towards the promise of barrier-free information access in which libraries will be the hub of information networks providing access to information.

The academic library therefore plays a central role in teaching and learning. It is a central organ for disseminating information and imparting lifelong learning skills to the users. ICTs, specifically the Internet, are new and popular channels for information dissemination. An assessment of the HEIs quality of education would include the quality of the library services.

It follows from the above that there is a need to evaluate the HEI libraries in Kenya as an example of a developing country, to gauge the levels of their ICT usage in support of teaching and learning. An evaluation is certainly necessary as it will:

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- Enable library managers to design Information Literacy programs that enhance lifelong learning skills;
- Identify the ICT usage patterns at Kenyan HEIs;
- Identify the level of ICT integration that some Kenyan HEI libraries have reached; and
- Identify the level of ICT integration in teaching and learning at HEIs in Kenya.

1.3 Main Research Question

In an attempt to offer such an evaluation, this study poses the following research question:

- What are the main features of ICT use at public and private university libraries in Kenya to support formal and informal teaching and learning?

In order to answer this question, the study selects one Private University (University of Eastern Africa Baraton) and one Public University (Kenyatta University) and asks the following subsidiary questions.

1.3.1 Secondary Research Questions

- What is the ICT infrastructure at University of Eastern Africa, Baraton and Kenyatta University libraries?
- What is the level of access and use of ICTs at University of Eastern Africa, Baraton and Kenyatta University libraries?
- What are the ICT usage patterns among the students at University of Eastern Africa, Baraton and Kenyatta University libraries?
- What is the role of the library in determining the student's learning outcomes?

1.4 Limitations of the Study

This study will not address the technical details of ICT infrastructure or its wider use in the curriculum. It will focus on the general use of ICTs by the students and specific applications of ICTs in the libraries.

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1.5 Research Methodology

This study will apply the survey methodology, with comparative analysis. The study will assess the use and outcome of the technology under investigation. Detailed discussion of the methodological approaches and procedures are found in chapter three.

1.6 Research Sites

The study will be conducted at two sites- the University of Eastern Africa, Baraton in the rural Nandi District of the Rift valley Province, and Kenyatta University, located in the urban Nairobi Province. A comparative analysis is essential because Kenya has both private universities and public universities, and the two institutions selected are significant in the provision of higher education.

1.7 Permission

Written application for permission to carry out the study will be sought from three places. First, a formal request will be made to University of Pretoria's EBIT Faculty Committee for Research Ethics and Integrity. Second, permission to conduct the study will be sought from the Ministry of Education Science and Technology in Kenya through a written application. Third, written application will be made to the administration of each individual university.

1.8 Data Collection Methods

The random sampling method will be used. The student population will constitute registered third year students in both universities. For the library managers and academic staff, the entire population of willing participants will be used.

1.9 Data Collection Tools

- Data for third year undergraduate students will be gathered through the use of self-administered questionnaires, which will be distributed to respondents at both universities.

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- Data for library managers will be gathered through self-administered questionnaires and selected interview schedules at the two universities.
- Data for library committee members shall be obtained through self administered questionnaires at the two universities.
- Site visit data will be collected by use of observations.
- Documents such as library handbooks and reports will also be used.

1.10 Data Analysis Procedures

The Statistical Package for the Social Sciences (SPSS) will be used in the analysis of the data. The data will be presented in categories, coded, entered and analyzed. The findings will be discussed and conclusions drawn regarding subsidiary and main research questions.

1.11 Definition of Key Terms

The key concepts in this study are: Academic Library, Information & Communication Technologies (ICTs), Formal Learning, Informal Learning Lifelong Learning and Information Literacy.

Academic Library

Academic libraries are libraries in educational institutions at any level such as Universities, Colleges, and Research institutions (Prytherch, 2000:3; Soper, Zweizig & Osborne, 1990:7). Since academic libraries house ICT resources for students and lecturers, there may be a convergence between management of the library and the ICT facilities.

Information Communication Technologies (ICTs)

ICTs are networks that provide new opportunities for teaching, learning and training through delivery of digital content (Prytherch 2000: 357). For the purposes of this study and in the context of curriculum, ICTs will refer to the range of tools and techniques

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relating to computer-based hardware and software, to information sources such as the Internet, Audio and Video Tapes, CD-ROMs and DVDs.

Formal learning

Formal learning is associated with the hierarchically-structured, chronologically-graded education system, running from primary school through the university and including, in addition to general academic studies, a variety of specialized programs and institutions for full-time technical and professional training (Colley, H., Hodkinson, P. & Malcolm, J., 2002).

Informal learning

Informal learning refers to the lifelong process whereby every individual acquires attitudes, values, skills and knowledge from daily experience and the educative influences and resources in his or her environment, from the library and the ICTs (Colley, H., Hodkinson, P. & Malcolm, J., 2002).

Life Long Learning

Lifelong Learning (LLL) is the deliberate progression throughout the life of an individual, where the initial acquisition of knowledge and skills is reviewed and upgraded continuously, to meet the challenges set by an ever changing society (Brophy, 2000; Mark, 2000).

Information Literacy

Information Literacy refers to a set of abilities that a student will require to know when they need information, to locate the information, to evaluate the information and to use the information that has been obtained to meet an information need (ACRL 2000; ALA, 2005).

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1.12 Overview of Selected Key Resources

The following sources mainly from books and conference papers have been reviewed and identified as relevant to the research problem and the entire study. Chapter two provides a more detailed review of the literature.

1.12.1 Books and Chapters in Books

Lifelong learning in the digital age: sustainable for all in a changing world edited by Tom J. van Weert & Mike Kendall. 2004. This book is a collection of papers presented at the IFIP Lifelong learning working track in 2003. With views from various authors this book addresses a range of issues in ICT, Higher education and lifelong learning. Some of the papers address issues arising as institutions of higher learning embrace ICT as well as the different approaches to the development of ICTs.

A chapter from the above book **Information and Communication Technology in Higher Education by Yvonne Buettner et. al. 2004.** Discusses four systematic, approaches in the development of ICT in higher education, namely the emerging approach, applying approach, integrating approach and transforming approach. Each of these approaches are international in scope and helps institutions of higher learning to determine their stage of ICT development.

Another chapter from the same book is entitled **Lifelong learning in the digital age by Divjak et al. 2004.** This chapter evaluates various types of environments namely, personal, cultural and political that contribute to the changing global environment and here the author argues that for each of these environments there are opportunities for lifelong learning. There is also an examination of the role of ICT in the implementation of lifelong learning.

Virtual learning and higher education edited by David Seth Preston. 2004. This is a publication on research projects. It combines the works of various researchers. In part III of the book that is titled “looking before leaping: issues in virtual higher education” an article by David Seth Preston ‘Virtual values: the university in E-crisis’- considers

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whether modern ICT is actually capable of fulfilling many of the claims of revolutionary impact on the University. It examines the values that often accompany the vision and explores what new forms might be more desirable for the university.

The Global information technology report 2003-2004: Towards an equitable information society by Soumitra Dutta, Bruno Lanvin and Fiona Paua. 2004.

Chapter one of this reports provides current country ICT profiles of 102 countries, including Kenya, and gives an analysis of the Networked Readiness Index (NRI). This is the degree of preparation of a nation or community to participate and benefit from ICT developments. This statistical data is vital to this study because it gives the country's ICT profile and locates Kenya's ICT development.

Education in and for the information society by Cynthia Guttmann. UNESCO. 2003.

This book addresses issues arising in the education such as education divide where certain countries may be left out, education as a new vector for wealth, and the need to rethink current education systems. It reflects on issues surrounding the use of ICTs as a catalyst for innovation. Such issues include meeting the demand for higher education, widening access, and new learning environments.

ICT in education: an e-premier by Victoria Tinio. 2002.

This book gives a good introduction to ICTs in education, provides definitions of ICT terms, and gives an account of most ICTs and their use in education. It raises issues about use of ICTs in education such as whether or not ICTs enhance learning, the costs involved, equity in access and sustainability. The author reflects on the current situation of developing countries.

The research methods knowledge base by William M K Trochim. 2001. 2nd ed.

Chapter 1 of this book defines evaluation research and discusses how it differs from other social science research methods. It explains the goals of an evaluation research as well as the strategies. As a beginning point, this provides a framework within which to introduce

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the methodology. This book is relevant because this study is an evaluation of two libraries.

The practice of social research by Earl Babbie and Johann Mouton. 2001. Chapter 12 is very important to this study as it defines the basic principles of evaluation research. Evaluation research is unique in that it aims at program evaluation. There are many methodological issues in evaluation research and it is important to have a thorough knowledge of this kind of research.

ICT, pedagogy and the curriculum: Subject to change edited by Avril Loveless and Viv Ellis. 2001. This is a useful book with chapters contributed by different authors. Of importance to this study is part II and part III that deal with pedagogy, curriculum and ICT. These parts provide insight into various issues pertaining to teaching and learning in relation to ICT. For this study, it offers a good basis for a theoretical framework.

Harrod's librarians glossary and reference book, 9th edition, compiled by Ray Prytherch. 2000. This is an important reference tool that will be consulted frequently to provide definitions to various terms in Library and Information Science.

Education in the information age: What works and what doesn't edited by Claudio de Moura Castro. 1998. This book consists of papers contributed by a number of authors. In section 1, the topic "Education for all in the age of globalization: the role of Information technology" by Wadi D. Haddad deals with the promise of technological revolution for education. It discusses how education must respond to the challenges of globalization and to the new knowledge.

Education in the information age: promises and frustrations by Claudio de Moura Castro. 1998. The article highlights the difference between computers and technologies used in distance education and how this compares cost wise when used in conventional

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education. This is an important discussion especially as far as sustainability of ICTs is concerned. Lessons can be learned about how one form of usage can be cost effective while another is not.

International encyclopedia of information and library science edited by John Feather and Paul Sturges. 1997. May be used to give explanations of various issues pertaining to Library Science, for example it provides a definition of the academic library and gives details about its functions and purpose in a university.

The myth of the electronic library: librarianship and social change in America by William F. Birdsall. 1994. In chapter 4 of this book the author presents the issues facing an electronic librarian the information society.

1.12.2 Important Articles and Other Publications

Impact of ICT revolution on the African landscape by Maria Beebe. 2004. CODESRIA conference on electronic publishing and dissemination: Dakar Senegal 1-2 September 2004. This paper presents a summary of the African educational institutions, the challenges they have faced and what some institutions are doing to overcome the ICT integration challenges. It also provides a summary of case studies on the impact of ICTs in education as well as the relevance of the AAU maturity tool and UNESCO's manual for pilot testing the use of indicators to assess impact of ICT use in education.

Report of the national conference on education and training: Kenyatta international conference center November 27-29, 2003. Ministry of Education Science and Technology. This report highlights the new direction that the Government of Kenya through the Ministry of Education Science and Technology has resolved to take in a bid to progress towards the Global Information Society. It provides a framework on ICT issues in Higher Education and points the direction in which higher education institutions should be heading.

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Manual for pilot testing the use of indicators to assess impact of ICTs use in education. UNESCO. 2003. This is a key source in evaluation research as it provides the relevant tools in carrying out such a study.

Higher Education: Peril and Promise by Myriam Diocaretz and Jeroen de Kloet. 2000. This article deals with worldwide trends of universities in the use of ICTs, and the significant changes that are currently facing University education. It also highlights some of the problems experienced in a bid to integrate ICTs into education.

“World Conference on Higher Education: Higher Education in the Twenty-First Century Vision and Action”. UNESCO 1998 Paris 5-9 October. Draft by Ulrich Teichler.

In this report, the theme is on the requirements of the world of work. The contributors highlight issues in HE that can create a connection between HE and work. That HE must progress in response to the challenges from the world of work. Some of the issues include the ability of graduates to: be interested in and prepared for life-long learning; prepare themselves for internationalization of the labor market; be literate in areas of knowledge which form the basis for various professional skills such as in the new technologies.

1.13 Conclusion

This chapter presented the motivation for the study and the main research question. Clearly there is a need for ICTs in university libraries. Countries like Kenya need to develop their library and institutional ICT infrastructure to become part of the Global Information Society. There is also a need to use ICTs to achieve the MDG, especially goal 8, by the year 2010. The study will be structured as follows:

Chapter 1: Chapter one presents an introduction to the research project. This chapter gives an overview and plan of the entire study and the details of the various aspects

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mentioned will be dealt with separately in later chapters. It also presents a list of useful sources relevant to the study.

Chapter 2: Chapter two presents a detailed review of the literature on the research topic. It highlights key learning theories and communication principles. The chapter touches on some of the issues affecting use of ICTs in education, and in academic libraries.

Chapter 3: Chapter three presents the research methodology applied in this study. It discusses the survey research design and gives details on the data collection methods and tools that are applied, as well as an overview of their strengths and weaknesses.

Chapter 4: Chapter four presents, analyzes and tabulates the research findings according to the subsidiary questions listed in chapter one and chapter three.

Chapter 5: Chapter five presents an interpretation of the data presented in chapter four.

Chapter 6: Chapter six presents an Information Literacy training model that can be adapted for use by UEAB and Kenyatta University.

Chapter 7: Chapter seven presents the findings. It also presents recommendations that can be implemented with respect to the findings and the model, and suggestions for future research.

Chapter 8: Chapter eight contains a list of references.

Chapter 9: Chapter nine is a list of Appendices.

Chapter 2

Literature Review

“Acquiring knowledge is the first step toward change, whether this change be technological, social, economic, cultural, legal, or political. Information is the catalyst, fuel, and product of this process of transformation. Inevitably, information systems - both formal and informal - play a central role in our lives.”

The International Development Research Centre -1995

2.1 Introduction

The previous chapter outlined the background and gave a brief overview of the key components of the study. It positioned this study within a global context driven by the current information revolution, where Higher Education Institutions (HEIs) in developing countries face great challenges. Some of the challenges identified in the literature are discussed in this chapter. These challenges include politics, access to information, curriculum, and the role that the academic library can play. The purpose and role of the academic library seems to be changing to enable it to participate in new forms of teaching and learning, and the overall educational mission of the university. This chapter looks at:

- Theories of learning, information and communication;
- The concepts of lifelong learning and information literacy;
- ICTs in teaching and learning;
- ICTs in developing countries;
- Kenya’s ICT scenario;
- Institutional framework of the Kenyatta University and the University of Eastern Africa, Baraton; and
- ICTs in academic libraries as tools for formal and informal learning.

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2.2 Theoretical Framework

The current technological revolution is characterized not by the centrality of information and knowledge but the application of such knowledge and information to ‘knowledge generation’ and ‘information processing’ in a feedback loop between innovation and uses of innovation. Aristotle, along with many other classical Greek thinkers, believed that the appropriateness of any particular form of knowledge depends on the *telos*, or the purpose that it serves (Smith, 1999). Therefore the Aristotelian contemplator is a man, who has already acquired knowledge, and what he is contemplating is precisely this knowledge already present in his mind. The contemplator is engaged in the orderly inspection of truths which he already possesses. His task consists in bringing forward from the recesses of his mind, and arranging them fittingly in the full light of consciousness. This, for Aristotle, was the highest form of human activity (Smith, 1999). With reference to the current technological revolution, the role of the educators is to help learners to gain the knowledge on which they are to reflect. The educators need to train learners in the disciplines of contemplation, and to develop their dispositions so that they became inclined to this form of activity.

Notably, there are some barriers to information use. The reasons why people do not use information are many and complex. Some of the reasons are identified below as:

a) Physical access to information sources and resources.

According to UNESCO (2000):

- There is need for infrastructure communications networks, equipment, native-language content and software to facilitate access. It is also important to ensure that the information systems are suited to the user needs;
- Physical access also indicates approximate number of hours ICT facilities are provided/allowed for students’ use per year. It also includes actual number of hours computers are used per week during regular school time; and
- The longer the students are exposed to these facilities, the greater is their chance to develop the skills, and knowledge in using/applying and integrating ICT into their learning process.

b) Personal barriers to information use.

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According to Schement (2002:1055) these factors include:

- Learners not knowing what information is needed or available;
- Learners not knowing what questions to ask, meaning that they lack the necessary mental model or context of a problem to know how to articulate a request for help;
- Learners not knowing where to look, meaning, they may have a question or problem but they do not know where to turn for help;
- Learners not knowing what sources of information exist. Many will be pleasantly surprised upon being guided to exiting resources by their librarians;
- Learners lacking communication skills for example lack of language skills required to ask for help;
- Learners lacking confidence or ability in technical skills required for the use of computers in the case of online information searching;
- Learners getting discouraged by the long delays when trying to access information sources especially if the network connection is slow; and
- A lack of trust in the information source may prevent somebody from making use of that source. Such people are generally dissatisfied by the web resources and may also be unable to cite the electronic resources.

Barriers to information use may be minimized by increasing potential usefulness of the information itself. Through information literacy training, HEIs can overcome the above mentioned barriers to use of information. HEIs can also improve learners' use of information. Ayoo & Otike (2002), cite lack of information literacy training and awareness as major barriers to information use in both government and private sectors in Kenya. They further state that lack of commitment by information professionals is contributing to slow development of information literacy campaigns. The theories that follow seek to provide a theoretical framework for learning as an important concept, and to understand communication and the flow of information as applied in this study.

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2.2.1 Learning Theories

John Dewey (1943) like Aristotle shares the views that an inquisitive mind with the ability to build things and express feelings and ideas form the greatest educational resource. To Aristotle reason is vital for learning. In this respect therefore the educational challenge is to nurture these impulses for lifelong learning. Lack of attention to the nature of learning inevitably leads to an impoverishment of education (Smith, 1996).

2.2.2 Cognitive Orientation to Learning

The cognitive theory has been discussed by theorists like Piaget, Wertheimer, Koffka, Kohler, Lewin, Ausubel, Bruner, and Gagné (Smith, 1996). Cognitive theorists stress the acquisition of knowledge and skills. According to Schunk (2004:18), knowledge and skills can be acquired through:

- Information processing; and
- Metacognition.

Information processing is a central theme in this theory. It includes construction, acquisition, organization, coding, rehearsal, storage in and retrieval from memory and forgetting. Cognitive theorists emphasize making knowledge meaningful and taking into account learners' perceptions of themselves and their environment. Cognitive theorists are concerned with what students do with information because the way learners' process information determines how they make use of learning. Within the cognitive focus, learning is defined as "an enduring change in behavior or in the capacity to behave in a given fashion, which results from practice or other forms of experience" (Schunk, 2004). Kruse and Schmidt (2001: 139) observe that various cognitive functions do change with age. Examples of such cognitive functions include decreases in memory performance, problem solving and concentration. Memory and performance can be improved through good instructions guiding the process of encoding and the training of learning strategies at an earlier age. Lack of effective learning strategies often results in difficulties in recalling stored information, hence affecting recall.

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Another theme that emerges from the cognitive view of learning is the concept of metacognition. Metacognition refers to the capacity to reflect upon one's thinking, and thereby to monitor and manage it (Collins, Greeno & Resnick; 2001:4279). This points to the importance of self-conscious management of one's own learning and thinking processes.

Emerging from the two themes is the concept of transfer. Transfer depends on acquiring conceptual representations that do not change across situations. For transfer to occur learners must master those situations that do not change in their early learning. This means that instruction plays an important role in shaping the cognitive functions of learners.

Robert Gagné and the Instructional Theory

Gagné's theory focuses on the conditions of learning. Gagné emphasizes that the conditions of learning influence the learning outcomes or capabilities. Conditions of learning can be external or internal and they affect the process of learning and result in what he calls events of learning. Ultimately when those events are deliberately planned they result in instruction. In his seminal model, he proposed nine events of learning or instruction. By categorizing each type of learning, the instructional designer should be aware that each type of learning potentially requires a different event of instruction to optimize learning.

Gagné classified learning outcomes into five categories. The categories represent the variety of capabilities or outcomes that are possible as a result of the learning process. The different learning outcomes not only differ in the human performances, but they also differ in the conditions most favorable for their learning. Instructional theory by Gagné can be summarized as follows:

- Learning occurs in phases;
- Skills are acquired sequentially;
- Practice, feedback, and review are key components of the system; and

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- Motivation is a function of the learner's attitudes and external conditions of learning including contextual factors.

Preference for Cognitive Theory

The cognitive orientation to learning is appropriate for this study because it emphasizes the role of cognition in an individual and the overall effects it bears on lifelong learning skills. Cognitive processes are at the very beginning of everyday performance. People may encounter difficulties in their memory performance and this may impact negatively on their everyday activities. When people fail to organize and restructure new information effectively, it is because the memory performance has diminished. Often, this is due to lack of effective learning strategies. Such strategies include coding and encoding of information discussed earlier, which facilitate recall. Cognitive functions can be improved through adequate training programs, especially when individual, social, and occupational aspects of the life situation are taken into account.

While Gagné's theory covers most aspects of learning, the main focus of that theory is on intellectual skills. Gagné's theory specifically addresses the role of instructional technology in learning. New tools will not only help people do cognitive jobs more easily, but they will lead to fundamental alterations in the way problems are solved. From the lifelong learning perspective, learners need to change their mindset. That is, "the future of how we live, think, create, work, collaborate and learn is not out there to be 'discovered' it has to be invented and designed. Mindsets grounded in seeing learning as an important part of human lives will be an integral part of the future"(International encyclopedia of the social and behavioral sciences, 2001:8840).

2.2.3 Humanistic Orientation to Learning

Abraham Maslow and Carl Rogers are two well known humanistic theorists. Humanistic psychology emphasizes people's capabilities and potentialities. Carl Rogers states that life represents an ongoing process of personal growth or achieving wholeness. This is a process he calls actualizing tendency (Pintrich & Schunk, 2002:41). The actualizing tendency is the fundamental motivational construct in

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Rogers' theory and all other motives derive from it. People have a need for unconditional positive regard (Schunk, 2004:340). In education, Rogers applied his theory to meaningful experiential learning which has relevance to the whole person. Learners perceive meaningful learning as relevant because they believe it will enhance their selves. The whole conceptual framework of Carl Rogers rests on his profound experience that human beings become increasingly trustworthy once they feel at a deep level that their subjective experience is both respected and progressively understood (Smith, 2005).

Maslow believed that human actions are unified by being directed toward goal attainment. Most human action represents a striving to satisfy needs. At the lowest level of the hierarchy are physiological needs and at the top is self-actualization. A strong motive to achieve in or out of school is a manifestation of self-actualization. When self-actualized persons attempt to solve important problems, they look outside themselves for a cause and dedicate their efforts to solving it. They also display great interest in the means of attaining their goals (Schunck, 2004: 338). To self-actualized people, the outcome is as important as the means to an end. According to Schunk (2004:336) and Pintrich & Schunk (2002: 197) Maslow's hierarchy is a useful general guide for understanding human behavior. The hierarchy provides teachers with clues concerning why students act the way they do.

The humanistic principles are highly relevant to learning. Some important principles include the need to:

- Encourage personal growth by providing students with choices and opportunities to initiate learning activities and establish goals;
- Facilitate learning by providing resources and encouragement;
- Show positive regard for students, and;
- Allow students to evaluate their learning (Schunk, 2004:342).

The learning process is viewed as a personal act to fulfill one's potential. A combination of motivational and cognitive strategies may be applied to help students accomplish their personal goals. The purpose in education is to become self-

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actualized and autonomous. The educators' role is to facilitate development of the whole person.

The learning theories discussed above are significant to this study because:

- Motivation which is a common factor in these theories can help learners acquire skills well beyond their formal learning years.
- Gagné's instructional theory discusses two aspects in instruction. The events of learning and the learning outcomes. This study seeks to explore both aspects of the instructional theory in an attempt to explore the best ways through which lifelong learning skills can be taught.
- Gagné's discussion on the learning outcomes is also relevant to this study because it can be used by librarians to design information literacy programs that are beneficial to learners in the current information-based society.
- The cognitive theory focuses on 'information processing'. This refers to the ability to develop capacity and skills to learn better. Cognitive training helps learners to apply various learning strategies such as coding and encoding to their everyday activities especially in lifelong learning.
- Motivation and cognitive skills are important ingredients in lifelong learning; this is the essence of quality education which all libraries in HEIs aim to achieve.

2.2.4 Information and Communication Theory

The information theory emerged in the late 1940s and captured the imaginations of several researchers independently. Theorists associated with the theory include Nobert Wiener, A. N. Kolmogoroff, Claude Shannon, R. A. Fisher and Warren Weaver. Shannon published the most elaborate account of the theory in 1948, offering proof of the uniqueness of its form and twenty one theorems of considerable generality (International Encyclopaedia of Communications, 1996:37). Warren Weaver anticipated that any theory clarifying the understanding of information and communication was certain to affect all fields of knowledge. Historically the information theory was a great stimulus to the development of communication research. In information theory, the term information is used in a special sense. Information is a measure of the freedom of choice with which a message is selected

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from the set of all possible messages. Information is thus distinct from meaning, since it is entirely possible for a string of nonsense words and a meaningful sentence to be equivalent with respect to information content. Other models of the theory were later developed, which apply to different types of human communication.

Gerbner, Osgood, Schramm, Westley and MacLean are some of the theorists in the human communication models who have attempted to describe the communication model. Basic ideas in the communication models can be summed up as follows. “Someone perceives an event and reacts in a situation through some means to make available materials in some form and context conveying content with some consequences” (International Encyclopaedia of Communications, 1996: 37). Schramm drew on the work of Osgood to emphasize the circularity of communication and to introduce the process of encoding and decoding, without which messages can have no meaning.

The central issue of communication has been the effect on the receiver. Whereas most other models take the sender as their starting point, those that deal with the use of media start with the individual member of the media audience and his or her basic needs and motives for engaging in media use. An important motive in communication is the search for information. The most unique feature about this theory is what constitutes information. Information is equated with selectivity. Information can thus be conceived as a measure of the organizational work a message can do, selection being a simple case. Information can be processed and encoded in different media. Information also creates its own context (International Encyclopaedia of Communications, 1996: 379).

This theory is useful to the study because:

- It explains how the use of information is conceived as a final stage of a process that begins with the recognition of an information need. The library plays an important role in training information seekers to realize when they have information need.
- It explains how, when requesting for information, the information seeker, who becomes the receiver should be able to use information seeking skills

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gainfully to reduce “noise” by only using correct ‘search phrases’ or terms. The World Wide Web is a good example of increasing uncertainty because contradictory information can be found on different websites.

- It seeks to explain how a skilled information seeker will evaluate the information and either reject or accept it as knowledge. Precision in evaluating, associated with an information literate person is therefore an advantage.
- Generally it seeks to support the need for information literacy skills. When information is received the recipient should be able to utilize and add it to his or her knowledge base.

2.3 Lifelong Learning Skills

Lifelong learning (LLL) is defined as a deliberate progression throughout the life of an individual, where the initial acquisition of knowledge and skills is reviewed and upgraded continuously, to meet the challenges set by an ever changing society (Brophy, 1998; 2000; Mark, 2000). LLL refers to a society in which learning possibilities exist for those who want to learn. Unlike in the past when a person’s education took place for a specific period of time (mostly during their youth), education is now widely seen as a continuing activity taking place throughout the lifespan of a person (Blurton, 1999). Therefore, establishing LLL habits among learners is important. LLL may be through formal or informal learning.

Learning can be a social activity in which interactions with the environment play an important role. Learning is the creation and use of new operational knowledge that steers action. Learning is also a personal activity such that no one who does not want to learn can be forced to learn. On the other hand a motivated learner wants to learn and will learn.

From a LLL perspective, learning needs to be examined across the individual’s lifespan because of the traditional notions of a divided lifetime. The notions of education followed by work are no longer tenable (Keller, 2001:8836). Professional activity has become so knowledge-intensive that learning has become an integral part

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of work activities. Learning is a new form of labor, and working needs to be a collaborative effort among colleagues. In the emerging information society, an educated person will be someone who is willing and is able to consider learning as a lifelong process.

LLL has emerged as one of the major challenges for the worldwide knowledge society. The great eight nations (G8) in the world have named LLL as one of the strategies to fight unemployment (Fisher, 2001: 8836). Further, Fisher (2001: 8836) highlights some problems in the information age such as:

- **Insufficient School-to-work transition.** There is a discrepancy between the requirements of the world of work and living and the way universities prepare students to function in this world.
- **Educational reform.** ICTs have been used to mechanize old ways of doing business, rather than fundamentally rethinking the underlying work process and promoting new ways to create new knowledge. ICTs are necessary to achieve objectives and to provide foundations for people to change their mindsets. However, ICTs by themselves are not sufficient to cause changes.
- **Changing Mindsets.** To create different mindsets, there is need to change HEIs to environments in which knowledge is created, externalized and shared. Skills that support learning as a lifetime habit must be developed. Learners need to develop a positive attitude and motivation toward learning. Changing mindsets is important because no one will engage in processes and attitudes during their lives for goals and objectives they do not like. Mindsets can impact on learners by changing them from consumers to active contributors. ICTs provide an opportunity for construction of knowledge through discussion and collaboration. The need to create knowledge is prominent in the current knowledge-based society.
- **Evaluation.** Informal and self-directed learning are fundamentally different from traditional classroom learning. Evaluation of these forms

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of learning is important. Currently this remains an unresolved issue. There is a need to develop evaluation techniques on performance-based executions. While mindsets cannot be directly evaluated by test, it needs assessment of motivation and techniques. Academic libraries can play an important role in evaluating learners' mindsets by using information literacy standards to assess learners.

2.3.1 Information Literacy

People's use of information depends on their level of information literacy. Information literacy is a prerequisite for lifelong learning. It enables learners to engage critically with content and to extend their investigations, become more self directed, and assume greater control over their own learning. Being information literate implies a wide range of skills. A ten-year study by Apple Computers Corporation sought to understand why there is an emphasis on information seeking and assessment skills. The study concluded that in technology-rich learning environments there are non-measurable abilities that are gained (Haddad, 2004: 26). The internet and the World Wide Web have created even more demands on learners at every level. Such abilities can be found in an 'information literate' person. It is therefore imperative that every academic library should carry out information literacy training for all its users.

What is information literacy?

According to the ALA's information literacy Committee (1998), information literacy enables people to recognize the value of information and use it to make informed choices in their personal, professional and academic lives. An information literate student effectively:

- Assesses;
- Evaluates;
- Organizes;
- Synthesizes; and

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- Applies information from a variety of sources and formats in a variety of contexts.

Further, according to the ALA (2005), the abilities to know when there is a need for information, to identify information for that need, and to be able to locate, evaluate and effectively use that information are not new abilities that have emerged as a result of the Information Age. In fact, these abilities have always been important to success and the quality of life. The only thing that has changed is the amount and variety of information that is now available.

In an information society all people should have the right to information which can enhance their lives. Out of the super-abundance of available information, people need to be able to obtain specific information to meet a wide range of personal and business needs. These needs are largely driven either by the desire for personal growth and advancement or by the rapidly changing social, political, and economic environments of society.

Loveless, DeVoogd & Bohlin (2001:67), and Engauge (2000) state that students are expected to develop knowledge, skill and understanding to:

- Find information about a topic from a variety of sources;
- Develop their ideas using ICT tools to enhance the quality of their work;
- Be able to share and exchange information directly and through electronic media; and
- Review, modify and evaluate their work reflecting critically on quality.

The Council of Australian University Librarians (CAUL) (2001), states that in order to incorporate information literacy in all the programs there is a need for collaborative efforts of academics, librarians and administrators. Collaboration is therefore essential in the following ways:

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- Lecturers can use course materials and face-to-face discussions to establish the context for learning. They can also inspire students to explore the unknown, offer guidance on how best to fulfill information needs, and monitor student progress.
- Librarians can coordinate the evaluation and selection of intellectual resources for programs and services. Other than organizing and maintaining library collections, librarians can also provide advice and user training to students and academic staff who seek information.
- Administrators can facilitate opportunities for collaboration and staff development among academics and librarians. Staff development opportunities can be geared towards acquiring information literacy skills that will be later transferred to the students.

Information literacy is increasingly important in the contemporary environment of rapid technological change and growing information resources. Because of the escalating complexity of this environment, individuals are faced with diverse, abundant information choices in their academic studies, in the workplace, and in their personal lives (ALA, 2005; IFLA, 2004). Information is available through libraries, media, and the Internet. Increasingly, information comes to individuals in unfiltered formats, raising questions about its authenticity, validity, and reliability. In addition, information is available through multiple media, including graphical, and textual. These pose new challenges for individuals to evaluate and understand information.

2.3.2 Learners' Characteristics

The learning environment in which the curriculum is based determines the student characteristics. The key characteristic of ideal learners is that they are good information processors. These learners are able to incorporate their cognitive and motivational skills in their learning environment. Development of information literacy courses or components involves a more holistic approach in determining the educational needs of students as they progress through their academic lives, as well as collaboration with other librarians and educators.

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ACRL (2000), states that as with all instruction, information literacy can be informed by a variety of pedagogical theories and techniques. This includes methods, such as problem-based learning, collaborative learning, and hands-on learning. It can also use tools, such as presentation software or electronic classrooms. Finally, the nature of the course may be credit, noncredit or course-integrated. All these factors will affect the impact of the instruction given.

Academic library users represent diverse ages, ethnicities, and abilities. Information-seeking behaviors, technological competencies, and research skills vary widely among such users thus presenting a challenge for librarians. By understanding more about these audiences, instruction librarians can create meaningful educational environments and enduring information literacy programs that meet current and future needs of the student and lifelong learner.

In order to use electronic information resources efficiently, scholars must sharpen their computer literacy and information literacy skills. Since many students turn to the Internet as their primary tool for research, they need technological competencies and an increased sophistication in the selection of the materials, perhaps even more so than in the past.

There is a continuing need for research into the pedagogical basis of information literacy and the application of educational theories and methodologies to actual information literacy training programs.

Various research projects conducted in the developed countries where ICTs in education have existed for longer reveal the following:

- **Positive ICT impact.** This was a study done in Western Australia (Newman 2002: 51) in which findings indicated that the students used ICTs in different ways. At least 5% of the students did not like to use ICTs, especially the computer. The same study also found students with good ICT skills and positive attitudes preferred to work on their own, relying on the teacher only 50 percent of the time.

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- **The sense of personal identity.** Provision of more flexible access to ICT requires greater personal responsibility, which may be lacking in some students. Studies have shown that students use their computers for inappropriate activities during class time (Crawford & Vehay; 2002: 1).
- In another survey on students using their laptops, 95 percent liked using their computers for assignments with 85 percent preferring to use paper and pen.

2.4 Use of ICTs in Education

Use of ICTs in education is recommended by Hezermans & Rutzen (2004: 244) and Buettner, (2004:244). They state that it arises from changes in:

- Workforce demand. Employers require workers skilled with knowledge;
- Student population (target group) - current growing demands for higher education;
- Curriculum and its organization, from supply-based to demand-based where students are to acquire competencies; and
- Teacher role, from transmission of knowledge to organizing learning process and a coach of ICT resources.

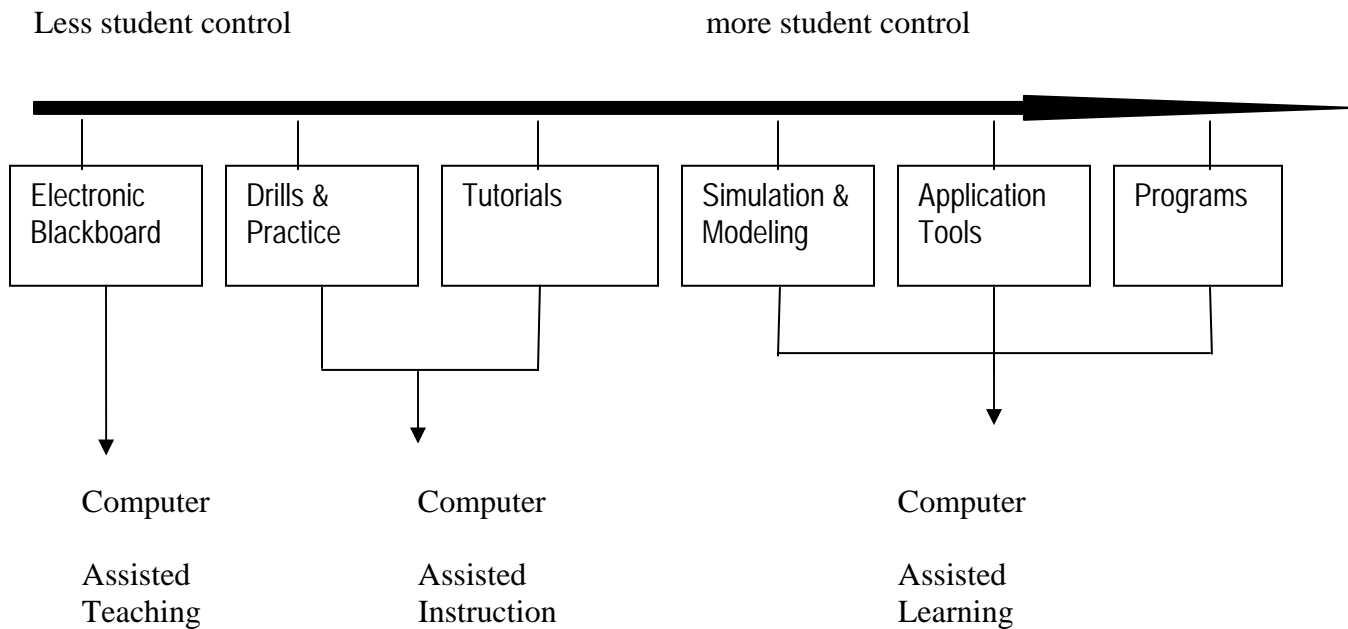
The potential of each technology varies according to how it is used. Haddad & Draxler (2002), Newhouse (2002: 29), Ajayi (2000), and AAU (2000), identify at least six stages of technology use in education:

- **Presentation** (Electronic blackboard). The teacher presents information to whole class as graphics or images. At this stage the learning is teacher centered. Here emphasis is on presentation therefore need for high quality hardware and software that can allow fast and smooth flow of presentations.
- **Drill / Practice and Tutorials.** The student revises skills and knowledge. The emphasis in tutorial drill and practice is on individualized instruction, revision and evaluation. The computer is a more patient tutor. The computer takes on the instructional role of the teacher while the teacher manages the instruction.
- **Demonstration /Tutorial.** Student is presented with new information.

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- **Interaction /Simulation.** Student uses computer to imitate real situations. The computer can be used powerfully in providing support for students to investigate ideas and concepts through modeling and simulation.
- **Modeling.** Student uses computer to imitate situation whether real or imaginary. Application tools enable students and teachers to complete tasks using software packages such as word processors, graphics databases.
- **Programming.** Student sets instructions for the computer in order to solve a problem.

A diagrammatical presentation on classification of computer use according to degree of student control



(Source: Newhouse 2002)

From the above illustration, and according to AAU (2000) and UNESCOBKK, (2000), the use of ICTs in specific subjects indicates the progressive development of the ICT for the education programme where ICT is being used in a more integrated manner and as a teaching tool rather than as a separate subject. At the drill and practice stage, many learners are able to benefit from the patience of the tutor (computer) and master the drill. Generally, a computer can help motivate students to

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learn due to the fact that the learners can model and simulate ideas. It also guides curriculum planners and administrators on whether or not to expand the coverage of subjects where ICT can be introduced.

2.4.1 ICTS and the Quality of Education

Along with the globalization of educational institutions are issues of quality. Quality improvement continues to be a major concern, so much so that institutions that have not embraced the use of ICTs in learning and in their libraries risk being excluded. Therefore, improving quality of education is a critical issue in the world today. Tinio (2004:6) and Schunk (2004:277) point out some of the ways in which ICTs when applied locally can enhance the quality of education:

- Increasing the motivation of learners. ICTs such as videos, television, multimedia computer software-text all make students engage in the learning process.
- Facilitating the acquisition of basic skills. Concepts that are the foundation of higher order thinking and creativity can be facilitated through the use of ICTs.
- ICTs are also transformational tools. When ICTs are used appropriately they can promote the acquisition of skills and knowledge that make a shift to learner-centered learning. Learner-centered learning empowers students for lifelong learning. Ultimately, this is a requirement of the knowledge-based society.
- ICTs allow for networking and distance learning. Networks connect computers to one another and to periphery. Distance learning saves time and reduces costs. Another networking application is the electronic bulletin board. This allows people to post messages and be part of a discussion.
- ICTs facilitate e-learning. E-learning refers to learning through electronically delivered means. Most commonly it is used to refer to internet based learning. Although the internet has many advantages it also poses danger to learners. For instance, some learners may believe that such as believing that every piece of information found on the internet is important and reliable.
- ICTs are a medium through which virtual reality can be experienced. Virtual reality refers to computer-based technology that incorporates input-output

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devices and allows students to experience an artificial environment as if it were the real world.

A study cited by Buztin (2002), developed in 1988 by the University of Florida USA, shows that the students using ICTs have consistently scored higher grades on standardized tests than their counterparts in the traditional classroom. Another study cited by Guttman, (2003: 35) shows that in Chile and Costa Rica, programs have been launched through a telecommunications network to raise the quality of education using a constructivist approach that would encourage collaboration between learners to raise cognitive skills. The results in both programs show significant changes in student attitudes and a noticeable increase in creative initiatives by the students. According to Ritchie & Wiburg (1994), when computers are authentically used to help students and teachers achieve their goals, both groups become more committed to learning and teaching. Within the institution framework both parties become committed to educational changes.

The use of ICTs in education motivates learners and helps raise cognitive skills as put forward by the learning theories discussed earlier. No one instructional medium is consistently superior to others. Promising evidence shows that technological applications can enhance learning. However, more research evaluating its effectiveness is necessary.

2.5 ICTs in Developing Countries

Developing countries are largely excluded from the information revolution in two ways. First, there is a lack of appropriate technological infrastructure. Second, developing countries face economic constraints to put such infrastructure in place. The information revolution is about the 'transformation' from a material to an information-based society (Guttman, 2003:19; Lin, 1994). In some countries, this revolution has marked the transition from an industrial society to an information society. In Africa, there are many reported financial constraints. The World Bank Report (2004) shows that Africa produces only 1% of the global Gross Domestic Product (GDP). Most African countries suffer impeded economic performance. As a

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result of Africa's economic constraints, the 'transformation' into an information society is a slow and uneven process.

According to the FID task force (1994) the aim of the information superhighway is to impact access to information and to promote universal literacy and lifelong learning. The task force recommended that there should be an establishment of a National Information Infrastructure (NII) that will enable people to connect with one another and to a vast array of information sources. Gilbert (1994) raised the question, "does the information superhighway go south?" In this context South represents Africa, Latin America, East Asia etc. (developing countries), while North represents Europe and USA (developed countries). Assuming that all people on the globe have the NII together with knowledge, skills affordability and ultimately accessibility, what then are some of the problems posed by Global Information age for Africa? The following statistics may be instructive.

TABLE 1 WORLD INTERNET STATISTICS

	Pop Estimates 2007	Internet Usage	% of Pop Penetration	Usage % of world
Africa	933, 448,292	43,995 700	4.7%	3.5%
Asia	3,712,527,624	459,476,825	12.4%	36.9%
Europe	809,624,689	337,878,613	41.7%	27.2%
Middle East	193,452,727	33,510,500	17.3%	2.7%
North America	334,538,018	234,788,864	70.2%	18.9%
Latin America/ Caribbean	556,606,627	115,759,709	20.8%	9.3%
Oceania/Australia	34,468,443	19,039,390	55.2%	1.5%
World Total	6,574,666,417	1,244,449,601	18.9%	100%

(Source: World Internet Statistics 2007)

From the statistics, Africa lags far behind the other continents in internet usage. Some of the arguments suggest that the reasons for this lag include the lack of adequate infrastructure, and indigenous content.

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There are questions raised in relation to the information superhighway. These questions touch on the direction of communication flows, the distribution of benefit among participants and matters on who controls or influences control or authority in global ICT issues. It becomes clear from the data above that Africa and the rest of the developing nations are just consumers of content. The big question is, how possible is it for the information superhighway to pull Africa and the developing nations out of this dependence syndrome?

2.5.1 ICTS in Africa

During the Brussels G7 meeting in 1995, Thabo Mbeki (1995), then vice president of the republic of South Africa said "the debate about the information society is of relevance to all humanity and therefore we cannot ignore the position, the needs and the role of the developing world." However, it seems that technological development continues to highlight disparities between developed and developing countries. In order to promote economic development, developing countries such as those in Africa need to urgently address this challenge. Today the vision of this African leader is being realized in South Africa's ICT policy, and there is widespread use of ICTs in both formal and informal learning. Most of the HEIs in South Africa have ICT infrastructure and widespread use of ICTs in learning. In the cities and towns there are about 70 telecenters established to help rural disadvantaged communities benefit from use of ICTs in informal learning experiences (Benjamin, 2001).

This brings a focus on issues regarding education and human resource development. The information superhighway should be used to promote human development in areas such as education, health, social services and commercial activities (Ajayi, 2002: 122; Thapisa, 2000). ICT infrastructure can help advance the education of all African people and build capacity for economic growth. In developing countries the advantages of a knowledge-based society are also received alongside other ICT threats. ICT threats include warnings about 'discarded people.' 'Discarded people' are an outcome of the 'new world order' currently being experienced in the developed nations. Bezanson (1994) describes the 'discarded people' situation as one arising where technology has taken over the role of people. In such a situation, goods are

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produced with less and less labor input hence more unemployment. The new world order is bound to spread all over the world, creating another division of the 'excluded/included'.

To prevent this situation, Benzanon (1994) suggests that education and worker empowerment might provide an answer to the problem. The information superhighway provides the technology for educating or re-educating people. Education can be used to curb 'included/excluded' phenomenon when people are equipped with lifelong learning skills and are competent to survive in the current knowledge-based society.

2.6 ICTS in Higher Education

The link between education and economic growth places a greater emphasis on national governments to increase the levels and quality of education. The existing global trend is towards "quality education for all" coupled with self-directed learning and shifts in approaches to teaching methodologies. This has led to life-long learning that is synonymous with ICTs. The use of ICTs in education is a global phenomenon (Gordon, 2003:115). ICTs feature in plans to build and sustain the economy globally (Schunk, 2004:340). ICTs in education are a feasible tool for addressing significant education challenges (La Rocque & Latham 2003; Guttman, 2003). The 1998 World declaration on Higher Education for the 21st century stated, without adequate higher education and research institutions providing a critical mass of skilled and educated people, no country can ensure genuine endogenous and sustainable development. This requires HEIs to take the lead in drawing the advantages and potential of ICTs. HEIs can do this by creating new learning environments ranging from distance education facilities to complete virtual institutions.

There is a demand for change in the role of educational institutions if the societies within which they exist are to sustain capacity building for knowledge (Zehavi & Rosenfeld, 1996; World Bank, 2002; Hezermans & Rutzen, 2004). Universities need to be reorganized for innovation. Such innovation is linked to knowledge networks. In knowledge networks, educational issues such as the use of ICTs are addressed.

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HEIs face problems of population growth in terms of student numbers and education. Kenya is a good example of a country where current HEIs cannot cope with (population) student demand (Juma, 2003). As a result, many parents are forced to send their children abroad spending an average of \$18,000 per year per child. This is money that a country loses because of inadequate provision of higher education opportunities.

In the 19th century, Malthus predicted the following about agriculture: Humanity would face great tragedies as a result of the exponential growth in population related to linear growth in capacity of societies to produce food. The situation was never as dramatic as had been predicted. This is because agricultural communities managed to create an exponential growth in food production directly through the application of new technology in agriculture. Using the problem of population and education as an analogy, Romiszowski (2004: 61), argues that the only route to increasing the supply of education in proportion to demand is through application of new information technologies. There is a need for countries such as Kenya to popularize the use of ICTs in education in order to meet the demand for higher education.

2.7 ICTS in Kenya

Kenya faces great information challenges. Although efforts are being made to provide access to ICTs there are still many milestones to be reached. Ayoo and Otiike (2002), state that the lack of a National Information Policy (NIP) has contributed to the underdevelopment of the information sector. They emphasize that if Kenya develops a NIP then activities within the information sector would be harmonized to ensure full utilization of information resources countrywide. The following is a statistical expression of Kenya's ICT status.

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TABLE 2 ICT Infrastructure and Access in Kenya 1999-2002

Population in millions	32
Internet users	500 000
Personal computers	175 000
Main telephone lines in operation	328 104
Cellular mobile telephone subscribers	1 325 222
Dial-up subscribers	35000
International Bandwidth	28000
ISPs	627

(Source: ITU 2003)

From this table we find that in 2002, the majority of Kenyans, (98.5%) did not have access to the internet. The percentage of the population with personal computers is 0.14%. The percentage of the population who own a cellular phone is 4.14%. These statistics clearly indicate the underdevelopment of the ICT sector. There is a lack of statistics about the number of computers per student in the HEIs. As suggested by Ayoo & Otike, there is indeed a need for a national board through which further surveys can be conducted to show the current ICT situation in Kenya.

Although the history of the Internet in Kenya dates back to 1994, its significant growth has only come at the turn of the millennium. Among the pioneers to seek Internet connectivity was the African Regional Center for Computing (ARCC), which achieved connectivity service provider in United States of America. In 1995 Africa Online was set up and later other companies followed. Access to the Internet was quite expensive during those early years. A major turning point for internet provision came in the year 1998 with the establishment of JamboNet, a subsidiary of Kenya Posts and Telecommunications (KPTC). JamboNet forms the Information Technology (IT) backbone of the country. Currently, JamboNet is configuring VSAT to key urban towns. According to the regulatory framework for the communications sector in Kenya (2000), ICT access and especially access to the Internet is monopolized by KPTC. In 1999, the KPTC was split into three legal entities:

- Telkom Kenya Ltd to offer telecommunication services;

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- Postal Corporation of Kenya for postal and courier services; and
- The Communications Commission of Kenya (CCK) to regulate the telecommunications sector. The CCK is expected to create an enabling environment for fair competition in the IT industry.

Currently the Kenya DataStream Network which is just a year old has the responsibility of installing a fibre-optic cable to connect major cities within Kenya. So far, Nairobi has been connected (The Standard, 2005). However, the CCK still faces great challenges of improving Kenya's information infrastructure as well as establishing sound information policies. While finding investors to boost this sector has been a problem, potential investors complain of too much bureaucratic red tape in the tendering processes.

2.8 HEIs and ICT Initiatives in Kenya

The HEI sector in Kenya consists of seven Public Universities with an enrollment of over 42,000 government-supported students and about 10,000 self-supported students. In addition to this there is a total enrollment of over 10,000 students in the 19 Private Universities (Commission for Higher Education, 2006). There is still a great demand for access to higher education in Kenya. The challenge to provide higher education to more students requires HEIs to map ways in which ICTs can be utilized for online e-learning as well as distance education. The Kenya Education Network (KENET) and the African Virtual University (AVU) represent two such initiatives, where the former plays a role in facilitating the ICT infrastructure the latter focuses on utilization of ICT in provision of distance-learning in higher education in Kenya. The two initiatives have been funded by foreign donors, and therefore require careful monitoring and evaluation to realize their intended potential.

2.8.1 The KENET Initiative

The main objective of KENET is to establish sustainable communication and networking among education institutions in Kenya that will facilitate the use of Internet technology in teaching, research and sharing of information resources at an

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affordable cost. It is hoped that the use of ICTs in teaching and learning can help trigger further changes, albeit byte-by-byte. KENET grew out of a bilateral agreement between the Government of Kenya and the United States to implement the Leland initiative (Beebe, 2003; Thairu, 2003). Twenty-two institutions in Kenya organized themselves to form KENET, with the members expecting equal and mutual benefits after making equal investments. This kind of initiative is based on a reciprocity model. KENET embarked on four major tasks to develop:

- A technology plan for linking universities to each other and to the Internet;
- A human resource plan to manage the technology;
- A financial plan, to assure sustainability; and
- A governance structure to transparently manage the system and the resources it represented.

The KENET initiative has yielded remarkable results. The Communication Commission of Kenya (CCK), (Kenya's telecommunications regulator) recognized KENET as a potential instrument for delivering universal access goals. CCK designated KENET as an Education Trust authorized to negotiate for bandwidth at wholesale rates. CCK donated radio frequencies and other resources.

KENET won the agreement from CCK to directly access the Internet, in effect becoming the first entity to break the monopoly over access to the internal Internet backbone. Sixteen of the twenty-two institutions are now connected (2006). At the individual level, KENET encourages each institution to have an Internet Development Committee whose task is to recommend and pursue institutional Internet projects. The AVU in conjunction with five KENET members have established distance-learning centers. A big challenge for KENET is that of bandwidth. This was unforeseen, but as more institutions are getting connected, the issue of insufficient bandwidth becomes more evident. Bandwidth allocation formula is based on the number of students. It ranges from 64Kbps for under 5 000 students to 256Kbps for over 10 000 students.

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2.8.2 The African Virtual University (AVU)-Kenyatta University Initiative

The AVU developed as a project for sub-Saharan Africa within the World Bank and was piloted between 1997 and 1999 (Okuni, 2001 Ajayi, 2002 and Juma, 2004). The AVU covers 8 Anglophone and 7 Francophone countries in Sub-Saharan Africa. The AVU seeks to address challenges facing HEIs in Africa. Such challenges include low enrollment due to inadequate access, limited levels of research, and poor quality education due to inadequate library collections. The AVU seeks to address these challenges by:

- Bridging the digital divide by improving connectivity in AVU learning centers;
- Influence libraries in Africa to elevate their holdings to the global platform by use of ICTs;
- Facilitate access to African content irrespective of its location;
- Promote libraries as centers of excellence for education and research in Africa;
- Dignify the work of information workers;
- Increasing access to HEI; and
- Improve quality of education by tapping global resources.

Students interact with their instructors and other students via an international satellite covering the entire African continent, Western Europe, the East coast of the United States of America, and Canada. With the success of the pilot phase the AVU has been established as the intergovernmental organization with headquarters in Nairobi, Kenya. The AVU uses a technical infrastructure that integrates satellite and web-based technologies to transmit video and data resources from anywhere in the world to multiple sites in Africa. Leading universities and content providers offer a combination of live and videotaped instruction, supported by textbooks, a digital library and course notes. The AVU Kenya University initiative has now established centers linked to other public universities across Kenya. The initiative also takes advantage of the KENET initiative in the provision of ICT infrastructure to other public universities.

Ajayi (2002) cites three examples of ICT use and development in HEIs in Africa. The Obafemi Awolowo University, Ile-Ife in Nigeria started off the ICT project with no strategic ICT plan. However the university declared ICT a priority project. This project also led to gradual digitization of the library. To generate revenue this project established a consultancy unit. The University of Zambia and the University of Dar es Salaam both started with the development of an ICT strategic plan. In the case of the University of Zambia, the project was developed as an academic information network which became Zambia's first Internet Service Provider. This project also covered the provision of internet access to the library. To raise more revenue the project established a consultancy and training unit. The University of Dar es Salaam went through all the developmental stages and is considered a classical example of a strategic plan for ICT development. As a result, the university ICT project has attracted funding from two international agencies as well as their own government.

From these examples, Kenya can learn important lessons, namely:

- It is not enough to launch an initiative. Its sustainability is even more crucial;
- As in the developed countries of Europe, there is a need for evaluation of such initiatives to determine the impact of investment;
- It is important to rank ICT initiatives according to each institution;
- Assessing maturity will help such initiatives perform better because benchmarks and goals will be set; and
- Assessment will act as a launching pad to apply for grants and to raise funds.

Although such initiatives exist in Kenya, Juma (2001) cites some of the problems undermining utilization of ICTs in HEIs:

1. **Attitude towards technology enhanced learning.** Many academics from universities in Kenya do not believe that quality education can be delivered through information technology and some of them are very slow in changing their attitude towards this kind of modern Distance Education. Indeed, many scholars cannot easily adopt “a mind set” which appreciates that digital literacy is an important dimension of learning just like “reading and writing.”

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2. **Lack of ICT skills.** Most university academics and students have very low skills in ICT to the extent that AVUs digital libraries, e-learning platforms and many other products are not fully utilized by faculty members.
3. **Lack of a clear education policy.** The Ministry of Education, Science and Technology has recently added an ICT component to its mission statement. However, there is a need for a strategic plan or policy that is based on an analysis of the needs and priorities for the use of ICT to improve education.

2.9 Higher Education Institutional Framework

Traditionally, the public education sector provided most educational services. Today that is changing. In many developing countries the private education sector is growing. This is due to lack of adequate funding in the public education sector to foster rapid expansion to cope with the huge demand for tertiary education. For this reason, though private universities are a recent phenomenon in Africa they are indeed growing fast. Private universities therefore attempt to fill the gap or address the challenge of access to higher education (AAU, 2000; Adei, 2003:95).

There are 7 public and 7 private chartered universities in Kenya, although currently there are several other private universities that are affiliated to foreign universities abroad (Commission for Higher Education, 2006). The AAU is the only body that lists HEIs in Africa. However, the AAU admits that there is no comprehensive record of HEIs in Africa. For the purposes of this study, the focus is on chartered universities.

2.9.1 Kenyatta University

The Kenyatta University is public institution situated 16 Kms from Nairobi, Kenya's capital city. It was a constituent college of the University of Nairobi, from 1970 to 1985 specializing in teacher training. In 1985 it received full university status and established various faculties. The library complex was built in 1984 and can seat 415 readers. It houses 145000 volumes and 1000 journals.

TABLE 3 Student and Faculty Demographics Kenyatta University

Faculty	No. of full-time lecturers	No. of part-time lecturers	No of students
Arts	202	78	891
Commerce	38	3	505
Education	261	29	4394
Science	235	41	683
Environmental Studies	35	12	268
Home Economics	28	6	With education
Total	779	169	6741

(Source: Association of African Universities 1999)

The mission of Kenyatta University is to:

- Provide directly and in collaboration with other HEIs, facilities for higher learning including technological and professional education and research; and
- To play an effective role in the development and expansion opportunities for Kenyans wishing to continue with their education.

2.9.2 University of Eastern Africa, Baraton (UEAB)

The University of Eastern Africa, Baraton is a private Seventh-day Adventist institution. It was established in 1981 and chartered in 1991. This University is one of the largest Seventh-day Adventist institutions in Africa. It is located 40 Kms from Eldoret town and about 365 Kms from Nairobi in the rural Nandi district of the Rift Valley province. The library building was completed in 1992. The Library currently has over 50 000 volumes and 54 journal titles, as well as electronic resources.

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TABLE 4 Student and Faculty Demographics UEAB

Faculty	No. of full-time lecturers	No. of part-time lecturers	No. of students
School of Business	13	3	180
Humanities and Social Sciences	21	3	400
Science and technology	45	7	480
Education	7	8	26
Total	86	21	1086

(Source: University of Eastern Africa Baraton 2005)

The mission of UEAB is to:

- Provide and advance a holistic Christian quality education for the youth with the aim of equipping them with the necessary skills for service to God and humanity;
- Provide an opportunity for developing proficiency in discovering knowledge that is relevant to life; and
- Uplift the vision of society by challenging and motivating its students to develop to the highest possible goals.

Similarities and differences between the Kenyatta University and UEAB:

- Both institutions are chartered by the government of Kenya;
- Both institutions offer degree programs in Business, Education, Humanities and Science;
- Both universities offer a four-year degree program for the undergraduate students;
- Both institutions are beneficiaries of the KENET initiative;
- University of Eastern Africa Baraton is a private institution, sponsored by a Christian Organization;
- Kenyatta University is a public institution, sponsored by the government of Kenya;

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- University of Eastern Africa Baraton is a small university with few students comparing with Kenyatta University which is a large institution with thousands of students; and
- University of Eastern Africa Baraton is located in a rural setting while Kenyatta University is in an urban setting.

2.10 ICTS in Academic Libraries and their Role in Teaching and Learning

By definition a library is the central organ of a university (Kargbo, 2002:412). While universities engage in transmitting and expanding knowledge, libraries are the repositories of this knowledge. Wilkinson (1997) observes that technology has transformed most library functions from access to storage of materials. As a result, the role libraries play has changed. It has been suggested that the best way libraries and universities can cope with technology oriented problems is by identifying the educational goals of the institution. Libraries can also help to provide the missing link between technology and learning.

Libraries can organize and manage information literacy programs according to different models. The success of information literacy initiatives is also highly dependent on the larger institutional environment. Factors such as the level of cooperation between academic departments and librarians, the perception of librarians as teachers, and expectations for the library, determine how these programs are implemented and sustained.

There now emerges a new perception of the librarian as a teacher. This view acknowledges that a great deal of learning occurs in libraries as much as it does in the classrooms. When students are faced with research activities, librarians are in a better position to facilitate that learning. The information society demands skills that will enable learners to access the numerous information resources. In light of these, librarians have become co-teachers, equipping learners with information literacy skills. When learners are information literate, it means that they have acquired lifelong learning skills, a prerequisite of the knowledge-based society.

2.10.1 Impact of ICTs on Academic Libraries

Technology has resulted in convergence of two movements in the libraries affecting information access; namely:

- New forms of information; and
- New technologies that have transformed library holdings.

New forms of information have implications on transformation of library holdings. According to Haddad (2004: 25) ICTs have transformed the way library holdings provide endless possibilities of going over the same material in a variety of formats. For example one can find in literature a piece of work in monograph/hard copy, on a CD-ROM as text, on a video tape or DVD as a play being acted. These are some of the benefits that ensue from use of information technology in academic libraries.

New technologies have also impacted on library holdings. The impact of automated technology is evident in various online services, especially the value of remote access to electronic resources. Libraries have portals where access to information is no longer restricted to the physical library building, but spreads through campus networks and through the World Wide Web. To fully utilize these technologies call for a new type of preparedness known as e-readiness.

According to the European Economic Intelligence, e-readiness refers to the degree to which a community is prepared to participate in the Internet-based opportunities. According to Dutta & Jain, (2004:8) e-readiness may be gauged in two ways. First it is gauged by assessing a community's relative advancement in the areas that are most critical for ICT adoption and the most important applications of ICT. Such areas include possession of relevant skills for using ICT within individuals, issues affecting access and affordability of ICT and prevalence and use of ICT for services. Second, through individual readiness measured through factors such as information literacy rates and locus of access to Internet. In academic libraries the former is an important factor from which to measure e-readiness.

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2.10.2 Students' Learning Outcomes

It is important to recognize that there are many types of outcomes, such as research, learning, as well as institutional outcomes (Fraser & McClure, 2002). This study deals with student learning outcomes or the extent to which students learned, retained, and built on their foundation of knowledge and skills (ALA, 1998). Student learning outcomes mostly apply to a course or program of study at either the undergraduate or graduate level. There is no single concise definition of what an "outcome" means in the context of library service. In general, outcomes could include :

- The notion of an impact, benefit, difference, or change in a user, group, or institution based on the use of or involvement with a library service or resource;
- The planning process in which the library engages to produce desired service or resource outcomes through the setting of service/resource goals and objectives; and
- Measuring and demonstrating the extent to which library services or resources meet the anticipated outcomes determined by the library or imposed by the community the library serves in this case the academic institution.

Developing a framework for outcomes assessment requires a complex analysis that encompasses the operating environment of the library, the impact of situational factors on library services and resources outcomes, and the reality that it is not always possible for libraries to anticipate and predict the outcomes of their services/resources on users.

The assessment process measures learner performance. As such, it is student-oriented rather than institution-centered. Assessment measures changes in library users as a result of their contact with an academic library's programs, resources and services, such as student known content, developed skills and abilities, and acquired attitudes and values. Therefore, assessment is comprised of statements about what students will know/think/be able to do as a result of their contact with library programs.

Students are asked to demonstrate acquisition of specific knowledge and skills, generally:

- What do students know that they did not know before?

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- What can they do that they could not do before?

In an effort to answer these results-oriented questions, higher education governing and monitoring bodies have been working to address this need for accountability. Higher education institutions, including academic libraries, are increasingly implored upon to demonstrate their effectiveness and efficiency. HEIs and various accrediting bodies need to increase awareness, and necessity for measuring and reporting student learning outcomes. The link of information literacy to student learning outcomes has led to identification of a direct role for academic libraries.

The student learning outcomes will illustrate and demonstrate the value of the academic library as an institutional teaching and learning partner. Librarians also need to partner with teaching faculty to pursue other types of outcomes and to ensure that the instruments and techniques used are valid and reliable, and lead to true improvement in instructional programs. Clearly, academic librarianship is embarking on a new journey, one that stands to place more libraries at the crossroads of their institutions.

2.10.3 The Current Context and the Need for Answers

The environment in which libraries find themselves at present creates a situation which demands answers to various research questions such as those raised in chapter one. Academic libraries find that they are considered increasingly as part of the larger organizational structure in which they reside, university departments or local government agencies. Bertot and McClure (2003) identify the following situations in which libraries are being asked to:

- Articulate the importance of and need for their services and resources;
- Identify the use and uses of their services and resources; and
- Establish the value, impacts, and benefits that the community receives from the library services and resources.

In addition to this management context, there is the evolving technology context in which libraries operate. There is also the issue of technologies that continue to change and evolve at an ever-intensifying pace. Together with these are the

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network-based resources and situations that remain outside the direct control of libraries.

2.11 Conclusion

The role of ICTs in teaching and learning cannot be underestimated. The theories point to the importance of both formal and informal learning and the significance of information receivers being able to understand the information they receive. If ICTs are to cross the threshold from promise to practice in HEIs, certain minimal conditions must be met. While it is true that from the statistics provided Africa lags behind in the ICT infrastructure, there is need for political leaders to play an active role in creating sound ICT and education policies to put countries like Kenya on the roadmap to progress. At the institutional level there is a need for clear mission statements incorporating the support of ICT which can be used to guide the development of a strategic plan. The issue of planning has been well articulated by (Draber, 2003; Ajayi, 2002) stating that strategic planning is championed as an important way to address challenges facing HEIs. The two mission statements reviewed in this chapter are not clear about the position of ICT in education.

From the literature it is apparent that in Kenya, educators need to be sensitized to the new learning methods. They also need support through professional development in ICT related areas. Competent educators will apply ICTs in their teaching more easily. There is a need for learners to be equipped with lifelong learning skills. In Kenya this can be made possible by utilizing the academic libraries as centers for dissemination. The librarians together with all other players in the information sector must come together and make national plans that can enable the country to progress as a knowledge-based society. Taking the case of telecenters where some success stories have been recorded worldwide, Kenya can also start by using academic libraries for such training. Libraries need to have a more profound effect on the whole learning life of the students. The need to recognize librarians as co-teachers will help universities in Kenya.

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According to ACRL (2000), assessment is an essential part of documenting the effects of library instruction and information literacy programs. Information literacy programs need to show that skills learned are transferable from one discipline to another. Therefore an assessment of the information literacy programs is a key component in determining the value of programs, activities, and techniques within the educational process and to determine areas needing attention. Assessment of educational outcomes provides measurable accountability for both teacher and learner. Administrators, stakeholders and funding organizations are demanding justification for programs through cost-benefit analyses of programs and activities, and requiring evidence of successful learning outcomes.

The literature relating to empirical studies conducted in Kenya's HEIs is scant and unable to affirm or negate the above. This brings into focus the relevance of this study: it seeks to fill in the literature gaps on ICTs in HEI, and the role of libraries in teaching and learning (both formal and informal). The next chapter deals with the research methodology and will highlight the various components of the proposed empirical study.

Chapter 3

Research Methodology

Our 'society' requires a prompt and accurate flow of information on preferences, needs, and behavior. It is in response to this critical need for information on the part of the government, business, and institutions that so much reliance is placed on surveys.

-Fritz Scheuren. 2004

3.1 Introduction

In the previous chapter, there was a discussion on learning theories, the information and communication theory, as well as issues relating to the academic library's role in formal and informal learning. While the learning theories explain the cognitive and motivational aspects to learning, the information and communication theory explains how learners can become information literate. These theories can be used by librarians to design information literacy programs which form the basis for lifelong learning (LLL) skills. In this study, the library forms a common ground for activities of formal and informal learning. This chapter consequently discusses the research methodology and its applications, and draws attention to the following main features:

- Research design;
- Theoretical orientation;
- Data collection methods;
- Data coding and analysis; and
- Ethical issues in research.

3.2 Research Design

One of the most important aspects of a research design is to determine a focus for the inquiry. In this study the focus for inquiry consists of the following factors:

- ICT infrastructure available and how it is managed at UEAB and Kenyatta university;
- Availability and accessibility of e-resources in different formats at UEAB library and Kenyatta university library;
- A comparison of user perceptions regarding the usage of the library among the third year undergraduate students at University of Eastern Africa, Baraton (UEAB) and those at Kenyatta University;

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- User support services in the libraries to enhance students' LLL skills at UEAB and Kenyatta university; and
- Overall impact of the library on teaching and learning at UEAB and Kenyatta University.

All the above seek to address the primary objective of this study which is to investigate the role of the library in formal and informal learning at UEAB and Kenyatta University.

3.2.1 Survey Research Design

The survey research design for this study was developed within a broad qualitative approach. The survey design was selected because this study is descriptive (Singleton, 1988: 237). Generally the survey research is usually designed to measure one or more phenomena across a sample representative of the population (Powell, 2004:86). The selection of this design was premised on the following reasons:

- In a survey, researchers sample a population. Since populations can be quite large, researchers directly question only a sample of the population. A sample refers to any set of persons or objects that possesses at least one common characteristic.
- Surveys are used extensively in library and information science to assess attitudes and characteristics of a wide range of subjects.
- By carefully following certain scientific procedures, surveys can be used to make inferences about a large group of elements by studying a relatively small number selected from the larger group (Mugenda & Mugenda, 1999:164); and
- The broad area of survey research encompasses any measurement procedures that involve instruments of administering questions to respondents such as interviews or questionnaires.

The survey generated data has been analyzed by comparing and evaluating the various variables. The evaluation was selective in terms of purpose and issues that were addressed.

3.2.2 Theoretical Orientation

The application of a qualitative approach refers to the use of qualitative data, meaning that the information is not expressed in numbers but in words or pictures. The qualitative approach was used to gauge the user's perspective rather than the

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researcher's perspective. In this approach, the application of 'constructivism' helped in understanding how the behavior patterns of individuals are inextricably linked to the environments in which they are situated. It relates, in this case, to what the libraries in the two higher education institutions are doing to support their learners in acquiring LLL skills. This approach also helped to understand this process by examining how events are interrelated along a developmental continuum (Struwig & Stead, 2001:12). In this study, the term 'process' is used to understand the entire learning process.

Constructivism refers to an epistemological position in which knowledge is regarded as constructed. Hjørland (2002) suggests that constructivism in LIS should be understood from an interdisciplinary approach where it represents an epistemological position. Hjørland & Nicolaisen (2005) also state that constructivism is a more moderate view in which the mind constructs reality but within a systematic relationship to the external world. The consequence of this is the analysis of person-situation-interaction. Constructivists view knowledge as an active structuring of experience which involves the cognitive aspects of a person (Gerstenmaier & Mandl, 2001: 2654). Emphasis is placed on the participants' perspectives and description of events, beliefs and behaviors. "What makes a research method constructivist lies in the method or technique itself, rather than in the philosophy with which the technique is used" (Neimeyer & Levitt, 2001:2651). For instance in interviews, when the focus is on distinctive patterns or processes of constructing meanings in a given personal or social context, such a method is said to have a 'constructivist orientation'.

In LIS research, constructivism has been applied to studies in diverse ways. Powell (1999) identifies constructivism as one of the methods used in qualitative studies in LIS. Forerunners in the application of constructivism in LIS research include Dervin (1983) who states that "an information user is not a passive information processing system but actively makes sense of the surrounding reality and attaches personal meanings to information." Dick (1993), states that "researchers using constructivist methodology ask questions that deal with personal or subjective understanding and meaning." Albrechtchen & Jacob (1998), discuss approaches to classification research

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using constructivism. In their analysis of research methods, they state that constructivism offers a view of ‘knowledge as a product’ for the classifications.

Wai-yi (1998), in his study on information seeking and use, advocates that people who are able to go through constructive information seeking and use are information literate. Hence, constructivism helps the students to turn data into useful information that provides answers to their queries.

Cognitive constructivism emerged in LIS in the late 1970s and early 1980s in support of the ‘user oriented revolution’. Cognitive constructivism, a variant of constructivism, found in the work of Piaget, has commonly and broadly formed the background for the study of information needs. Its starting point is the supposition that the individual mind generates knowledge by creating mental structures and mental models which represent the world, mediate and filter information (Talja, Tuominen & Savolainen, 2005).

In LIS research, cognitive constructivism has been applied in fields such as; information retrieval, information search behavior; task related behavior task related searching, user system interactions among others. Some prominent LIS researchers with contributions to cognitive constructivism include: Kunz & Rittel, 1972; Brookes, 1980; Byström, 1980; Hollnagel, 1980; Belkin *et al.*, 1982; Ingwersen, 1984; Kulthau, 1999; Vakarri, 1999; and Belkin *et al.*, 2000, and Bergman *et al.*, 2003. In this respect, cognitive constructivism is an area of significance in LIS research, and this study aims to expand and enrich the perspective.

3.2.3 Setting

The study is limited to two universities in Kenya. The Kenyatta University, a large urban based public university (see 2.9.1) and UEAB a small, rural based private university (see 2.9.2).

The two universities were selected for the study because:

- They both benefit from the KENET initiative which seeks to provide internet access to Universities in Kenya.
- Their range of faculties is similar although Kenyatta University has more faculties.

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- For comparative purposes, the two universities were selected because of their physical location. The Kenyatta University is situated in an urban region while the University of Eastern Africa, Baraton is in a rural region.
- Also for comparison purposes, Kenyatta University is a public university while University of Eastern Africa, Baraton is a private University.

In this regard, it is useful to evaluate the extent to which ICTs have been utilized by the two university libraries in facilitating formal and informal learning.

3.2.4 Sampling

The importance of sampling has quite profound effects on the overall study. This study will use the random sampling procedure. With simple random sampling, each item in a population has an equal chance of inclusion in the sample. The advantage of simple random sampling is that it is simple and easy to apply when small populations are involved. The main aim of sampling is to get the correct sample size. Rowell & Connaway (2004:96) and Struwig & Stead (2004) cite some of the basic factors that need be considered when determining a sample size. These factors include the:

- Basic characteristics of a population, that is whether it is homogenous or heterogeneous;
- Objectives of the study and
- Data analysis and credibility.

However, in relation to this survey research design the sample was small-scale, meaning that the respondents were between 200-350. This is mainly because of the following administrative issues:

- Costs; and
- Time.

In conducting surveys, determining the target group correctly is critical. If one does not identify the right kinds of target groups then one may not successfully meet ones research goals.

3.2.5 Target Groups

There were three target groups. The first group was a sample of the third-year undergraduate students at both universities.

The third year undergraduate students had been selected because they represent a group of learners who have:

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- At this point in time had undergone necessary library training in the use of library resources; and
- Academically reached a level where they were engaged in academic research projects that require the use of subject-specific information resources; and

The second target group was the entire population of the library managers. They had been selected because:

- They are professional librarians charged with the responsibility of managing the library resources;
- They contribute to decision making with regards to the overall running of the libraries; and
- They participate in the development of the strategic plans of each university's library.

The third target group includes the library committee members with similar functions as those of the second target group, and consists of representatives from academic departments and from university administration. In this group, the entire population was used because they are few in number and not all of them may be available during the data collection period. The reasons for selection include:

- Their function in the running of the library as far as decision making is concerned; and
- Their formal interaction with the students in class resulting in the role they play in directing the students to use library resources.

In data collection, the content of the tools will target each of the three groups separately.

3.3 Target Content in Data Collection

According to Trochim (2005), constructing a survey instrument is an art in itself. There are numerous small decisions that must be made about content that can have important consequences for the entire study. Aspects of content for the data collection methods are discussed below and are an adaptation from an evaluation toolkit for e-library developments (Evalued, 2004).

3.3.1 Access Skills

The role played by libraries in the past in providing information has changed to one of providing access to information. This requires skills to enable the users in the selection of information from electronic collections, intranets and portals. Access therefore calls for user competency in access skills. Key issues under investigation are:

- Factors affecting access to library e-resources such as basic competencies in library skills and computers skills;
- The ability to use different resources such as print and electronic resources; and
- Preferences for resources, whether electronic or print.

3.3.2 Promotion

The provision of electronic resources is in itself not sufficient. The academic library staff needs to ensure that users are made aware of the resources and services available to them. Effective promotion strategies are essential if resources are to be used as widely and effectively as possible. Users need to know about their availability and how to access them. This aspect is important to this study because learners need to be acquainted with all available sources of information in order to become information literate and lifelong learners, even to advance in their careers long after graduation. In academic libraries some common methods of promotion include the use of library web pages, printed guides, posters, newsletters, presentations, inductions, handbooks and displays or exhibitions. These data collection tools seek to identify or discover:

- Promotional materials targeted at users;
- Kinds of promotional activities the libraries use;
- How promotion is done; and
- If promotion is linked to other activities, for example evaluation or user induction.

3.3.3 User Support

User support is a core function of the academic library making it an essential service. In this study the focus on user support was intended to discover the kinds of support the university libraries provide to their users, and whether it is reliable, trusted and responsive. New types of e-resources provided through academic libraries require

additional skills for effective library use. In addition to subject-related questions and general information seeking enquiries, students require support and training in the use of information technology (IT) if they are to make full use of the electronic information sources available. Some examples of new types of support developed to meet the changing needs of library users include: available support all the time, e-mail, online tutorials, knowledge bases, feedback forms, help desks, help lines and reference desks. Data will be obtained to evaluate the effectiveness of the formal and informal support offered to students by each of the two libraries. Data collection tools address the issues of:

- How library staff supports users; and
- Types of support services offered by each library.

3.3.4 Impact on Users

Focus on the impact of library services to the users is steadily gaining importance because of the increasing learner-focused environment of higher education institutions, as well as issues related to global marginalization. However, impact is a term that can imply and entail an array of research areas. In this study, the focus was on the 'scope' of impact. This means that the study focused on the range of opportunities, the services, training and resources available to the learners. Looking at impact from the scope perspective therefore meant that the impressions and perceptions of the third year undergraduate students about the range of services and resources available to them in the two university libraries would be sought. Getting these perceptions would ultimately help the library services to respond positively to the new learning methods. Libraries need to focus on equipping students with transferable skills which will enable them to become information literate, as well as supporting them in their coursework. Although libraries can impact on students' learning in three main ways that is; literacy, subject skills and LLL, data collection tools actually focus on finding out students' basic information literacy skills.

3.3.5 User satisfaction

User satisfaction through evaluation is used to seek the continuous improvement of a service. There is evidence that users are increasingly demanding and expecting better service each passing day. Libraries need to develop an in-depth understanding of users' needs and expectations in order to design services and build collections which

target these needs. Knowledge of user needs is crucial to academic librarians. They need to be aware of the different resources and services that would promote learning. For purposes of the scope of the study, the data collection tools focused on the content discussed above.

3.4 Data Collection Methods

Data collection methods refer to the procedures to be used to collect data as well as the techniques to process and analyze data (Struwig & Stead, 2001:40). In this study, data collection was through survey method using questionnaires, interviews and site visits (Powell & Connaway 2004:123). Data was then analyzed by evaluation in which the two libraries data was compared using the criteria identified in 3.2.1 - 3.2.5.

3.4.1 The questionnaire as a data collection technique

Questionnaires are a set of questions for submission to a number of persons to get data. They have important advantages over other techniques for collecting survey data. This study deployed self-administered questionnaires specifically for the student sample. Since non-response rates are relatively high for mail, e-mail and web-based questionnaires, the researcher has chosen to use self-administered questionnaires. Powell & Connaway (2004:124-125) and Leedy & Ormond (2005:185) discuss some of the advantages and disadvantages of the questionnaire.

3.4.1.1 Advantages of questionnaires

- They can facilitate the collection of large amounts of data in a relatively short period of time;
- They are relatively inexpensive to administer;
- They are easier to administer because each item is followed by alternative answers such as matrix questions;
- They can be administered electronically allowing respondents to complete them at their leisure;
- The characteristics of the questionnaire help to produce frank answers as well as eliminate interviewer bias;
- The questions once written out do not change and this eliminates variations in the questioning process, however, this may not eliminate the possibility of respondents interpreting the same question in different ways; and

- Questionnaires also allow for open-ended questions where respondents can give their feelings, background, hidden motivations, interests and decisions.

3.4.1.2 Disadvantages of questionnaires

- They are difficult to construct because categories must be well thought out.
- Responses are limited, the respondent is compelled to answer questions according to the researcher's choices.
- When the respondent is free to give an individual response deemed to be proper, there is a tendency to provide information which does not answer the stipulated research question.
- The responses given may be difficult to categorize and hence difficult to analyze quantitatively. Some responses are very useful for qualitative analysis.
- Responding to open ended questions is time consuming. This may put off some respondents.

From the advantages and disadvantages of questionnaires as a data collection technique, it is apparent that the advantages prevail over the disadvantages.

3.4.2 Interviews as a Data Collection Technique

An interview is an oral administration of a questionnaire or an interview schedule (Trochim, 2001:184). This study employed face-to-face, semi-structured interviews in which a carefully worded questionnaire was administered. This is also known as a schedule. An interview schedule is a set of questions that the interviewer asks when interviewing. An interview schedule was used to ensure that the interviewer is consistent, asking the same questions in the same manner to all respondents. The interviewees included the chief librarians and ICT managers at UEAB and Kenyatta University. The semi-structured interview schedule has categories and responses, and the interviewer simply checks the respondent's response. Some semi-structured questions are asked together with some open-ended ones, allowing the interviewer to probe where necessary.

3.4.2.1 Advantages of Face-to-Face Interviews

According to Babbie & Mouton (2001:249), face to face interviews have the following advantages:

- They provide in-depth data which is not possible to get using a questionnaire;

- They make it possible to obtain data required to meet specific objectives of the study;
- They guard against confusing the questions since the interviewer can clarify the questions;
- Interviews are more flexible than questions because the interviewer can adapt to the situation and get as much information as possible;
- Sensitive and personal information can be extracted through interviews;
- They allow the interviewer to get more information using probing questions; and
- They yield higher response rates because it is difficult for a respondent to refuse to answer questions or ignore the interviewer.

3.4.2.2 Disadvantages of Face-to-Face Interviews

Kumar (2005:131) identifies the following disadvantages:

- They are expensive to administer;
- Respondents may not be easily available for the interviews; and
- They may be time-consuming if the sample size is large.

The advantages of face-to-face interviews outweigh the disadvantages. This strongly supports reasons for choice of this method.

3.4.3 Observation as a Data Collection Technique

Struwig & Stead (2001:96) and Kumar (2005:120) state that observation can be useful in determining how the program is implemented and provides opportunities for identifying unanticipated outcomes. Observation can answer questions on whether or not the program is being delivered and operated as planned. Observation can be used in evaluation to secure descriptive data and to document activities, processes and outcomes of a program. Observation is used when there is a need for direct information. It can be obtrusive or unobtrusive. What can be observed is limitless, and includes people, behaviour, attitudes, skills or physical settings. Observation can lead to deeper understandings than interviews alone, because it provides knowledge of the context in which events occur, and may enable the researcher to see things that participants themselves are not aware of, or that they are unwilling to discuss.

3.4.3.1 Advantages of Observation

- They allow the researcher to watch from outside, without disturbing the participants;
- They allow the researcher to maintain a passive presence, being as unobtrusive as possible and not interacting with participants;
- They engage limited interaction, intervening only when further clarification of actions is needed;
- The researcher may exercise more active control over the observation, as in the case of a formal interview, to elicit specific types of information; and
- The researcher may act as a full participant in the situation, with either a hidden or known identity.

3.4.3.2 Disadvantages of Observations

- Observation (obtrusive and unobtrusive) can be expensive and time-consuming;
- Depending on the situation, the observer may need to be a content expert to accurately interpret the observations;
- The presence of an observer is likely to introduce a distortion of the natural scene which the researcher must be aware of, and work to minimize;
- Critical decisions, including the degree to which researcher's identity and purposes will be revealed to participants, the length of time spent in the field, and specific observation techniques used, are wholly dependent on the unique set of questions and resources brought to each study;
- The researcher must consider the legal and ethical responsibilities associated with observation; and
- There may be ethical implications in the use of observation.

While the use of observation as a data collection tool has legal and ethical responsibilities, it has the advantage of gathering certain details that may not be disclosed during other data collection techniques. It complements the other data collection techniques.

3.5 Data Coding, Analysis and Interpretation

Data analysis enables researchers to organize and bring meaning to large amounts of data. In this study, data analysis was done by use of coding, that is grouping

information into themes by using codes (Struwig & Stead, 2001:169). Codes are labels that assign units of meaning to the information obtained. The Statistical Package for Social Sciences (SPSS) software was used in the coding and analysis process. The interpretation of data was focused on the research objectives. In this study, data interpretation focused on holistic understanding and extrapolation thus giving meaning to the raw data. These are dealt with in the next chapter.

3.5.1 Descriptive Statistics

The purpose of descriptive statistics is to enable a researcher to meaningfully describe a distribution of scores or measures using a few indices or statistics (Struwig & Stead, 2001:158). This study used measures of central tendency such as mean, mode and median to determine the typical score. The study also used frequency distribution to describe the shape of a distribution by use of graphs, tables, histograms, bar charts, and percentages.

3.5.2 Evaluation

Evaluation is selective in terms of audience, purpose and issues. Evaluation comes after data collection, namely in the chapter on data analysis and interpretation. Evaluation is often used to judge the effectiveness, merit or worth of a program, project or a technology (Patton, 2004:476) and (Babbie & Mouton, 2001:338). The purpose of evaluation in this study was to generate knowledge and to find out what works. The evaluation was at the 'first level', (at the level of usage) focusing on the third-year undergraduate students, and the library managers.

3.5.3 Validity and Reliability of Data

According to Meijer *et al.* (2002:145), triangulation is a method of highest priority in determining internal validity in qualitative research. Triangulation is a strategy of using multiple constructs to help isolate the construct under consideration (Heath, 2001:15902). Basically, triangulation strategy acknowledges that no one method in social science research is a perfect measurement of constructs under consideration. It refers to a process by which a researcher wants to verify a finding (Meijer *et al.*, 2002:146). This study used data triangulation from students, library managers, library committee members, library handbooks and personal observations. This study compares observational data with interview data. It also compares students' views

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with library managers' views. Moreover, it compares the library managers views with written reports such as library handbooks, and, where possible, relevant minutes of library committee meetings.

3.6 Ethical Aspects

The questionnaires were submitted to the Faculty Research Ethics Committee at the University of Pretoria for approval. Permission to conduct the research was also sought from the Ministry of Education Science and Technology in Kenya. Permission was sought from each individual institution. The procedure was straight-forward and the researcher did not experience any problems. A research permit was then granted and the researcher proceeded to administer the data collection tools.

3.7 Conclusion

This chapter discusses the survey research design in detail. It also highlights the methodological approach. The methodology encompasses various methods involving triangulation both in data collection techniques, as well as the data collection tools. Various issues pertaining to library usage are also discussed. In the context of this study, the focus on usage covers the main aspects which directly impact on the role of the library in formal and non formal learning. A user investigation of access skills, library promotion, user support, user satisfaction and general impact of the library usage on the students, sums up aspects of the research problem discussed in chapter one.

However, it is important to recognize that this study is not a complete exploration of the role of the library in formal and informal learning. This study is therefore in no way intended to provide comprehensive information on all issues involved in the role of libraries in formal and informal learning.

Chapter 4

Data Presentation, Tabulation and Analysis

Those people who develop the ability to continuously acquire new and better forms of knowledge that they can apply to their work and to their lives will be the movers and shakers in our society for the indefinite future.

-Brian Tracy-

4.1 Introduction

The previous chapter provided a discussion on the research design, data collection methods and tools. The data collection methods included questionnaires, interviews, site visits and use of relevant documents. This chapter focuses on data presentation, tabulation and analysis. Interpretation of data is discussed in the next chapter.

Questionnaires were the main data collection method in this study. Their presentation, tabulation and analysis capture data from the following target groups:

- Third-year undergraduate students who were registered (February 2006) at University of Eastern Africa Baraton (UEAB) and Kenyatta University at the time the survey was carried out;
- The library managers at the two universities present and willing to participate in the survey (February 2006); and
- The library committee members at the two universities present and willing to participate in the survey (February 2006).

The student sample was calculated using the sample size calculator. According to the Survey System (2003), the sample size is determined by population, confidence level and confidence interval percentage. The key terms in sample size calculation are explained below as follows:

- **Population.** Refers to the number of people in the group your sample represents.
- **Confidence interval.** Refers to plus or minus the figure usually reported in results. For example, if you use a confidence interval of 4, and 47% percent of your sample picks an answer you can be sure that if you had

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asked the question of the entire relevant population between 43% (47-4) and 51% (47+4) would have picked that answer.

- **Confidence level.** Tells you how sure you can be. It is expressed as a percentage and represents how often the true percentage of the population who would pick a given answer.

UEAB

- Confidence level of 95%.
- Population: 250
- Confidence interval percentage: 50%
- Sample size: 80

Kenyatta University

- Confidence level of: 95%,
- Population: 2000
- Confidence interval percentage: 50%
- Sample size: 328

At UEAB, a total of 80 questionnaires were distributed to the third year undergraduate students. Fifty five fully completed questionnaires were returned. There were 6 incomplete questionnaires which were not used in the data analysis.

At Kenyatta University, a total of 328 questionnaires were distributed to the students. Two hundred and eighty seven fully completed questionnaires were received back. There were 7 incomplete questionnaires which were not used in the data analysis.

The response rates were as follows:

- UEAB had 55 out of 80 fully completed questionnaires, equivalent to a response rate of 68.75%;
- Kenyatta University had 287 out of 328 fully completed questionnaires, equivalent to a response rate of 83.84%; and
- The total number of questionnaires received from the students sample was 342.

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In the other two groups that is, the library managers and library committee members the entire population of each group was used. Their response rate was influenced by their presence and willingness to participate in the survey. At Kenyatta University, the response rate for the library committee members was very low because some were not willing to participate in the survey.

Interviews with the chief librarians and ICT managers were conducted at both universities. Observations from the site visits as well as analysis of relevant documents were also used. Below is a breakdown of the response rates for library managers and library committee members.

The response rate for library managers:

- At UEAB, 3 out of 3 library managers responded making the response rate 100%; and
- At Kenyatta University, 10 out of 14 library managers responded making the response rate 71.4%.

The response rate for library committee members:

- At UEAB 21, out of 24 library committee members responded, making the response rate 87.5%; and
- At Kenyatta University, 1 out of 21 library committee members responded, making the response rate 4.8%.

4.1.1 Problems Encountered

The Library committee members at Kenyatta University were unwilling to participate in the survey. Only one questionnaire was returned. The rest of the questionnaires distributed to this group were not returned. Although the library committee members at Kenyatta University did not participate in the survey, this did not affect the study too much because the data was mainly used for triangulation purposes.

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The researcher was also unable to access the current student demographic data at Kenyatta University. The officers in charge were not willing to release the data despite the researcher having obtained authorization to conduct research at the institution from the University's Vice-Chancellor. Hence, the researcher used data from the circulation librarian to estimate the number of the third year undergraduate students.

4.1.2 Data Presentation, Tabulation and Analysis

The researcher has preferred to present, tabulate and analyze data using a comparative format between the two universities. The researcher could not present, tabulate and analyze the data by directly following the format of the questionnaire due to the application of data triangulation. A comparative evaluation has been used in order to bring together responses from related questions in the different questionnaires. Chapter three presented a detailed discussion on the target content used in the data collection tools. This section draws upon the target content and primarily focuses on the objectives discussed in chapter one. Included in this analysis but not mentioned in the objectives is the first category of analysis concerning the students' demographics. Data presentation and analysis will therefore be according to the following categories:

- Students' demographics by age, gender and degree course;
- ICT infrastructure;
- Access to, and promotion to ICT services in the academic libraries;
- ICT usage patterns among the students within the libraries in formal and non-formal learning in the two universities; and
- The Role of the Library in determining the students learning outcomes.

4.2 Students' Demographics by Age, Gender and Degree Course

The Students demographic data is important and will assist the researcher in understanding the detailed characteristics of the students' sample. Since this study is a survey, it is important that the sample is representative in terms of age, gender and degree course.

Students' Demographics by Age

Age	UEAB	Kenyatta
19-22	28	154
23-27	21	118
28 and over	6	15
Total	55	287

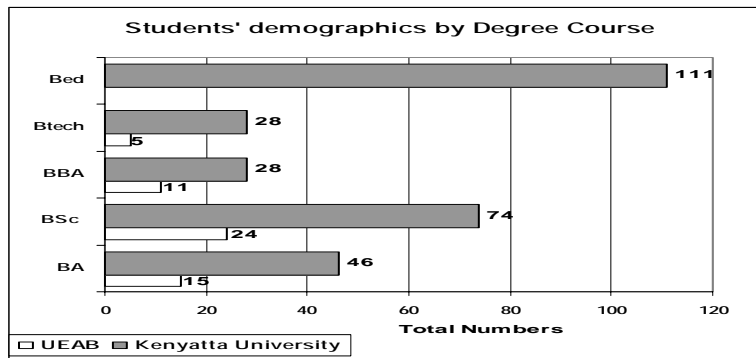
The highest number of respondents is within the age group of 19-22. UEAB had 28 and Kenyatta University had 154. The second highest number of respondents was within the age groups 23-27. UEAB had 21 and Kenyatta University had 118. There are very few respondents within the age group of 28 and over. UEAB had 6 and Kenyatta University had 15.

Students' Demographics by Gender

	<i>UEAB Numbers</i>	<i>Percentage</i>	<i>Kenyatta University Numbers</i>	<i>Percentage</i>
Male	32	58.2	163	56.8
Female	23	41.8	124	43.2
Total	55	100	287	100

The highest number of respondents from both universities was from male students, UEAB (58.2%) and Kenyatta University (56.8%). The female respondents were UEAB (41.8%) and, Kenyatta University (43.2%).

Students' Demographics by Degree Course



There are categories of five degree courses representing the respondents. The respondents from each of the five categories are full-time students registered for their third year. The highest number of respondents is from Bachelor of Education degree course (111) at Kenyatta University while the lowest category was from UEAB Bachelor of Technology degree with 5 respondents.

4.3 ICT Infrastructure at UEAB and Kenyatta University

As discussed in chapters one (see 1.3) and three (see 3.3.1) the data analysis focuses on the basic description of the ICT infrastructure available in the two libraries. The data presented here is what was gathered by the researcher from the site visits.

UEAB

The UEAB library has utilized the Very Small Aperture Terminal (VSAT) facility that is an initiative of the Kenya Educational Network (KENET) project. The university has also purchased extra bandwidth to enhance the speed. As a result, the library has an intranet, and the Online Public Access Computers (OPAC) is web based. There are four OPAC computers in the library. Previously there had been problems of space but this was resolved three years ago when more academic buildings were constructed consequently creating room within the library building. The library has a special internet access room known as the 'online resource center'. There are currently fifty computers for undergraduate students' use. The post-graduate students have a separate room with six computers while the faculty has yet another room with four computers. In the online resource center there are CD-ROM databases and the students use some of the computers to access the CD-ROMs. The library subscribes to about 100 e-databases that the students can access. The audio visual materials are housed in a separate room called the 'Audio

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Visual Room'. This room carries a collection of audio tapes, audio CDs and VHS tapes. The students are allowed to borrow the AV materials for use outside the library.

Kenyatta University

The library has a VSAT facility which is an initiative of the KENET project. However, there is no computer network in the library. The OPAC has been in existence for two years and consists of four stand-alone computers that only house the catalogue. The OPAC is updated periodically using CD-ROMs. The card catalogue is still evidently in use. There is a separate room for internet access and CD-ROM access that also houses the audiovisual materials. This room has five computers and one is set aside specifically for CD-ROM access. The students have to make bookings in order to use the computers and they are only allowed 30 minutes per session. The library also has a separate room with two computers for postgraduate students' access to CD-ROMs under the Program for Enhancing Research Information (PERI) project. These two computers also house the Database for African Theses and Dissertations (DATAD) project. Although these projects are within the library, access is restricted to faculty and postgraduate students only. Due to the current ICT situation at Kenyatta University, the students in their questionnaires, made the following comments with regards to inadequate infrastructure.

- The library needs to improve e-access services for students;
- The library needs to increase computers for online services;
- The time allocated for access to online resources should be increased; and
- The technology level at Kenyatta University has yet to meet the required standards since most services are unavailable.

According to data from a follow-up interview, the chief librarian indicated that the library lacked support from the university administration, and that this made it difficult to make any improvements to the services. There were no clear policies that support the development ICT at the university in general. The library is not allocated funds from the University. In another follow-up interview, the librarian-in-charge of ICT also stated that funds to make improvements to e-services were inadequate.

4.4 Access and Use of ICTs in UEAB and Kenyatta University Libraries

The main focus here relates to use and access. This section presents findings on three aspects. The first two aspects focus mainly on data from the library managers, and the

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third aspect focuses on data from the students. The three aspects are library promotion services, user support services and access skills First, what are the methods used in promoting library services? Second, what user support services are available? Third, what access skills do the students have that can enable them to access e-services in the libraries?

4.4.1 Library Services Promotion

Library services promotion is essential. The effectiveness of the promotion determines the use or non-use of a service.

Library services promotion methods used by the library managers

- leaflets,
- posters and
- memos.

At UEAB, the following promotion methods were also used:

- library website;
- Special meetings such as university assembly and committees.

At Kenyatta University, accession lists were also used.

After obtaining data from the library managers about the methods they used to promote library services, these finding are triangulated with data from students about how they first learned about the library e-resources. Their responses are given in the table below.

Table indicating how students first found out about the e-resources in their library

	UEAB	Kenyatta University
Leaflets/posters in library	23.9%	6.5%
Told by librarian	19.6%	11.1%
Told by another student	23.9%	31.5%
Told by lecturer	15.3%	20.4%
Induction/Orientation	8.7%	11.1%
Posters elsewhere on campus	4.3%	2.5%
Browsing the library website	4.3%	5.4%
I do not know about the library	-	11.5%
TOTAL	100%	100%

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From the table, most respondents knew about e-resources in the library through their fellow students. At UEAB, 23.9% and Kenyatta University, 31.5% of the respondents indicated that they knew about e-resources in their libraries through a fellow student. At UEAB, 23.9% of the respondents indicated that they knew about library e-resources through leaflets and posters used in promotion. At Kenyatta University the same methods yielded 6.5%. The percentages of respondents who were told about library e-resources by librarians were 19.6% at UEAB and 11.1% at Kenyatta University respectively.

4.4.2 User Support Services

The library managers provide user support services. The library managers indicated that the most common types of enquiries at both universities were:

- Information searching enquiries as the most frequent;
- ICT related enquiries as second most frequent; and
- Subject related inquiries as the third most frequent.

Only Kenyatta University library managers indicated that they received some enquiries about library operations and about introductory letters to other libraries.

The following questions and answers about user support services indicate the responses of the library managers at UEAB and Kenyatta University.

How do library managers deal with informal inquiries from the students?

- The responses from UEAB library managers all indicated that they offered personal assistance to informal requests;
- Similarly, Kenyatta University library managers all stated that they offered personal assistance to the students, and;
- One library manager at Kenyatta University used help screens and other documentation while another referred such students to another librarian in the event that the response was not effective.

Do the library managers' feel that they dealt with the enquiries effectively?

- At UEAB, the library managers indicated that there was a need for specialist staff in order to deal effectively with enquiries;

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- At Kenyatta University, some library managers indicated that the lack of ICTs (infrastructure) and adequate staff hampered their effectiveness.
- At Kenyatta University, there was the issue of time constraints due to inadequate staff; and
- Some of the library managers at both Universities indicated that they were able to deal with the inquiries effectively.

Library managers' comments on their inability to effectively respond to informal inquiries

At both institutions there was a consensus on a need to train the librarians with ICT skills in order to discharge their duties effectively. The issue about a need for training resonated with some of the comments that the students made.

The comments included statements such as:

- The library staff should improve on their response to students;
- The library staff should extend training to users;
- The library staff should know that it is their duty to help students access the library services;
- The library should use top-notch information management skills; and
- There is no training offered in the library.

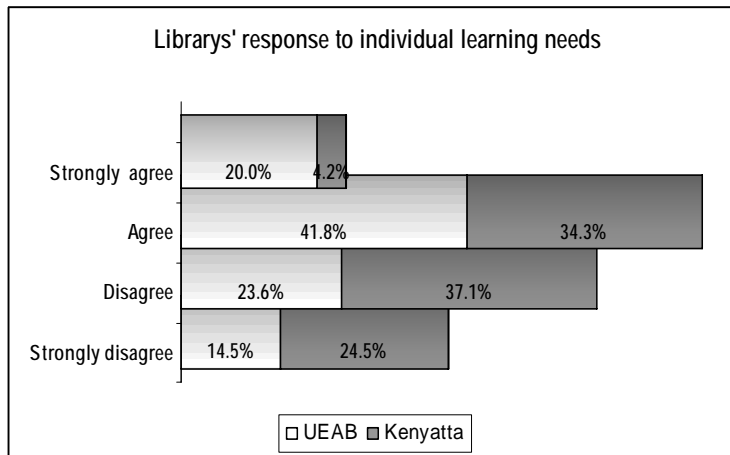
Frequency of students reports on problems encountered while using e-resources in the library

	Always	Sometimes	Never	Total
UEAB	27.8%	44.4%	27.8%	100%
Kenyatta University	11.9%	47.2%	40.9%	100%

From the two sets of data, the highest frequency category was for 'Sometimes'. UEAB had 44.4% and Kenyatta University had 47.2%. At Kenyatta University 40.9% and at UEAB 27.8% of the students never reported the problems they encountered while using e-resources in the library.

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Students’ response to how library staff dealt with individual learning needs with regards to library e-resources



From the data presented above, 41.9% of respondents from UEAB agree that the library staff responded effectively to their individual learning needs. This percentage is also the highest response category. At Kenyatta University, 34.2% of the respondents agree that the library staff responded effectively to their individual learning needs, while 37.1% disagree that the library staff responded effectively to their individual learning needs. This percentage is significant because it is the highest among all categories of responses.

Students’ response on how the library staff dealt with technical problems

	Always effective	Sometimes effective	Never effective	TOTAL
UEAB	17.3%	67.3%	15.4%	100%
Kenyatta University	11.2%	56.1%	32.7%	100%

From the responses above, the majority of the respondents from both universities UEAB (67.3%) and Kenyatta University (56.1%) indicate that the library staff sometimes deal effectively with their technical problems. On the other hand, 15.4% respondents from UEAB, and 32.7% from Kenyatta University indicate that the staff never deals effectively with their technical problems.

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Students' response on how they decide on the most appropriate resources to complete a task

	UEAB	KENYATTA UNIVERSITY
Lecturer recommends	35.3%	41.6%
Librarian recommends	3.9%	3.8%
Prior knowledge	13.7%	20.3%
Through searching/browsing	47.1%	34.3%
TOTAL	100%	100%

At UEAB, the highest response percentage indicates that it is through searching and browsing (47.1%), followed by what the lecturer recommends (35.3%). At Kenyatta University, the highest response percentage indicates that the lecturer recommends 41.6% followed by searching and browsing (34.3%). The lowest response percentage from both institutions indicates that the librarian recommends for UEAB (3.9%) and Kenyatta University (3.8%).

4.4.3 Access to ICT Services in the Libraries

Access defines one's ability to make use of ICT related services in the libraries. The basic underlying factor in access is the skills or basic competencies such as computer skills. Another factor in access pertains to skills training offered by the library to the students to improve their access skills. First, the students ranked their own basic computer skills levels. Second, the students responded to the effectiveness of library skills training. Data about students' basic computer skills is presented according to age and gender in the tables below.

UEAB Students' Basic Computer Experience by Age

	No experience	Novice	Intermediate	Expert	TOTAL
19-22	--	39.3%	46.4%	14.3%	100%
23-27	--	38.1%	38.1%	23.8%	100%
28 and over	--	33.3%	50%	16.7%	100%

The highest percentage of experts is in the age group 28 and over, with 50% intermediate skills. The age group 23-27 displays an even pattern of skills ranging from 23.8% to 38.1%. The Age group 19-22 has the second highest percentage of intermediate skills.

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There are no students in the category for no computer experience. Generally, in all age categories there are students with expert level of computer competence.

Kenyatta University Students' Basic Computer Experience by Age

	No experience	Novice	Intermediate	Expert	TOTAL
19-22	6.1%	43.3%	41.3%	9.3%	100%
23-27	8.4%	42.9%	39.5%	9.2%	100%
28 and over	13.3%	33.3%	33.3%	20.1%	100%

At Kenyatta University, there are students with no computer experience in all age categories. The percentage of students with expert skills is low. Kenyatta University students data indicates low percentages of 20% and below.

Analysis of Students' Basic Computer Experience by Gender

	UEAB		KENYATTA	
	MALE	FEMALE	MALE	FEMALE
NO EXPERIENCE	--	--	4.9%	10.7%
NOVICE	48.4%	26.1%	42.3%	43.8
INTERMEDIATE	25.0%	60.9%	44.8%	33.1%
EXPERT	26.6%	13.0%	8.0%	12.4%
TOTAL	100%	100%	100%	100%

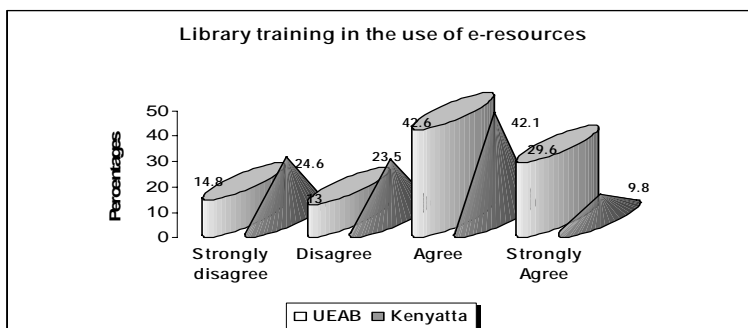
At UEAB, the highest percentage (60.9%) in levels of competence is among female students with intermediate skills, followed by (48.4) percentage of male students with novice skills. At Kenyatta University, the highest frequency of competence levels is 44.8% for male students with intermediate skills. The expert competence skills are low for both male (8.0%) and female (12.4%) students at Kenyatta University.

Library committee members ranking of their individual computer experience

	No Experience	Novice	Intermediate	Expert	Total
Male	---	31.2%	50.0%	18.8%	100%
Female	---	33.3%	66.7%	----	100%

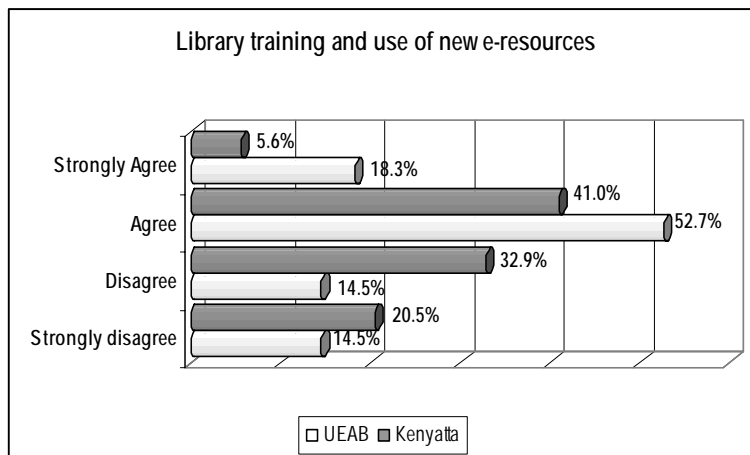
There are no library committee members without computer experience. The highest category of skills level is intermediate. The males had 50% and the females had 66.7%. There were no library managers with ‘no computer experience’.

Students’ indication of usefulness of the library training in the use of e-resources



The graph above indicates that at UEAB (42.6%) and Kenyatta University (42.1%), the majority of the respondents ‘Agree’ that library training in use of e-resources has been helpful to them. Also at UEAB, 29.6% of the respondents ‘Strongly agree’ that the training in use of e-resources has been helpful to them.

Students’ indication of how library training in the use of e-resources has led each one of them to use new resources



The graph above shows that at UEAB 52.8% and at Kenyatta University 40.1% ‘Agree’ that library training has led to the use of new e-resources. At Kenyatta University, 32.9% of the respondents ‘disagree’ that library training in the use of e-resources has led them to new e-resources.

Students’ indication of use of e-resources and improvement of ICT skills

		Strongly disagree	Disagree	Agree	Strongly Agree	Total
UEAB	Male	6.7%	13.3%	56.7%	23.3%	100%
	Female	4.5%	4.5%	77.3%	13.7%	100%
Kenyatta University	Male	19.9%	23%	44.1%	13%	100%
	Female	17.4%	28.9%	43%	10.7%	100%

From the table above, the ‘Agree’ category has the highest frequency. At UEAB, 56.7% males and 77.3% females agree that using the e-resources has helped them improve their ICT skills. In the category for ‘Strongly agree’ at UEAB, there were 23.3% males and 13.7% females. At Kenyatta University in the same category, there were 13% males and 10.7% females. Those who strongly disagreed at UEAB were 6.7% males and 4.5% females. At Kenyatta University in the same category there were 19.9% males and 17.4% females.

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Library managers' response to the statement on the library training on the use of resources given to students

The category with the highest response was 'fairly effective', in which UEAB had 66.7% and Kenyatta University had 55.6%. At UEAB, 33.3% of the managers responded in the 'effective' category. At Kenyatta University, 44.4% of the managers responded in the 'ineffective' category. There was no response in the 'very effective' category.

4.5 ICT Usage Patterns in the Two University Libraries

Usage in this section deals with the habitual, consistent practices in using ICT related services within the libraries. Usage patterns therefore focus on what the students, library committee members and library managers practice as they carry out their ICT related library practices.

4.5.1 Use of Library Resources

The students' were asked to indicate when they last used library resources

	Last week	Last month	Last semester/quarter	Never	Total
UEAB	90.9%	1.8%	7.3%	----	100%
Kenyatta University	58.9%	14.6%	18.8%	7.7%	100%

At UEAB, 90.9% of the respondents indicated that they had used the library within the last week. There were no respondents who indicated that they had never used the library. This means that all the respondents had used the library at some time. At Kenyatta University, 58.9% of the respondents indicated that they had used the library within the last week. However, 7.7% of the respondents indicated that they never used the library resources.

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The students were asked to indicate when they last downloaded an electronic document

	Last week	Last month	Last semester/quarter	Never	TOTAL
UEAB	60.4%	15.1%	13.2%	11.3%	100%
Kenyatta University	23.9%	23.9%	27.7%	24.5%	100%

At UEAB, 60.4% of the respondents indicated that they had used library e-resources within the past week. This is the highest response score from both institutions. At Kenyatta University, the highest score is from respondents who had downloaded an e-document within the last semester/quarter, 27.7%. At UEAB, 11.3% and at Kenyatta University, 24.5% of respondents indicated that they had never downloaded an e-document.

The library committee members were asked to indicate when they last visited the library

Within last week:	65.2%
Within last month:	17.4%
Within last semester/quarter:	<u>17.4%</u>
Total:	100%

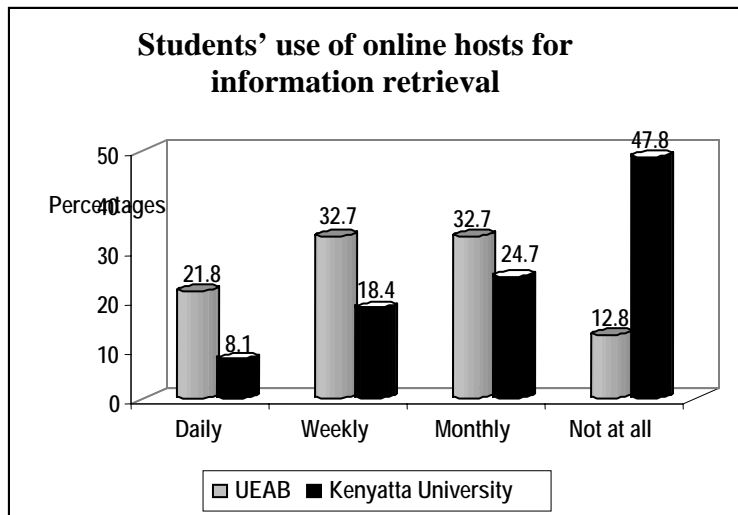
The library committee members were asked to indicate their preference of library resources

Electronic:	30.4%
Print:	47.8%
Both electronic & print:	4.4%
No preference:	<u>17.4%</u>
Total:	100%

4.5.2 Use of Computer Applications

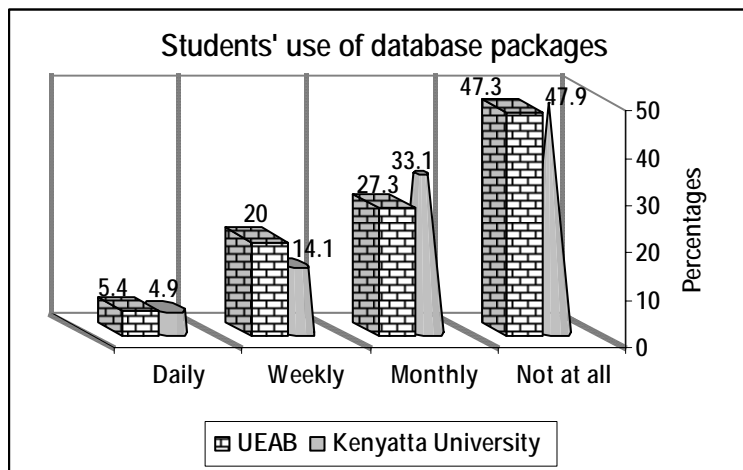
The students were asked to indicate their use of various computer applications. The graphs below give a summary of their responses for each computer application.

Students' response on how often they used online hosts for information retrieval



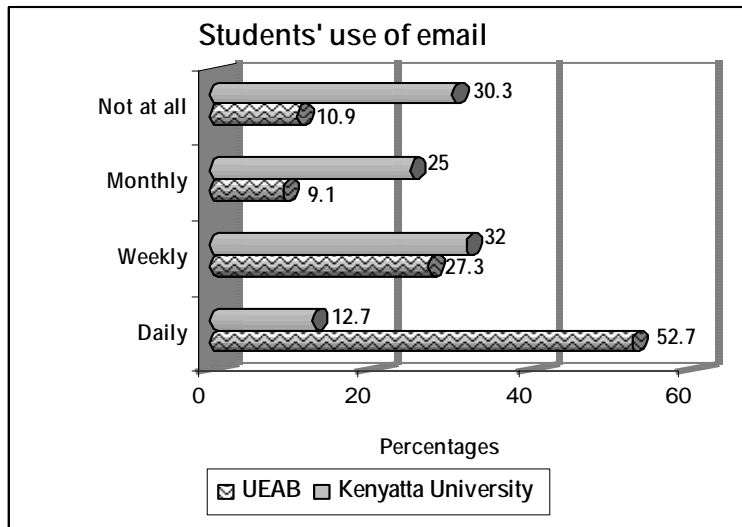
Use of online hosts for information retrieval frequencies are highest at UEAB, 32.7% followed by Kenyatta University, at 24.7% monthly. At Kenyatta University, 47.4% of the respondents do not use online hosts for information retrieval. At UEAB, 12.8% do not use online hosts for information retrieval.

Students' response on how often they used database packages



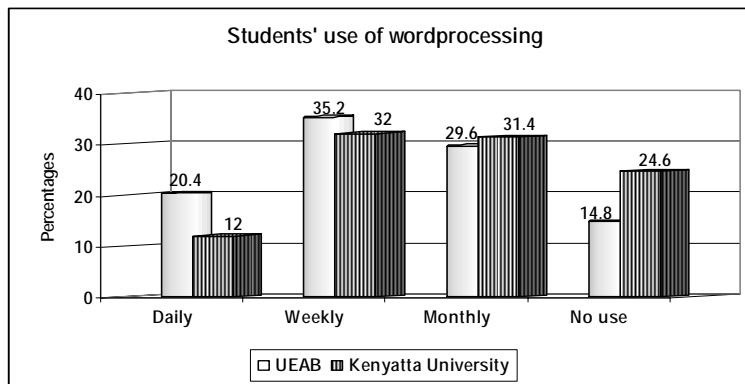
Daily use of database packages is the lowest frequency at both universities UEAB had 5.4% and Kenyatta University had 4.9%. The highest frequency is for no use, UEAB had 47.3% and Kenyatta University had 47.9%.

Students' response on use of e-mail



The daily use of e-mail at UEAB (52.7%) is the highest score. It contrasts sharply with the daily use of e-mail at Kenyatta (12.7%), and 30.3% of the students do not use e-mail at all.

Students' response on use of word-processing



The use of word processing data among students indicates that the highest frequency is UEAB, 35.2% for weekly use. Kenyatta University a frequency of 32%. Some of the respondents indicated that they did not use word processing at all - UEAB (14.8%) and Kenyatta University (24.6%).

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Library committee members' response whether there were any changes in their approaches to gathering information for use

- Strongly disagree: 9.5%;
- Disagree: 19.0%;
- Agree: 47.6%; and
- Strongly agree: 23.8%.

The highest response category was for 'Agree' in which 47.6% of the library committee members indicated that there were changes in approaches to gathering information for use. The second highest response category was 'agree' with 23.8%.

Library Managers' Computer Usage

	DAILY	WEEKLY	MONTHLY	NO USE AT ALL	TOTAL
Use of word processing					
UEAB	100%				100%
Kenyatta University	44.4%	44.4%		11.1%	100%
Use of Database packages					
UEAB	33.3%	66.7%			100%
Kenyatta University	25%	50%		25%	100%
Use of statistical packages					
UEAB	66.7%	33.3%			100%
Kenyatta University		14.3%	28.6%	57.1%	100%
Use of email					
UEAB	67%	33%			100%
Kenyatta University		11.1%	33.3%	55.6%	100%
Use of online hosts for information retrieval					
UEAB	100%				100%
Kenyatta University	30%	50%		20%	100%

From the table above, most computer applications are used daily by the library managers at both institutions. At UEAB, 100% of the respondents use word processing and online hosts for information retrieval daily. At Kenyatta University, daily use of word processing is 44.4%, and use of online hosts for information processing is 30% daily.

4.6 The Role of the Library in Determining Students Learning Outcomes

Student learning outcomes are considered within the context of computer and information skills. Gagné's instructional theory in chapter 2 (see 2.2.2) gives the conditions that influence learning outcomes or capacities. These include phases such as skills acquisition, practice, feedback and motivation. This section focuses on the views of the students, library committee members and library managers by ranking the impact of various e-resources. It is divided into use of e-resources to meet personal learning needs, e-resources user satisfaction survey, lifelong learning skills and the role of the library in teaching and learning.

4.6.1 Use of E-resources to Meet Students' Personal Learning Needs

In this section, the students give their perceptions on various statements regarding the use of e-resources to meet personal learning needs. The focus is to find out whether or not the use of library e-resources accomplishes this task. The data is presented in the tables below.

Students' response to whether library e-resources supported their academic learning

	Always	Sometimes	Never	Total
UEAB	55.6%	31.4%	13%	100%
Kenyatta University	42.5%	47%	10.5%	100%

At UEAB, 55.6% of the students indicated that library e-resources 'Always' supported their academic learning. At Kenyatta University, 47% of the respondents indicated that the e-resources 'Sometimes' supported their academic learning.

Students' response to use of library e-resources and improved standards of their work

	Always	Sometimes	Never	Total
UEAB	57.7%	40.4%	1.9%	100%
Kenyatta University	35.7%	50%	14.3%	100%

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At UEAB, 57.7% of the students indicated that the use of the library e-resources ‘Always’ improved standards of their work. At Kenyatta University, 50% of the students indicated that the use of library e-resources ‘Sometimes’ improved standards of their work.

Students’ response to whether library e-resources supported their learning in other ways such as exploring personal interests

	Always	Sometimes	Never	Total
UEAB	44.2%	42.3%	13.5%	100%
Kenyatta University	24.7%	59.6%	15.7%	100%

The majority of Kenyatta University students (59.6%) indicated that library e-resources ‘Sometimes’ supported their learning in other ways such as exploring personal interests. At UEAB, the majority of the students (44.2%) indicated that library e-resources ‘Always’ supported their learning in other ways such as exploring personal interests

Students’ response to whether library e-resources met their needs in terms of informal learning

	Always	Sometimes	Never	Total
UEAB	39.1%	50%	10.9%	100%
Kenyatta University	13.3%	65.4%	21.3%	100%

The majority of the Kenyatta University students (65.4%) indicated that their library e-resources ‘Sometimes’ met their needs in terms of informal learning. UEAB had 50% in the same response category. At UEAB, 39.1% of the students also indicated that their library ‘Always’ met their needs in terms of informal learning.

The library committee members were asked to indicate if they were aware of the potential of library resources to the students.

In the responses, 78.3% of the library committee members agreed that they were aware of the potential of library resources to the students, while 21.7% said they were not aware of the potential of library resources to the students.

The library committee members were asked to indicate if they considered their library resources to be relevant to the needs of their students?

From the three response categories namely, ‘Always’, ‘Sometimes’ and ‘Never’ there was no response in the ‘Never’ category. In the ‘Always’ category, 56.5% indicated that they considered their library resources to be relevant for the needs of their students. In the ‘Sometimes’ category, 43.5% indicated that their library resources were relevant for the needs of their students.

The library committee members were asked to indicate how effectively the academic staff work with library staff to identify suitable subject-specific resources.

There were three response categories ‘Very effectively’, ‘Effectively’ and ‘Not effectively’. The highest response category was ‘Effectively’ with 69.6%, followed by ‘Not effectively’ with 17.4%, and ‘Very effectively’ with 13.0%.

Provision of e-resources and changes in the ways students approach research

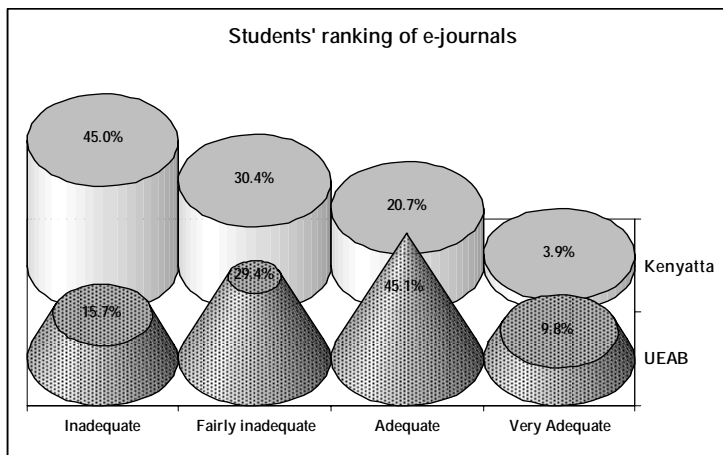
		Strongly disagree	Disagree	Agree	Strongly Agree	Total
UEAB	Male	9.6%	19.4%	51.6%	19.4%	100%
	Female	--	9.1%	50%	40.9%	100%
Kenyatta University	Male	19.9%	23%	44.1%	13%	100%
	Female	17.4%	28.9%	43%	10.7%	100%

According to the table, the category with ‘Agree’ had the highest frequency where UEAB had 51.6% males and 50% females. At Kenyatta University, 44.1% males and 43% females indicated that they ‘Agree’. At UEAB, 40.9% of the males ‘Strongly agree’ compared with 19.4% males. At Kenyatta University, 13% of the males and 10.7% of the females ‘strongly agree’. At UEAB, there is no female respondent who strongly disagrees while 9.6% of the males ‘Disagree’. At Kenyatta University, 19.9% males and 17.4% females ‘Strongly disagree’ that the provision of e-resources has led to changes in the ways they approach research.

4.6.2 User Satisfaction Survey

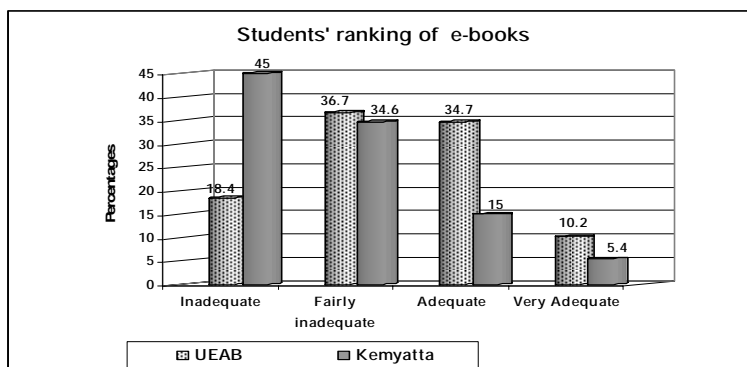
This section focuses on students, library managers and library committee members. Adequacy or sufficiency of the e-resources contributes to the understanding of how they play a part in both formal and non-formal learning needs. The library managers' and library committee members' views on importance of various e-resources are helpful. Below are graphs indicating the adequacy rankings of various library e-resources by the students.

Students' ranking of e-journals



The majority of the UEAB respondents (45.1%) indicated that the e-journals in their library were 'Adequate'. At Kenyatta University 45% of the respondents indicated that the e-journals were 'Inadequate'. At UEAB, 9.8% and at Kenyatta University, 3.9% of the respondents indicated that the e-journals in their libraries were 'Very adequate'.

Students' ranking of e-books

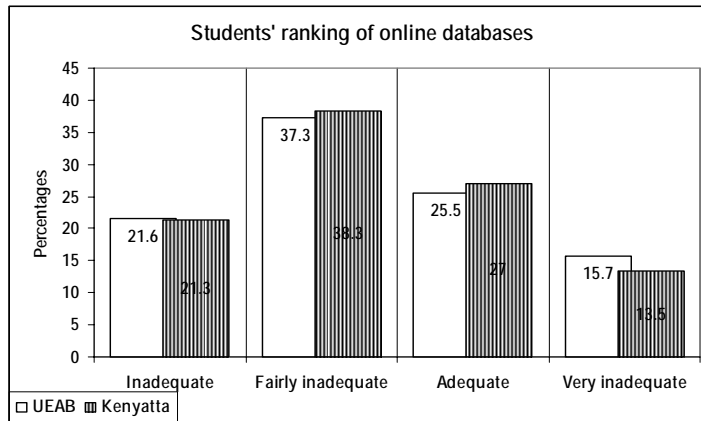


The majority of the respondents at Kenyatta University 45% indicated that the e-books are very 'Inadequate'. At UEAB the majority of the respondents 36.7% indicated that the e-books are 'Fairly adequate'. Respondents who indicated that the

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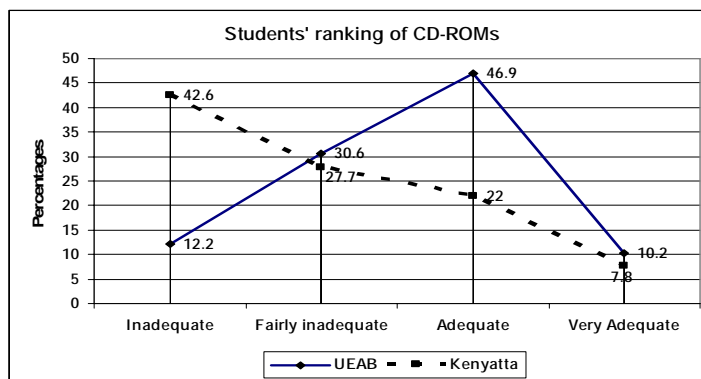
e-books were ‘Very adequate’ at UEAB were 10.2%, while at Kenyatta University they were 5.4%.

Students’ ranking of online databases



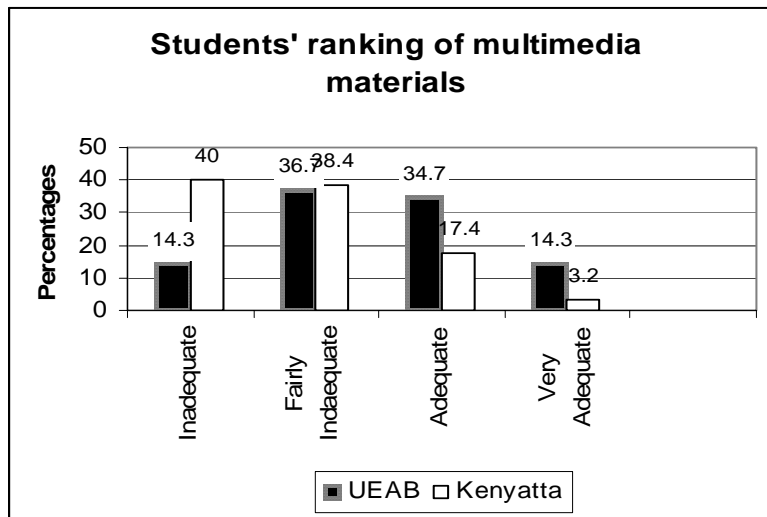
The category with the highest frequency is ‘Fairly adequate’. Kenyatta University had 38.3% and UEAB had 37.3%. The category of ‘Adequate’ is the second highest, Kenyatta University (27%) and UEAB (25.5%). At UEAB, 15.6% and at Kenyatta University, 13.4% indicated that the online databases were ‘Very adequate’.

Students’ ranking of CD-ROMs



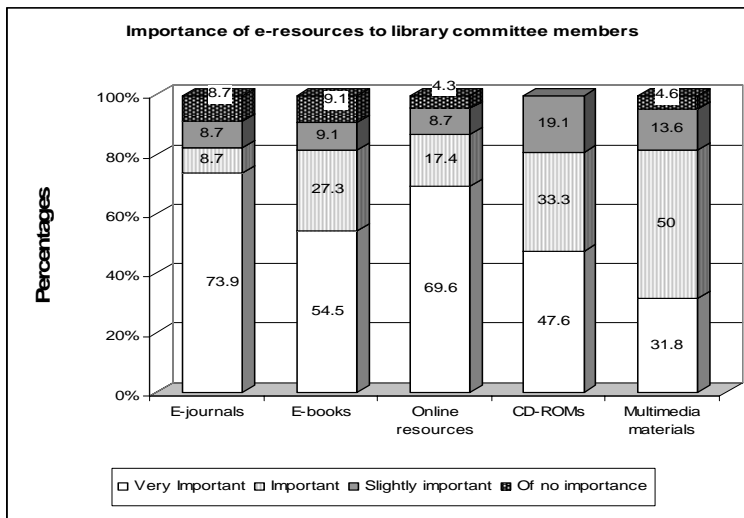
Students’ rankings of CD-ROMs indicated that the highest category was ‘Adequate’ where UEAB had 46.9%. The majority of the Kenyatta University respondents 42.6% indicated that the CD-ROMs in their library were ‘Inadequate’. The lowest frequency responses were in the ‘very adequate’ category where UEAB had 10.3% and Kenyatta University had 7.7%.

Students' ranking of multimedia materials



The category with the highest ranking is 'Fairly adequate' in which UEAB had 36.7% and Kenyatta University had 38.4%. In the category with 'Inadequate' Kenyatta University had 40.9% and UEAB had 14.3%. Kenyatta University only 3.3% of the respondents indicated that Multimedia materials are 'Very adequate'.

Library committee members were asked to indicate the importance of various e-resources.



From the graph above the highest response category for most variables is 'Very important'. Generally the library committee members indicated that e-journals (73.9%), e-books (54.5%), online resources (69.6%) and CD-ROMs (47.6%) are 'Very important'.

Library managers were asked to indicate the importance of various e-resources

		Very important	Important	Slightly important	Of importance	no	Total
E-journals	UEAB	100%					100%
	Kenyatta University	100%					100%
E-books	UEAB	100%					100%
	Kenyatta University	42.9%	42.9%	14.2%			100%
Online databases	UEAB	100%					100%
	Kenyatta University	88.9%	11.1%				100%
CD-ROMs	UEAB	100%					100%
	Kenyatta University	66.7%	33.3%				100%
Course Materials	UEAB	66.7%	33.3%				100%
	Kenyatta University	37.5%	50.0%		12.5%		100%
Student projects	UEAB	66.7%	33.3%				100%
	Kenyatta University	55.6%	44.4%				100%
Multimedia materials	UEAB	----	----	----	----		---
	Kenyatta University	33.3%	44.4%	22.2%			100%

Data from the table above indicates that the highest response category was ‘Very important’ for both UEAB and Kenyatta University. Generally, the library managers consider most of the e-resources to be ‘Very important’.

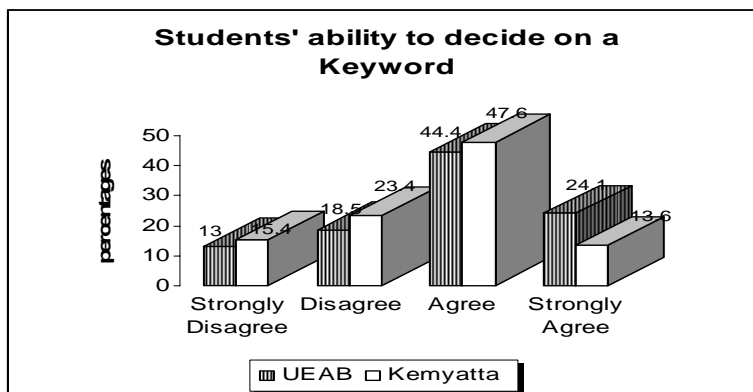
4.6.3 Students’ Basic Information Literacy Skills

This section presents three focal points. The first is about students and their perceived library skills. The second concerns library managers and the effectiveness of the library regarding information literacy. The third concern is about library managers and library committee members on the role of the library in teaching and learning.

Students’ Library Skills

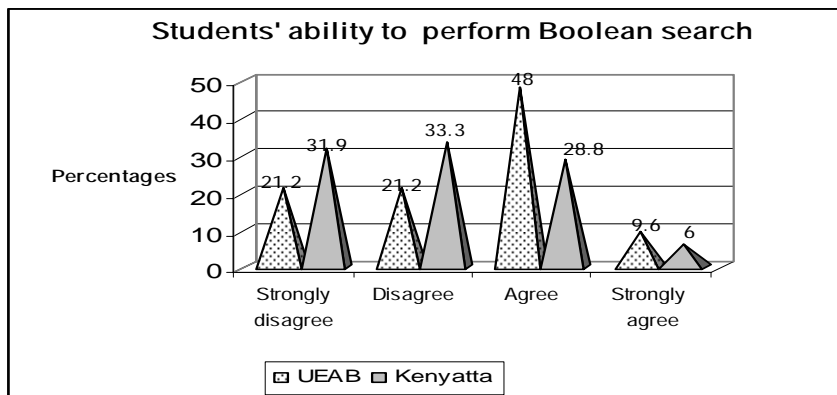
The students were asked to rank their ability to perform various basic library searches. In their responses they used four categories namely; ‘Strongly agree’, ‘Agree’, ‘Disagree’ and ‘Strongly disagree’. The charts that follow below show their responses.

Students ranking of their ability to decide on a keyword



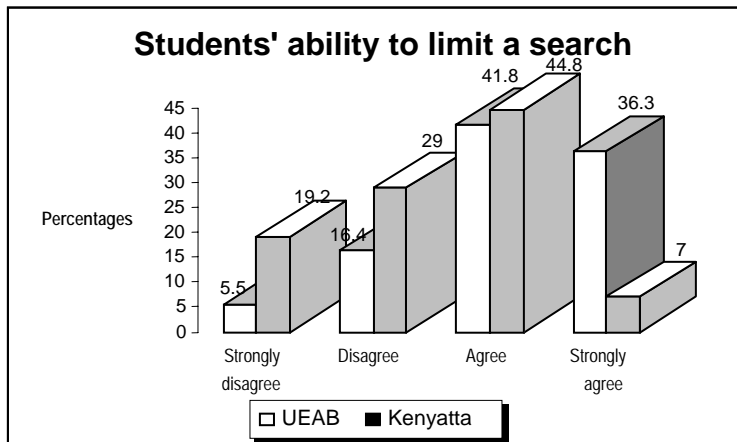
In both cases, the highest category was ‘Agree’ where UEAB had 44.4% and Kenyatta University had 47.6% respondents indicate that they had the ability to decide on a keyword. In the responses category ‘Strongly Disagree’ UEAB had 13%, and Kenyatta University had 15.4%.

Students ranking of their ability to perform a Boolean search



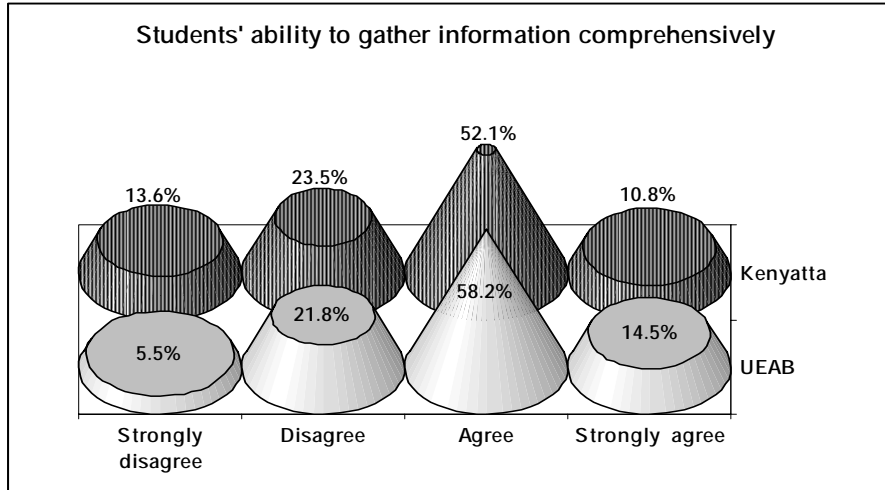
UEAB has the highest percentage of students who ‘Agree’ (48.0%) that they can perform a Boolean search. At Kenyatta University, 31.9 % ‘Strongly disagree’ that they have the ability to perform a Boolean search, while 33.3% ‘Disagree’.

Students ranking of their ability to limit a search



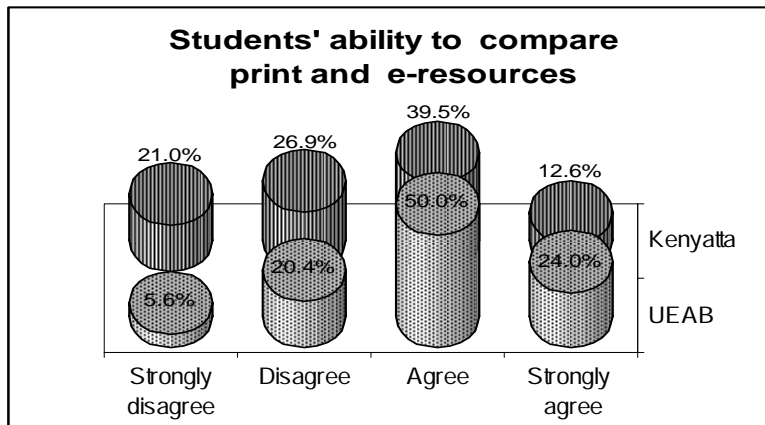
The category with the highest frequency is ‘Agree’. Kenyatta University had 44.8% and UEAB had 41.8%. At UEAB, 36.3% ,‘Strongly agree’ while Kenyatta University had 7%. At Kenyatta University, 19.2% and at UEAB 5.5% indicated that they ‘Strongly disagreed’ that they had ability to limit a search.

Students ranking of their ability to gather information comprehensively



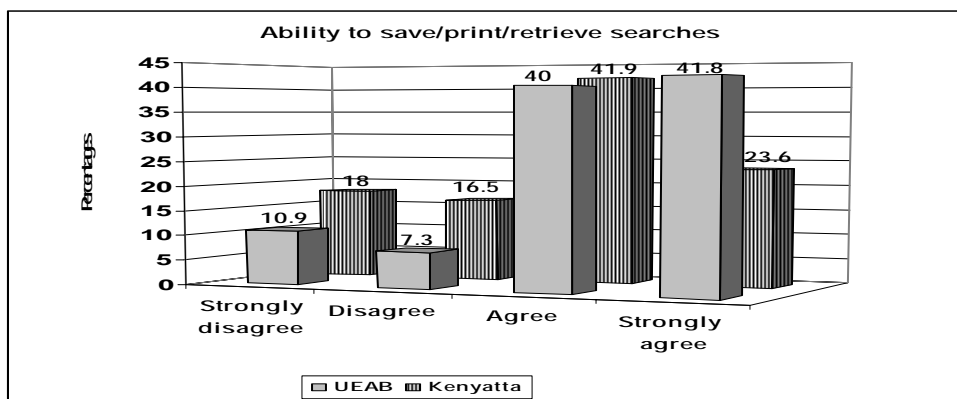
The respondents were asked to indicate their ability to gather information comprehensively by agreeing or disagreeing with the statement. The category with the highest frequency is ‘Agree’. UEAB had 58.3% and Kenyatta University had 52.1%. At UEAB, 14.5% and at Kenyatta University 10.8% ‘Strongly agree’ that they have ability to gather information comprehensively. In the ‘Strongly disagree’ category, Kenyatta University had 13.6% s UEAB had 5.5%.

Students ranking of their ability to compare print and e-resources



The category with the highest percentage of respondents is ‘Agree’ in which UEAB had 50% and Kenyatta University had 39.5%. At Kenyatta University, 21% of the respondents ‘Strongly disagree’ that they had ability to compare print and electronic resources and UEAB had 5.6%. At Kenyatta University 26.9% and at UEAB, 20.4% ‘Disagree’ that they have the ability to compare print and electronic resources. At UEAB, 24.0% ‘Strongly agree’ that they have ability to compare print and electronic resources, and Kenyatta University had 12.6%.

Students ranking of their ability to save/print/retrieve searches



The response category ‘Agree’ had respondents from both UEAB (40%) and Kenyatta University (41.9%) to indicate that they had ability to save/print/retrieve searches. In the response category ‘Strongly agree’, UEAB had 41.8% while Kenyatta University had 23.6% ‘Strongly agree’ that they had ability to save/print/retrieve searches. At Kenyatta University, 18% and at UEAB, 10.9% of the respondents ‘strongly disagreed’ that they had ability to save/print/retrieve searches.

4.6.4 Library Managers' Observations of Students' Information Literacy Skills

In this section, the library managers were asked to rank statements regarding the effectiveness of the library with regards to aspects of information literacy. The ranking was given in four response categories, that is, 'Very effective,' 'Effective', 'Fairly effective' and, 'Ineffective'.

Library managers' response to the statement about the effectiveness of the library in responding to individual students learning needs.

The category of response with the highest frequency was 'Fairly effective' in which UEAB had 66.7% and Kenyatta University had 55.6%. In the response category 'Effective', UEAB had 33.3% and Kenyatta University had 44.4%. There were no responses for the other two categories, namely 'Very effective' and 'Ineffective'.

Library managers' response to the statement about the effectiveness of students to express their information need and match this to available e-resources.

The category with the highest response was 'Fairly effective'. UEAB had 100% and Kenyatta University had 56.6%. The second highest category was 'Effective' in which Kenyatta University had 33.1%. Also at Kenyatta University, 11.1% of the managers were in the 'Disagree' category.

Library managers' response to the statement about the effectiveness of students to extract information from the library to match their information need.

The data indicates that the category with the highest response was 'Fairly effective' in which UEAB had 100% and Kenyatta University had 66.7%. Kenyatta University had 23.1% of the respondents in the category 'Effective'. Also, Kenyatta University had 8.3% respondents in the 'Ineffective' category.

Library managers' responses to the statement that students display an understanding of the unique characteristics of e-resources.

The response category 'Fairly effective' had the highest frequency. UEAB had 66.7% while Kenyatta University had 22.2%. In the response category 'Ineffective', UEAB had 33.7% and Kenyatta University had 66.7%. At Kenyatta University, 11.1% of the

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responses were in the category 'Effective'. There was no response in the category 'Very effective'.

The library managers' response to the statement on the effectiveness of students to choose appropriate searching techniques when using the e-resources.

The data indicates that the highest category of responses was 'Fairly effective' UEAB had 33.3% and Kenyatta University had 55.6%. The second highest category was 'Effective' in which UEAB had 66.7% and Kenyatta University had 11.1%. At Kenyatta University 33.3 % of the managers indicated that students were not effective in choosing appropriate searching techniques when using the e-resources.

Library managers' response to the statement on students' understanding of issues such as currency, accuracy, relevance and comprehensiveness of the library resources.

The category with the highest response was 'Effective', in which UEAB had 66.7% and Kenyatta University had 33.3%. In the response category 'Ineffective', Kenyatta University had 55.6%. In the response category 'Fairly effective', UEAB had 33.3% and Kenyatta University had 11.1%. There was no response in the category 'Very effective'.

4.6.5 The Role of the Library in Teaching and Learning

This section focuses on the library managers and library committee members. The two groups were each asked to rank various statements regarding the impact of the library on the quality of learning and teaching. Four categories of response namely; 'Strongly agree', 'Agree', 'Disagree' and 'Strongly disagree' were used.

The library managers' response to the statement on whether the library supports teaching by encouraging new teaching methods.

Kenyatta University had the highest frequency where 87.5% of the managers agree with the statement. At UEAB, 66.6% of the managers also 'Agree' while 33.4% 'Strongly agree' with the statement. At Kenyatta University, 12.5% of the managers 'Disagree'

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that the library supports teaching by encouraging new teaching methods. There were no responses in the category ‘Strongly disagree’.

The library managers were asked to indicate whether the librarians are involved in the development of courses.

The majority of the responses were in the ‘Agree’ category in which Kenyatta University had 44.4% and UEAB had 33.4%. In the ‘Disagree’ response category, UEAB had 33.3% while Kenyatta University had 33.4%. In the ‘Strongly agree’ category, UEAB had 33.3% while Kenyatta University had 11.1%.

The library managers’ responses indicating whether library staff are informed about changes to courses.

The majority of the responses were in the ‘Strongly agree’ category where UEAB had 100% and Kenyatta University had 88.9%. At Kenyatta University, 11.1% of the managers ‘Agree’ that the library staff are informed about changes to courses. There were no responses in the ‘Strongly disagree’ and ‘Disagree’ categories.

The library managers’ responses to affirm the participation of academic staff members in the selection of library resources.

Library managers from both UEAB 100% and Kenyatta University 100% ‘Strongly agree’ that the academic staff participate in selection of library resources.

The library managers’ response on whether or not the librarians provide induction and training for academic staff on use of resources focused on supporting teaching.

The majority of the library managers ‘Strongly agree’ that the librarians provide induction and training for academic staff on use of resources focused on supporting teaching. UEAB had a 100% response and Kenyatta University had 88.9%. At Kenyatta University, 11.1% of the library managers indicated that they did ‘Agree’ with the statement.

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The library committee members were asked to indicate if the library provides training in the use of library resources.

According to the responses 42.9% ‘Strongly agree,’ 33.3% ‘Agree’, 19.0% ‘Disagree’ and, 4.8% ‘Strongly disagree’.

The library committee members were asked to indicate if the library supports teaching by providing resources.

From the responses, 60.9% ‘Strongly agree’, 30.5% ‘Agree’, 4.3% ‘Disagree’ and 4.3% ‘Strongly disagree’.

The library committee members were asked to indicate if the library supports teaching by participating in the development of new resources.

According to the responses, 26.1% ‘Strongly agree’, 21.8% ‘Agree’, 39.1% ‘Disagree’ and, 13.0% ‘Strongly disagree’.

The library committee members were asked to indicate if the teaching staff participates in the selection of library resources.

From the responses, 54.6% ‘Strongly agree’, 36.4% ‘Agree’, 4.5% ‘Disagree’ and 4.5% ‘Strongly disagree’.

The library committee members were asked to indicate if there is effective communication between library staff and academic departments regarding changes to courses.

According to the responses, 21.7% ‘Strongly agree’, 52.2% ‘Agree’, 17.4% ‘Disagree’ and, 8.7% ‘Strongly disagree’.

The library committee members were asked to indicate if the library staff should play a role in the students’ assessment process.

According to the responses, 26.1% ‘Strongly agree’, 26.1% ‘Agree’, 30.4% ‘Disagree’ and 17.4% ‘strongly disagree’.

4.7 Conclusion

This chapter provides an uninterpreted presentation, tabulation and analysis of the data. The students' data reveal distinctive trends in various categories of analysis such as ICT usage patterns, access to ICT services in the libraries, and use of computer applications. Issues that emerge from the data include differences in levels of ICT skills among the students, differences in levels of adequacy in e-resources, and even different views on the role of the library in teaching and learning. Chapter five will present an interpretation of such and other similarities and differences with respect to the key sub questions posed in this study.

Chapter 5

Data Interpretation

“In a time of drastic change it is the learners who inherit the future. The learned usually find themselves equipped to live in a world that no longer exists”.

-Eric Hoffer

5.1 Introduction

The previous chapter presented and analyzed data on the role of the libraries in formal and non-formal learning. This chapter focuses on interpreting the data. The data interpretation will highlight some of the important issues raised in earlier chapters. It will focus on the secondary objectives of the study as identified in section 1.3.1. This chapter analyses the following:

- Student demographic data;
- The ICT infrastructure at the two universities;
- Access to and use of ICTs at the two university libraries;
- The ICT usage patterns among the students at the two university libraries;
- and
- The students’ learning outcomes at the two universities.

5.2 Student Demographics

The student demographics indicate a difference in the size of the student population. The two universities can be described as having small (UEAB) and large (Kenyatta University) student populations. The age demographics indicate that the range is between 19 to over 28. The highest concentration of students lies within the 19-22 year category. However, there are also a few mature students (28 and over) at both universities. The gender representation indicates that the percentage of males slightly exceeds that of females at both universities. The degree courses are all evenly represented with students from each faculty/school. Notably, Kenyatta University is mainly an education-degree based University and there were many (111) respondents in the Bachelor of Education degree category. This is the largest category for degree courses.

5.3 ICT Infrastructure at UEAB and Kenyatta University

The ICT infrastructure was examined in the context of:

- Type of network,
- ICT availability;
- Access and quality in terms of technology; and
- The current problems at each institution.

5.3.1 Type of Network

Data on the type of network indicated that there are differences between the two institutions. While both institutions benefit from the KENET initiative discussed in chapter two (see 2.8.1), UEAB has already established a LAN for the library. It has also purchased extra bandwidth for downlinks since the connectivity speed is slow. On the other hand Kenyatta University library does not have a LAN. Observations made by the researcher showed that the cables were laid several years ago but the work was left incomplete. The main reason cited for the incomplete work was that the University administration was not committed to this project and did not have funds for completion. The type of network is important because it determines the general physical infrastructure. A LAN is vital in the library because it will enable communication between all terminals that it facilitates access to.

5.3.2 ICTs Available

The ICTs available at the two institutions include online databases, e-journals, e-books, CD-ROMs, audio visual materials, the Internet and the World Wide Web (see 4.5.1). Most of the databases available in these libraries are donations, or funded by some donors. At Kenyatta University there are two such databases: the Program for Enhancing Research Information (PERI) project and the Database for African Theses and Dissertations (DATAD) project (see 4.3.2). UEAB has several databases and other e-resources that are currently being used by the students. However, if it were possible for UEAB also to get access to PERI and DATAD projects this would add value to their e-resource collection.

5.3.3 Access and Quality in Terms of Technology

Data indicated that both libraries provided access to ICTs. However, there were differences in the quality of technology. The first difference is the capacity. While at

UEAB there are over 50 computers for a population of about 1200 full-time undergraduate students, at Kenyatta University the library has only five computers for over 6000 undergraduate students. The ratio of student to computer at Kenyatta University was therefore high. As a result, many of the students were unable to access ICTs in the library. UEAB has also increased the quality of access by purchasing extra bandwidth for downlink, making access faster for the students. At Kenyatta University, connectivity was slow and most students were discouraged from using these facilities. There is a need for the government to provide broadband access to improve speed and to lower costs.

5.3.4 Problems with ICT Infrastructure at Both University Libraries

Kenyatta University experienced the following problems:

- Lack of space for an online access centre within the library.
- Lack of computers. There were five computers for students, which were also shared between internet access and CD-ROM access.
- Restricted access to the internet. Currently, access to internet services is restricted to 30 minute sessions to accommodate more users.
- Internet connection speed. The internet connectivity speed is slow even with just five computers. There is a need for broadband technology to improve speed. The students have raised concerns over their frustration while trying to download documents due to slow connection speed.
- ICT infrastructure. At Kenyatta University the ICT infrastructure is underdeveloped. Issues pertaining to the physical access provided by the ICT infrastructure are fundamental in establishing networks. According to UNESCO (2000) there is a need for ICT infrastructure to be suited to the users (see 2.4). Users must have access to computers for a certain number of hours per week. When this is done they develop the skills and knowledge needed for integrating ICT into the learning process.

The problems at UEAB included:

- Power outages. There was a high frequency of power outages on campus. This particular problem does not emanate from the university but it has serious repercussions for the LAN often causing it to malfunction. There have been cases where power outages have also destroyed computers on campus.

- Equipment downtime. As a result of the frequent power outages, there were frequent episodes of equipment downtime resulting into major technical failures that require skilled personnel to travel from Nairobi at the expense of the University.
- Location. Due to the rural nature of this University there is a need for the Ministry of Education to facilitate adequate and uninterrupted power supply to such institutions.

The KENET initiative (see 2.8.1) provides a platform for improving ICT infrastructure as well as connectivity. It offers a 50% reduction in tariffs which amounted to 64K @ US\$485 per month in 2006. This is not enough to support each university's internet access needs. If the universities are to enjoy the use of the internet they must purchase extra bandwidth at their own cost. Between the two universities only UEAB had managed to budget for and supplement the extra cost of running the VSAT facility.

The institutions need to have e-readiness campaigns in place. E-readiness depends on the availability of technology as well as other factors such as connectivity, technology infrastructure, and supporting e-services. This is an area that the universities need to emphasize in order to embrace this new technology and to optimise it fully.

5.4 Access and Use of ICTs at UEAB and Kenyatta University Libraries

This section discusses data on the following:

- Library services promotion;
- User support services; and
- Students' basic access skill.

5.4.1 Library Service Promotion

Various methods have been applied by the library managers to promote the use of library resources. These methods have not yielded good results. The table (see 4.4.1) shows that the majority of students knew about library resources through fellow students. The use of leaflets and posters yielded 23.9% at UEAB and 6.5% at Kenyatta University. While it is expected that the library services promotion should

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be done by librarians, this survey showed that their role did not feature significantly. The percentage of students who were told about library resources by librarians was 19.6% at UEAB and 11.1% at Kenyatta University. It is clear that library services promotion and especially those related to resources has not been effective. At Kenyatta University, there were students who did not know about the library. Indeed, there is a need to carefully re-evaluate the induction sessions offered to new students to ensure that the target group is made aware of the functions of the university library.

Library managers need to re-evaluate their library services promotion strategies. The use of posters within the library is fairly effective at UEAB. Information from the site visits reveals that at UEAB the notice boards are strategically located at the entrance hall leading to the main circulation area where lists of all new e-resources are displayed.

Lecturers also contribute significantly to promoting the use of library resources. The role of lecturers as agents promoting the use of library resources can be improved through collaboration with the library managers. Such collaboration places the academic libraries in a more advantageous position.

5.4.2 User Support Services

Data indicated that the library managers encountered problems while assisting students to use e-resources included:

Lack of library skills: At UEAB, the students agreed that the managers had skills to effectively deal with their inquiries. At Kenyatta University, the students disagreed that the library managers had skills to deal effectively with such inquiries. According to their judgement, they felt that the library managers were not adequately skilled to handle inquiries about e-resources effectively. Some of the comments made by both library managers and students indicate that lack of skills was a major hindrance in handling inquiries about e-resources.

Lack of technical skills: Students at Kenyatta University indicated that the library managers did not effectively deal with technical problems. This shows dissatisfaction from the Kenyatta University students and therefore creates an urgent need for

training of these library managers There should be at least one or two technical personnel employed to deal specifically with the more complicated technical problems.

Lack of a well-defined role of the academic librarian: There were three issues that emanated from the responses. The first issue was that the librarians had not been able to guide the students to information sources. Second, the students relied amongst themselves to find information. Third, was that the lecturers and not librarians played an important role in guiding the students to the most appropriate resources needed to complete a task. The libraries had not effectively supported the students learning at both institutions. There was a need for the library managers to re-define their role according to the functions of the academic library (see 2.6.1) in order to function effectively as agents of information disseminate.

Lack of time to handle users' inquiries. The library managers indicated that they were overwhelmed by the number of inquiries related to the use of e-resources. They recommended that library staff be increased to help cope with such inquiries. It could help if the current library managers received training on information literacy. Libraries must design information literacy training programs for their staff and users. In the case of users, the ACRL (2000) information literacy training programs provide some guidelines (see 2.3.1).

The information literacy program should be made compulsory for all library users. In order to create the required impact, the students should be tested on such skills. Schement (2002:1055) identified personal barriers to information use (see 2.2). Some of these barriers have been confirmed in this study. These include:

- Learners being unaware of information resources that are available;
- Learners lacking confidence or ability to use computers in the case of online information searching; and
- Learners getting frustrated and discouraged from using e-resources if the network is slow.

There was a consensus among students from both institutions on the need to introduce ICT skills training in order to utilize the e-resources more effectively and efficiently.

5.4.3 Students' Basic Access Skills

The data indicated that students' basic access skills varied with age and gender as follows:

- At UEAB, 50% of the students aged 22-27 had expert computer skills.
- At Kenyatta, novice and intermediate skills dominated all age categories.
- There were both male and female students at Kenyatta University with no computer experience.
- At UEAB, all the students have some form of basic computer experience.

All students at UEAB had basic computer experience because their curriculum has a compulsory computer skills course. On the other hand, at Kenyatta University there were students without basic computer experience. The gender analysis data indicated that 4.9% males and 13% females had no computer experience.

The findings on students' perceptions regarding usefulness in e-resource training in the library indicated that:

- At UEAB, the training had been useful to the majority of the students individually and had led the students to use new e-resources.
- At Kenyatta University, the training had not been useful to the majority of the students individually and had not led them to use new e-resources.
- At both Universities, the students indicated that they would have liked to explore and use new e-resources if they were given training on how to use such them.

The data relates favourably to Robert Gagné's instructional theory (see 2.2.2). The theory focuses on conditions of learning. In order for the Universities to develop lifelong learners' skills that stimulate cognitive thinking, they must be incorporated into the daily learning activities. The students must therefore be equipped with basic computer skills first and then proceed to acquire information literacy skills.

5.5 The ICT Usage Patterns at UEAB and Kenyatta University Libraries

The findings on ICT usage patterns are discussed under the following:

- Use of library resources; and
- Use of computer applications

5.5.1. Use of Library Resources

Findings on the use of library resources indicated the following:

- At UEAB, 90.9% of the students had used the library resources at the time of the survey.
- At Kenyatta University, 58.9% had used the library resources at the time of the survey.
- At UEAB, all the students had used library resources.
- At Kenyatta University, 7.7% of the students had never used any library resources.
- At UEAB, 60.4% of the students had downloaded an e-document during the week the survey was conducted.
- At Kenyatta University, 23.9% of the students had downloaded an e-document during the same period.
- On the use of selected library resources, data indicated that the students at both universities used more print than e-resources.
- The use of e-resources such as bibliographic databases and e-journals was low for both universities.
- The library committee members, mostly from UEAB, indicated that they had used the library within the week of the survey.
- The majority of the library committee members (47.8%) indicated that they preferred to use print resources.

The usage patterns indicated that the print resources are used more frequently than the e-resources. It may be that they do not have the relevant access skills, or the infrastructure, or even awareness of the current e-resources in their libraries. There is a need for both the library managers and faculty members to work together to ensure that all the students use library resources during their undergraduate studies.

5.5.2 Use of Computer Applications

The data on the frequency of use for most computer applications by the students indicated at Kenyatta University that the majority of the students did not use most computer applications.

- Use of Online hosts for information retrieval showed that at Kenyatta University 48.8% of the students did not use online hosts for information retrieval. At UEAB, the majority of the respondents (32.7%) used online hosts for information retrieval weekly and monthly.
- Use of database packages indicated that at both universities the majority of students did not use the database applications packages.
- Use of word-processing also indicated that students at both universities had no use at all. There may be a need for an investigation into why students did not use the word-processing application package.
- The use of e-mail indicated that most of the students at UEAB (52.7%) used e-mail daily, and that at Kenyatta University 30.3% did not use e-mail at all.
- The library managers at both institutions indicated that they used most computer applications weekly. However, at Kenyatta University some managers did not use any computer applications at all. The reason for this may be because of a lack of computers.

All the computer application packages were used daily but with varying levels. However, at Kenyatta University some library managers did not use any computer applications at all. The reason for this may be because of the lack of computers.

5.6 The Students' Learning Outcomes

The students' learning outcomes are discussed as follows:

- Use of e-resources to meet personal learning needs;
- User satisfaction survey on e-resources;
- Students' basic information literacy; and
- The role of the library in teaching and learning.

5.6.1 Use of E-Resources to Meet Personal Learning Needs

The data indicated that the provision of e-resources:

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- Always met personal learning needs, improved standards of academic work, and supported the learning of the majority of the students at UEAB;
- Sometimes met personal learning needs, improved the standards of their academic work, and supported the learning of the majority of the students at Kenyatta University;
- Sometimes met the formal and informal learning needs for both UEAB, and Kenyatta University students; and
- Had changed the way the students approached research at both UEAB and Kenyatta University.

The data indicated that there is a need for the library managers at Kenyatta University to ensure that the library e-resources suit the students' needs. It is likely that due to lack of budget allocations, the library did not purchase e-resources. It is also likely that most new e-resources that the library received were donations. Donations, though new may not necessarily meet the learning needs of the students at Kenyatta University. This could be the reason why the majority of the students at Kenyatta University indicated that the e-resources 'Sometimes' supported their learning needs, while at the UEAB students indicated that the e-resources 'Always' met their learning needs. By indicating that the e-resources 'Sometimes' met their learning needs, the students at Kenyatta University could have implied that there is no guarantee that the e-resources support their learning. The difference in the students' responses could be explained by the fact that UEAB library had a budget and Kenyatta University library had no budget allocation. At UEAB, the faculty members participated in the selection of library resources for their students. It is therefore unlikely that the books they selected were not relevant to the needs of the students. This could therefore explain why UEAB students' indicated that the library resources 'Always' met their learning needs. This may also show that for the libraries to meet the needs of the students there is a need for faculty-librarian collaboration.

5.6.2 User Satisfaction Survey on E-Resources

Data from the majority of students concerning the adequacy of various e-resources indicated that:

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- E-journals were adequate at UEAB (45.1%) and inadequate at Kenyatta University (45%);
- E-books were fairly adequate at UEAB (36.7%) and inadequate at Kenyatta University (45%);
- CD-ROMs were adequate at UEAB(46.9%) and inadequate at Kenyatta University (42.6%); and
- Online databases were fairly adequate at both UEAB and Kenyatta University.

The rankings for user satisfaction survey on e-resources were generally low. There are three possible reasons that could explain the low rankings. First, e-resources were not popular with the students from both universities. Second, the students lack the relevant skills to access these e-resources. Third, the students were not aware of the full potential of e-resources.

Data indicated that at Kenyatta University students perceived most of the e-resources in their library as being 'Inadequate'. This may be attributed to the following factors. First, there was inadequate ICT infrastructure at Kenyatta University. Although both Universities did not have broadband technology, UEAB had paid for extra bandwidth to enhance the downloading of electronic information and purchased more computers. Second, a lack of subscription to e-resources. For instance, Kenyatta University library did not have a library budget and therefore lacked the finances to purchase e-resources. The library committee members indicated that e-resources were very important. However, there is a need for the library managers at Kenyatta University to work out a way in which they can present their library budget directly to the university administration so as to provide such resources adequately.

5.6.3 Students' Basic Information Literacy Skills

Data from the students' self-assessment on various aspects of information literacy skills indicated two noteworthy trends. First, most students strongly agreed with the statements. Second, some students strongly disagreed with the statements. The findings on various aspects were as follows:

Ability to decide on a keyword: Most students at UEAB (44.4%) and at Kenyatta University (47.6%) strongly agreed that they had the ability to decide on a keyword.

Ability to perform a Boolean search: Most students at UEAB (48.1%) strongly agreed that they had the ability to perform a Boolean search. At Kenyatta University, 33.3% disagreed that they had the ability to perform a Boolean search.

Ability to limit a search: Most students at both UEAB (41.8%) and Kenyatta University (44.8%) agreed that they had ability to limit a search.

Ability to gather information comprehensively: Most students at both universities UEAB (58.2%) and Kenyatta University (52.1%) agreed that they had the ability to gather information comprehensively. Some students from both universities also strongly disagreed that they had the ability to gather information comprehensively.

Ability to compare print and e-resources: Most of the students from both universities UEAB (50%) and Kenyatta University (39.5%) agreed that they had the ability to compare print and e-resources.

Ability to save/print/retrieve searches: Most students from both universities UEAB (40%) and Kenyatta University (41.9%) agreed that they had the ability to save/print/retrieve searches. Some students from both universities also disagreed that they had the ability to save/print/retrieve searches.

The data in this section indicated that most students had basic information literacy skills. In the absence of an information literacy training program, there is a need for an effective library induction/orientation program. There are students from both universities who strongly disagreed that they did not have any basic information literacy skills. The six categories of basic information literacy abilities show that there are students from both universities who do not have these abilities. This may be an indication that the library induction/orientation has not been effective. Kenyatta University had a larger percentage than UEAB of students who did not have basic library skills.

5.6.4 Library Managers and Information Literacy

The library managers at both universities indicated that the library had been fairly effective in making students able to:

- Express their information need and match this to e-resources available UEAB (66.7%) and Kenyatta University (55.6%).

- Extract information from the library to match their information need UEAB (100%) and Kenyatta University (56.6%).
- Display an understanding of the unique characteristics of e-resources UEAB (66.7%) and Kenyatta University (22.2%).
- Choose appropriate searching techniques when using e-resources UEAB (66.7%) and Kenyatta University (55.6%).

Most students' at Kenyatta University (55.6%) did not have an understanding of issues such as currency, accuracy, relevance and comprehensiveness of library resources. Most students at UEAB (66.7%) had an understanding of issues such as currency, accuracy, relevance and comprehensiveness. This implies that library induction has not been effective at Kenyatta University.

5.6.5 The Role of the Library in determining Students' Learning Outcomes

Library committee members gave their views about the role of the library determining students' learning outcomes. The majority of the library committee members strongly agreed that:

- The library provided training on the use of resources;
- The library supported teaching by providing resources;
- The teaching staff participated in the selection of library resources; and
- There was effective communication between library staff and academic staff regarding changes to courses.

Most library committee members however disagreed on the statements stating that the:

- Library staff must have a role in the students' assessment process; and the
- Library supported teaching by participating in the development of new resources.

The data indicates that when the library managers and faculty members worked together to provide resources for learning (see 5.4.2 and 5.6.2) there was a positive impact on the students. The faculty members indicated that the library managers should not play a role in student assessment processes and the development of new courses. This could be because the faculty members lacked confidence in the ability of the library managers to assess students and to contribute to the development of new courses. This could also be because the role of the library in teaching and learning has not been clearly defined, especially within the ICT framework.

Library managers' views on the impact of the library on the quality of teaching indicated that most library managers at both universities agreed that:

- The library supported teaching by encouraging new teaching methods.
- The library managers should be involved in the development of new courses.
- The library should be informed about changes to courses.
- The librarian should provide induction and training for academic staff on the use of resources focused on supporting teaching.

The data indicates that the library managers at both universities wished to collaborate with the faculty members and to participate in the role of teaching students. For effective collaboration, the library managers must be involved in development of new courses as well as be informed about changes to courses. The faculty members may have the perception that librarians have no knowledge about course-related resources, and that may not even be qualified to guide students in their academic work. This mindset will have to be changed if there is to be a meaningful collaboration between the two groups.

5.7 Conclusion

There are clear differences between the two universities that are presented in their patterns of response. UEAB emerges as a university with a higher level of ICT integration, where the students have basic computer skills and the library has fairly adequate ICT infrastructure. Kenyatta University on the other hand appears to be at the initial stages of ICT integration. Most facilities are still in a nascent stage. For example, the library LAN at Kenyatta University library is still incomplete. The students' responses clearly indicate that there is a need to develop the ICT infrastructure as well as to equip the students with ICT skills.

From the data generated, the role of UEAB and Kenyatta University libraries should be re-defined so that both students and faculty members are fully aware of their valuable services. For this to be achieved there is a strong and urgent need for UEAB and Kenyatta University to develop and implement an effective information literacy programme. This programme will help both students and lecturers to access the available e-resources and to improve their lifelong learning skills (see 2.3). Lifelong

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learning skills are an important ingredient for the contemporary information environment. The next chapter offers a proposal for an IL model for the two universities, based on the interpreted data.

Chapter 6

Information Literacy Model for UEAB and Kenyatta University Libraries

The purpose of learning is growth, and our minds, unlike our bodies, can continue growing as we continue to live.

-Mortimer J. Adler

6.1 Introduction

In the previous chapter, data indicated that the students needed training in the use of e-resources. Through their comments, most students from Kenyatta University confirmed that the lack of information skills was a major impediment to accessing e-resources. As a result, some students were unable to use the e-resources in their libraries. Library managers also pointed out that they often failed to respond to ICT-related inquiries due to a lack of appropriate skills. This means that there is a need for the two universities to develop an information literacy (IL) programme for the students. Within the IL context, this chapter discusses:

- A motivation for the establishment of an IL programme at UEAB and Kenyatta University;
- IL challenges facing UEAB and Kenyatta University libraries;
- An overview of the aims and goals of the proposed IL programme;
- The role of the academic librarian in the proposed IL programme;
- An organizational model of the proposed IL programme; and
- Mode of operation of the proposed IL model.

The above issues are being discussed in the context of a proposed model of an IL programme that suits UEAB, Kenyatta University and other HEIs in Kenya.

6.1.1. Motivation

The lack of IT and information skills featured predominantly in the data. The data also indicated that UEAB and Kenyatta University librarians have not been considered important participants in the academic work of the students (see 4.6.5 and 5.6.5). A benchmark now exists for higher education information competencies

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(ACRL, 2000). The model for UEAB and Kenyatta University proposes to adapt the Information Literacy Competency Standards for Higher Education (ACRL, 2000). The ACRL benchmark is useful because it is a standardized set of competencies that can be adapted at various levels. It also has performance measures and learning outcomes within the standards. These will be used to plan an information literacy curriculum in some courses within the faculties. At UEAB and Kenyatta University, such courses(s) will be of a general nature and compulsory for all the undergraduate students such as ‘Communication Skills’ or ‘Writing Skills’. At Kenyatta University, the proposed IL programme may be launched as a new course through the Department of Library and Information Science. In this case, the performance measures and learning outcomes will be useful because they offer guidance to course instructors when designing activities and assignments that seek to measure information competence.

The proposed IL model will require the collaboration of librarians and faculty members in order to develop a programme that will infuse IL skills in the students. In the past, the librarian was only expected to give bibliographic instruction to the students. Bibliographic instruction focused on the use of information retrieval tools. In this proposal, the librarian’s role shifts from that of bibliographic instruction to that of providing information skills that encourage critical thinking. Collaboration will also mean a shift from the current *ad hoc* library instruction sessions during orientation to a planned IL programme targeting selected course(s) in the faculties.

Finally, this model proposes an approach emphasizing that IL integration is a dynamic process that is influenced by certain key skills. Each skill is important and significant in the infusion process. IL infusion means that the process involves a combination of different skills merging together to achieve IL competencies. These skills include:

- IT skills for access;
- Cognitive skills embedded in the subject knowledge; and
- Information skills.

A student who achieves competence in the above skills can be said to have developed IL competencies. Access skills have featured predominantly as a major hindrance to the student’s use of e-resources. Providing adequate ICT infrastructure as well as IT

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skills will ensure ease of access. Cognitive skills embedded in the subject knowledge were discussed earlier (See 2.2.2). Cognitive skills refer to information processing through construction, acquisition, organization, coding, rehearsal, storage in and retrieval from memory. The model addresses the specific challenges and needs of UEAB and Kenyatta University.

6.1.2 IL Challenges Facing UEAB and Kenyatta University Libraries

The data indicated that the two academic libraries faced challenges that may interfere with the successful introduction of an IL programme. These may be described as the:

- Collaboration challenge;
- Strategic challenge;
- Resources challenge;
- Staff development challenge; and
- Sustainability challenge.

The Collaboration Challenge

Worldwide there are issues raised about the collaboration of librarians and faculty members in the implementation of IL programmes. UEAB and Kenyatta University are no different. Data from the study indicate that the faculty members neither wish to incorporate librarians into the student assessment process nor let them participate in decisions concerning new course-related resources. The collaboration challenge will therefore mean that the librarians at UEAB and Kenyatta University try a tactful approach. In this approach, the librarians must seize opportunities that come their way without feeling inferior. The librarians should launch initiatives aimed at highlighting the importance of IL in a student's life.

The Strategic Challenge

One of the major difficulties that librarians have to overcome is ensuring that their libraries have a defined place in the university strategic plan. At Kenyatta University, the issue of strategic planning may not have been treated with the seriousness it deserves. The IL programme needs to be incorporated into the strategic plans of each university. The University of Pretoria (UP) in South Africa is a success story of the development and integration of the IL programme into the curriculum. At UP, the Department of Information Science has been instrumental in advocating for IL

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integration, and has successfully developed and runs a multidisciplinary IL course that is taught to all first year students. In addition, the Department has published a text book **Information Society Survival Toolkit, 2006** that is used as a standard text book for the IL programme. The proposed IL programme must be structured in such a way that its plans can be integrated into those of the learning environment aimed at developing key IL skills for the students. Data from the study indicated that even the library committee is not fully functional and that members keep changing. As a result, concerns of the library cannot be easily conveyed to the university authorities.

The Resource Challenge

A successful IL programme has to be supported by adequate resources. Lack of institutional commitment to information skills may cause problems for the IL programme. At Kenyatta University the library lacked ICT infrastructure. This was due to the lack of institutional support for the library. At Kenyatta University, the funds to improve the library budget could come from a library fee that should be charged to all registered students. Examples of the effects of the lack of resources from the data include an incomplete LAN network, and inadequate computers at the Kenyatta University library.

The Staff Development Challenge

As already discussed earlier in the study, there is a need for staff development through training. The IL programme affects all members of the two university communities, including librarians, faculty members and administrative staff. It is important to develop the library staff to have skills that can be used to improve the IL programme. It may also be beneficial for the university to train the faculty members and administrators to acquire IL skills.

The Sustainability Challenge

According to this study, the KENET initiative must be sustained by each university through additional funding. The KENET initiative is a donor-aided funding project, with its own limitations. UEAB and Kenyatta University must each find a way to sustain the KENET initiative. This means that they should either source additional funding from elsewhere or they should make provision for sustaining the project through internal funding incorporated into the regular annual budget.

6.1.3 An Overview of Aims and Goals of IL Programme

The aims and goals of the information literacy programme are based on the data of this study, as well as the ACRL (2000) information literacy competency standards for higher education. ACRL is important because it provides the international standards that have been successfully used in many parts of the world, including the United States of America and many countries in Asia.

Aims of the IL Programme

The aims of the IL programme at UEAB and Kenyatta University will be to:

- Support the use of ICTs for higher education through training of all the academic library users (see 5.3.1; 5.3.2; 5.3.3 and 5.3.4);
- Improve the quality of teaching and learning by offering access skills to a wide range of resources (See 5.4.1; 5.4.2 and 5.4.3);
- Help develop learners to think critically and to construct a framework for learning how to learn (see 5.6.3 and 5.6.5);
- Help create a student-centred learning environment where the focus is on problem-solving (see 5.6.1 and 5.6.6); and
- Facilitate the means by which learners develop lifelong learning skills (see 5.6.4).

Not only does IL form the basis for lifelong learning, it also cuts across all disciplines, learning environments and levels of education. In this case, it will enable the learners to extend their learning skills by becoming more self-directed, and will allow them to assume greater control over their own learning.

Goals of the IL Programme

The goals of the IL programme will be to enable users to:

- Determine their information needs;
- Be familiar with information resources related to their subject;
- Search for information competently;
- Process the retrieved information with a critical mind; and
- Develop a community of lifelong learners.

When these goals have been met, the information literate users should be able to:

- Know their information needs and determine the nature of the information needed;
- Access the information needed effectively and efficiently;
- Evaluate information and information sources with a critical mind, with a view to integration as part of their own knowledge;
- Use information efficiently to accomplish a precise goal; and
- Comprehend the ethical and legal issues pertaining to the use of information.

6.1.4 The role of the Academic Librarian in the IL Programme

Central to the IL programme is the academic librarian. Over the past decades, academic librarians have had a low profile at the two university communities in Kenya. In order to improve services to the university community, the role of the academic librarian in IL must be clearly understood. The librarian-in-charge of IL must have a professional qualification in Library and Information Science as a minimum requirement. This includes those with a basic degree in Information Science and those with a Post Graduate Diploma in Library and Information Science (PGDLIS). The librarian will be required to participate in activities such as:

- Training students in the use of information resources, especially e-resources;
- Information management and access such as maintaining adequate links to various e-resources; and
- Research by guiding students in subject-related research activities.

These activities demand that the academic librarian must be competent in the following:

- Training skills;
- Analytical skills;
- Library skills;
- Information technology skills;
- Leadership qualities; and
- Subject knowledge and research skills.

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All the above skills are pivotal to the successful development and delivery of the IL programme. At UEAB and Kenyatta University, there is a need for the librarians to prepare themselves accordingly. More important is the fact that power will largely rest with librarians that possess multiple skills based on technology applications. Librarians will be expected to provide leadership in computer application, internet capabilities and CD-ROM applications, among others. This therefore means that the librarians in the new digital are to be more knowledgeable, forward looking, creative, productive, focused and competitive.

The librarians should tactfully engage in activities that will raise their status and profile within the university communities. They must strategically showcase their skills and knowledge through activities such as presenting papers at conferences, co-authoring articles with faculty members, or by organizing a library week on campus when they can share their knowledge and the library facilities. Such activities may help improve their profile and help change the university communities' low perception of librarians. The librarians need to market themselves as well as their libraries within their university communities. Ultimately, librarians have to bear in mind that "real change comes from within." This programme is very specific in terms of its demands, and therefore its leadership must be entrusted to a designated librarian.

6.2 Organizational Model of the IL Programme

The structure of the IL programme will consist of three levels. The key levels shall include:

- Executive Director of the IL programme (Deputy Vice Chancellor for Academic Affairs);
- Coordinator of the IL Programme (Who should be a librarian);
- Subject Skills advisor; IT Skills Advisor; and Information Skills advisor. These three will together occupy the third level.

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The Executive Director of the IL programme (Deputy Vice-Chancellor Academic Affairs)

The Deputy Vice-Chancellor Academic Affairs (DVC) academic affairs shall be the executive director of the IL programme. The role of the executive director shall be to facilitate collaboration between the faculties and the library. The executive director will champion the IL prospects at the executive level of the university and keep the university executive management informed about the progress of the programme. The executive director shall mandate the coordinator of the IL programme with respect to authority and administrative issues. The DVC shall receive feedback regularly from the IL programme coordinator.

IL Programme Coordinator

The IL Programme Coordinator shall report to the executive director on activities of the IL programme. The programme coordinator will work with a team of advisors, namely, the subject and knowledge advisor, the IT skills advisor, and the Information skills advisor. Specific responsibilities of the programme coordinator will be to:

- Plan, implement, market, and evaluate the IL programme;
- Prepare a financial plan for the programme;
- Solicit funds for the programme;
- Coordinate and schedule all IL activities;
- Serve as the contact person for all general inquiries for the IL programme;
- Collaborate with the skills advisors to develop instructional materials;
- Maintain files of all instructional materials developed by the team;
- Develop and maintain the collection of readings, activities and other training materials for use by the team; and
- Maintain a database of all students who have successfully completed the IL programme.

Subject Knowledge Advisor

The subject knowledge advisor will be a faculty member. Each faculty may be represented by one member. This model proposes that the IL programme be launched within an academic discipline, targeting a specific general course such as communication skills course or writing skills, or as a faculty-wide stand-alone

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course, or in the Department of Information Science (where such a department exists). The subject knowledge advisor will be responsible for:

- Liaising with other members of the given faculty on course content materials;
- Developing subject content that encourages critical thinking;
- Giving the faculty members feedback on the progress of the IL programme;
- Creating content that will ensure IL competence in the subject; and
- Working with the team of advisors on the programme's implementation strategies.

IT Skills Advisor

IT skills are relevant and necessary if students are to achieve IL competencies. The data of the study indicated that lack of IT skills was a drawback to use of ICTs. The IT advisor will be either a faculty member in the department of IT, or an IT librarian.

The IT skills advisor will be responsible for the following:

- Liaising with other faculty members on the course content;
- Developing content for relevant IT skills;
- Facilitating the teaching of IT skills; and
- Working with the advisor's team on the programme's implementation strategies.

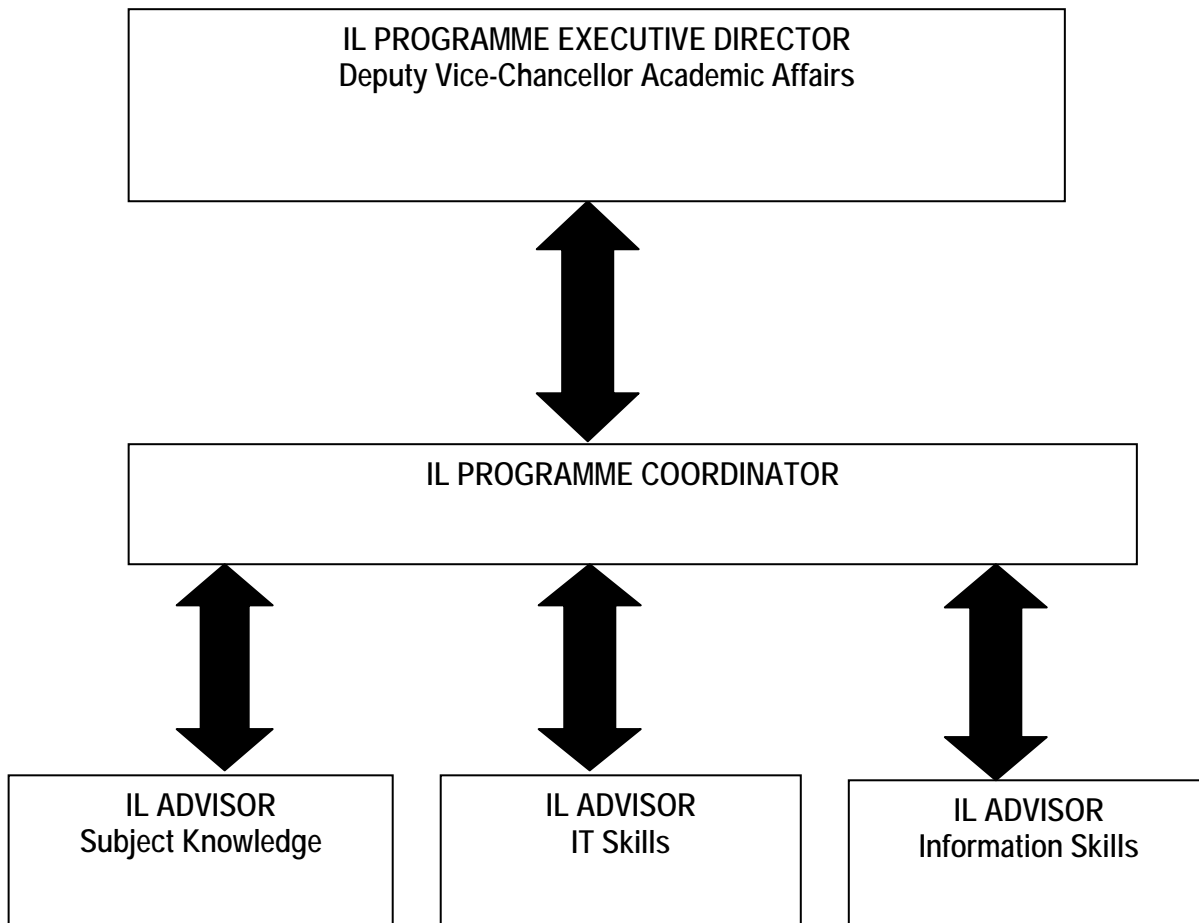
Information Skills Advisor

The information skills advisor of IL programme will be responsible for advising the team on the content of bibliographic instruction. The Information skills advisor will be a librarian responsible for:

- Developing IL content with regards to specific information skills;
- Developing performance indicators that enhance specific learning outcomes;
- Training the students on information skills; and
- Working with the team of advisors to oversee the programme's implementation strategies.

This proposal can be graphically presented as follows:

6.2.1 Diagrammatic Representation of the IL Organizational Model



This model is kept simple deliberately to suit UEAB and Kenyatta circumstances and that of other HEIs in Kenya. In other words it represents the minimum standards scenario.

6.2.2 Activating the Model

The programme will mainly use group instruction in electronic classrooms (rooms with computers and internet access). Such a mode of instruction will create a greater impact because it will be practical, allowing face-to-face interactions with the trainer. In future, additional web-based tutorials may be built into the library web page for the library users. The programme will be developed in three phases. Because of the dynamics of the IL programme the librarians and other trainers will require special skills, and therefore phase one will focus on preparations.

Phase One - Preparation

Phase one will be a preparation period, and is expected to last one year. It should begin as soon as the university administration gives its approval for the proposed IL programme. During this period the coordinator should actively engage in IL advocacy, as well as soliciting funds to support the training component of the IL program. Funding may come from international library associations or ICT initiatives supporting developing countries. There may be a need for the coordinator to get first-hand experience from universities that have successfully implemented a similar IL programme.

Preparation for the information skills advisor(s) instruction librarians and other advisors will be in the form of a one week intensive workshop covering all aspects of information literacy including IT skills. The training will cover aspects such as training and IT skills. The librarians will have to familiarize themselves with the print and e-resources available in their library. Hosting such a workshop may not be cheap and therefore it may be advisable for the universities to collaborate on this project. This may also have the added advantage of ensuring that skills acquired are basically the same and that, in turn, they may use the same approach in teaching the IL programme. However, if collaboration is not possible then each university can run its own workshop.

The advisors should work with the programme coordinator to identify the foundation course(s) that can serve as the initial integration disciplines for basic IL competencies. The team should evaluate the five ACRL standards, performance indicators and outcomes in relation to the course(s) objectives and assignments. They should work through the process by separating the standards from the outcomes to reduce the number of IL outcomes to what are necessary. Using course objectives they should identify the information competencies relevant for the selected course(s). At the end of the exercise the team ought to have identified the core performance indicators and standards that will be applied in the IL programme. They should also develop the course content by designing activities and assignments that seek to

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measure information competence. This will signal that the IL programme is ready for implementation.

Phase Two- Implementation

The IL programme will be implemented during this phase. This phase should last for two-three years. During its launch, the implementation of the IL programme will run in two parts, covering seven weeks each (one quarter). Part one will cover IT skills. The training sessions should take place in the library's e-classroom. If the library does not have one then instruction should take place in the teaching laboratories of the IT department. IT skills will cover computer application packages such as word-processing, spreadsheets and internet search skills. Part two will cover the information skills applied in subject knowledge content. The instruction librarians in collaboration with the subject lecturer should deliver information skills instructions to the students. At the end of phase one and two, the students should have developed IL competencies. The students who will have successfully attended and completed the training should either be given a letter of completion or a certificate of competence in IL. As a new concept at both universities, it may require more adjustments, especially pertaining to the specific subject areas in which the programme is launched. This proposed model is also open to further adjustments and adaptations. Phase three of the programme therefore focuses on evaluation and adjustment of the programme.

Phase Three- Evaluation

Phase three marks the end of the first cycle of the programme. It will be an evaluation phase. This phase will involve the IL programme coordinator and the team of advisors. It will focus on evaluation, feedback report on the progress of the programme and adjustment of various components. Through evaluation, the IL programme coordinator will be able to give feedback to the executive coordinator. Evaluation will enable the advisors to make adjustments to components of the programme. The evaluation will target the students by providing them with questionnaires targeting the learning goals. The questionnaires will be analyzed and the results will be used as feedback report on the progress of the program. The results will also be used to make relevant adjustments to the programme. If the programme

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runs successfully, the IL coordinator should recommend that it is integrated permanently into the university curriculum with a budget. The team should also develop policies and guidelines that will guide the running and sustainability of the programme.

Conclusion

The IL model programme places demands on librarian-faculty collaborations at both UEAB and Kenyatta University. This is an issue that may require tact and a strategic approach to find a permanent solution. Clearly the librarians are eager to get involved in the learning process of the students. However, the faculty members feel that the librarians should not get involved with the students academic work. The proposed IL model requires librarian-faculty collaboration to have the desired effect on the students.

There will be an urgent need for partnerships between faculty members and the library. These partnerships will set the basis for the education of future graduates who will have the information skills needed for life-long learning and for a productive professional career.

Activating the IL model should mark a starting point of a major breakthrough at the two Universities. This may also mean that IL becomes an integral part of the higher education curriculum, creating communities of learners with life long learning skills. Skills acquired through the IL programme will help bring about changes such as a learner-centred education process for both universities. The UEAB and Kenyatta University libraries will gain a prime position, and raise their visibility at the institutions. Ultimately, as in many parts of the world the university graduate from UEAB or Kenyatta University will also be a lifelong learner, ready for work as a professional in the global information-driven economy. The next chapter presents the findings of the study, and offers suggestions for further research.

Chapter 7

Conclusion

Minds are like parachutes---they only function when open.

-Thomas Dewar

7.1 Introduction

Chapter one discussed the rationale for using ICTs in academic libraries as tools for enhancing formal and informal learning. Current global trends and the technological revolution of the 21st century call for knowledge-driven economies fuelled by technology and supported by information literate workers. The MDG goal number 8 also outlines specific targets that are significant in the current knowledge-driven economies (see 1.1). The two academic libraries in this study face challenges of providing adequate ICT infrastructure, ensuring adequate access and use of ICTs, and ensuring that student learning outcomes are relevant to global trends and current job market demands. This chapter concludes the study by presenting:

- Findings of the study;
- Recommendations; and
- Suggestions for future research.

7.2 Findings

The findings cover the secondary objectives of the study which are to investigate:

- The ICT infrastructure at University of Eastern Africa, Baraton and Kenyatta University libraries;
- Access and use of ICTs at University of Eastern Africa, Baraton and Kenyatta University libraries;
- The ICT usage patterns among the students at University of Eastern Africa, Baraton and Kenyatta University libraries; and
- The role of the library in determining the students' learning outcomes.

Together these secondary objectives respond to the primary objective of this study expressed in the research question: What are the main features of ICT use at public and private university libraries in Kenya to support formal and informal teaching and learning?

7.2.1 ICT Infrastructure at UEAB and Kenyatta University

Findings on ICT infrastructure at both University libraries are that:

- The two universities have VSAT facilities sponsored by KENET, an initiative of the Leland project (see 2.8.1);
- UEAB has a complete and operational network including a library LAN and campus intranet;
- Kenyatta University does not have a LAN, and the networking process is incomplete;
- UEAB library has sufficient ICT equipment with about fifty computers shared among 1100 students;
- Kenyatta University library has insufficient ICT equipment (see 4.3 and 5.3.4). There are five computers to be shared among 10,000 students;
- Kenyatta University library faces the challenge of increasing ICT access points in order to ensure that all students are exposed to ICT facilities (see 2.2);
- Forms of ICTs available in the two libraries include both the physical access types such as CD-ROMS, audiovisual materials and the remote access types such as online databases (see 4.3); and
- The presence of the AVU at Kenyatta University has had no impact on the university library in terms of ICT infrastructure and e-resources.

7.2.2 Access to and Use of ICTs at UEAB and Kenyatta University Libraries

Findings relating to access and use of ICTs at UEAB and Kenyatta University libraries are that:

- The library promotion methods used by both libraries are ineffective (see 4.4.1 and 5.4.1);
- There is no evaluation system for the promotion methods used in order to measure their effectiveness;
- The Kenyatta University students and some of the library managers lack ICT skills (see 4.4.2 and 5.4.2); and
- Both university libraries do not have a formal skills-training program. The library orientation/induction is an *ad hoc* training which does not provide adequate training for both information and IT skills.

7.2.3 ICT Usage Patterns among Students at UEAB and Kenyatta University

Libraries

Findings on ICT usage patterns among the students indicate that:

- There is low usage of bibliographic databases and e-journals among students from both universities;
- At Kenyatta University the students consider their e-resources to be insufficient (see 5.6.2), and are demanding better library services;
- The majority of the students and the faculty members at both universities still prefer to use print resources over e-resources (see 5.5.1);
- The Kenyatta University library e-resources are inadequate for the students;
- UEAB students consider e-resources in their library to be sufficient; and
- The Kenyatta University students are not aware of the e-resources available in their library (see 7.2.2).

7.2.4 The Role of the Library in Establishing Students' Learning Outcomes

Findings on the role of the library in establishing students learning outcomes are that:

- UEAB students use e-resources to meet their personal learning needs and to support their formal learning and as a result this has led to changes in the way they approach research;
- E-resources at the Kenyatta University library do not meet the needs of the students;
- There are more students with inadequate information literacy skills at Kenyatta University than at UEAB (see 5.6.3);
- Issues pertaining to e-resources, including currency, accuracy and relevance have not been effectively dealt with at both universities; and
- The library managers do not play any role in the students' assessment process (see 5.6.5), hence challenging the role of the library in teaching and learning.

7.2.5 Main Findings

The main findings of the study are:

- Kenyatta University has been greatly affected by the lack of ICT infrastructure;

- There is low usage of bibliographic databases and e-journals among students from both universities;
- ICT usage patterns vary among the students at the two university libraries.
- Issues pertaining to e-resources including currency, accuracy and relevance have not been effectively dealt with at both university libraries;
- Student learning outcomes are diverse at the two universities; and
- Both university libraries should ensure that their librarians are equipped with current information and technical skills.

7.3 Recommendations

Based on the findings of this study, the following are recommendations for improving ICT use by public and private universities in Kenya to support formal and informal learning. It is recommended that:

- ◆ The Kenyatta University library should develop its ICT infrastructure;
- ◆ Each university should develop ICT policies in line with its vision and mission;
- ◆ Libraries should devise new methods for effective service promotion together with evaluation systems to measure the effectiveness of the new methods;
- ◆ The academic calendar of each university should include a library week for showcasing resources and services offered by the library;
- ◆ The University libraries be given a face-lift to match current technological trends;
- ◆ The library managers should pay attention to library staff needs such as training;
- ◆ The universities should develop an IL programme for the students; and
- ◆ Collaboration between faculty members and librarians must be encouraged.

7.4 Suggestions for Further Research

Further research should be conducted to:

- ◆ Evaluate existing ICT infrastructure at UEAB and Kenyatta University, and other HEIs in Kenya;

- ◆ Evaluate library collections at UEAB and Kenyatta University and other HEIs in Kenya. Evaluation of existing collections will enable the library managers to develop collection development policies so that the resources meet the needs of the students. This is important since the study indicated that some students did not find the library resources useful;
- ◆ Evaluate current teaching methods at UEAB and Kenyatta University and other HEIs in Kenya. Evaluation of current teaching methods will enable faculty members to adopt better teaching methods that may incorporate ICTs into teaching and learning, and prompt librarians to diversify library collections accordingly; and
- ◆ Identify factors affecting librarian-faculty collaboration at UEAB and Kenyatta University, and other HEIs in Kenya. This research is important because without faculty-librarian collaboration the proposed IL programme will not be successful.

7.5 Conclusion

This study revealed that the main features of ICT use by public and private universities in Kenya to support formal and informal learning have been affected by inadequate ICT infrastructure, specifically library networks and computers. Kenyatta University has been greatly affected by the lack of ICT infrastructure. There is a need for the HEIs to develop ICT policies that will support the development of ICTs. Access and use of ICTs has been affected by ineffective service promotion methods and lack of access skills. ICT usage patterns vary among the students at the two universities. Kenyatta University students have less usage than UEAB students. Student learning outcomes are diverse at the two universities. UEAB students have benefited from the use of e-resources and have been able to use these resources to meet both formal and informal learning needs. Kenyatta University students have not benefited from the use of library e-resources to meet their formal and informal learning needs.

In conclusion, the proposed IL programme responds to one of the main findings of this study, namely, that there is a need for information and technical skills if ICTs are

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to play a significant role in the libraries to support formal and informal teaching and learning.

Chapter 8

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APPENDIX A
QUESTIONNAIRE FOR THIRD-YEAR UNDERGRADUATE STUDENTS

**INFORMATION AND COMMUNICATION TECHNOLOGIES IN TEACHING AND LEARNING: A
COMPARATIVE EVALUATION OF TWO UNIVERSITY LIBRARIES IN KENYA**

Degree Course:

Year of study:

Gender [Please tick one].

Male Female

Age [Please tick one]

19-22 23-27 28 and over

1. Describe your computer experience [*Please tick one*].

- No experience at all
 Novice (little skill, basic options only)
 Intermediate (perform most tasks correctly)
 Expert (no help needed)

2. State how often you use the following computer applications by circling a number between 1 to 4 in the appropriate box.

Daily=1	Weekly=2	Monthly=3	Not at all=4	
Word processing	1	2	3	4
Database package	1	2	3	4
Spreadsheet	1	2	3	4
Statistical package	1	2	3	4
E-mail	1	2	3	4
Information retrieval through online hosts	1	2	3	4

3. When did you last use the library resources? [*Please tick one*]

- Within the last week
 Within the last month
 Within the last semester/ Quarter
 Never

4. When did you download an electronic document (for example a document from the internet)?
[Please tick one]

Within the last week

Within the last month

Within the last semester /quarter

Never

5. Which library resources have you used in this semester/quarter? [Tick all that apply]

Bibliographic databases Book chapters

CD ROM network E-books

E-journals Exam papers

Journal articles Multimedia/AV materials

Official university documentation Student projects

Theses

Other [Please specify] _____

6. How did you first find out about the electronic resources (such as CD-ROMS, online journals etc) provided by the library? [Please tick one].

Posters/leaflets in the library Posters elsewhere on campus

Informed by librarian Informed by lecturer

Informed by another student Browsing library website

Induction session I do not know about the library

Other [please give details] _____

7. How do you decide which resources are most appropriate to complete a particular task? [Please tick one].

Lecturer recommends

Librarian recommends

Prior knowledge

Searching/browsing

8. Please rate the following by circling a number between 1 to 3 in the box that best describes your experience.

Always=1	Sometimes=2	Never=3			
If you have problems using e-resources do you report to library staff?	1	2	3		
Do staff dealing with technical problems do so effectively?	1	2	3		
Do you think library resources have helped you to improve the standard of your work?	1	2	3		
Have library resources supported your learning academically?	1	2	3		
Do you study or write essays in the library without the use of library material?	1	2	3		
How often do you use the university library for non-academic reasons or personal interest?	1	2	3		
Have library resources supported your learning in other ways such as exploring personal interests?	1	2	3		
Do library resources meet your needs in terms of informal learning?	1	2	3		

9. Please rank the level of adequacy of the following e-resources in your library by circling a number between 1 to 4 in the appropriate box.

Insufficient=1	Fairly insufficient=2	Sufficient=3	Very sufficient=4		
E-journals	1	2	3	4	
E-books	1	2	3	4	
Online databases	1	2	3	4	
CD-ROMs	1	2	3	4	
Multimedia materials (e.g. video cassettes)	1	2	3	4	
Student project/theses	1	2	3	4	

10. Please rank the following statements about e-resources in your library using a scale of 1 to 4 by circling the appropriate box as they apply to you.

Strongly disagree=1	Disagree=2	Agree=3	Strongly agree=4		
The provision of e-resources has led to changes in the ways you approach research.	1	2	3	4	
Using the e-resources has helped improve your ICT skills.	1	2	3	4	
Using library e-resources assists you with problem solving.	1	2	3	4	
Using library e-resources assists to find information to support your coursework.	1	2	3	4	
Library e-resources help you decide on your future career.	1	2	3	4	
Library e-resources help you investigate continuing education.	1	2	3	4	

11. Please rate the following services offered by your library by circling a number between 1 to 4 in the appropriate box.

Strongly disagree=1	Disagree=2	Agree=3	Strongly agree=4	
Training offered in the library for use of e-resources is useful to you.	1	2	3	4
Library training in the use of e-resources has led you to use new resources.	1	2	3	4
Library staff responds effectively to your individual learning needs with regard to library resources.	1	2	3	4

12. Please rank your perceptions on the effectiveness of the following library usage training offered by your library by circling a number between 1 to 4 in the appropriate box.

Strongly disagree=1	Disagree=2	Agree=3	Strongly agree=4	
You have ability to decide on a keyword to use for a search.	1	2	3	4
You have ability to search for information depending on the task.	1	2	3	4
You have ability to perform a Boolean search	1	2	3	4
You have ability to limit a search if too many results are produced.	1	2	3	4
You know what to do to ensure you gather comprehensive information and that you have not missed crucial information.	1	2	3	4
You can ably compare print and electronic resources	1	2	3	4
You are able to print/save/email the information you find.	1	2	3	4

13. Any further comments

Thank you very much for your time.

APPENDIX B QUESTIONNAIRE FOR LIBRARY MANAGERS

INFORMATION AND COMMUNICATION TECHNOLOGIES IN TEACHING AND LEARNING: A COMPARATIVE EVALUATION OF TWO UNIVERSITY LIBRARIES IN KENYA

Indicate your designation/rank: _____

Gender [*Please tick one*].

Male Female

1. What methods do you use to promote the use of library services to students?

Leaflets/newsletters/flyers Induction
Information provided by course tutors Targeted emails
Information on library website
Other [*Please give details*] _____

2. How are academic staff and students informed of new resources and developments in the library?

Leaflets/newsletters/flyers Posters
Memos Targeted emails
Information on library website Meetings/committees
Other [*Please give details*]

3. What types of training in the use of library resources are offered? [*Please tick one*].

Online tutorials one-to-one sessions
Induction sessions
Other [*please give details*]

4. Are there any skills or resources which you feel are not adequately covered by current training provision? [*Please tick one*].

Yes No

5. How are training sessions for students advertised? [*Please tick all that apply*].

Library website posters/leaflets
Through lecturers
Other [*Please give details*].

6. How frequently do you receive informal requests for assistance in the use of library resources?

More than once a day A few times a week
Occasionally Rarely/never

7. How do you usually deal with these informal requests for help [*Please tick all that apply*].

Personal assistance Refer to documentation
Refer to help screens
Other [*Please give details*]

8. What are the most common types of enquiries? [*Please tick all that apply*].

Help with ICT skills help with information searching
Subject-related queries library operation/rules e.g. opening times
Other [*Please give details*]

9. Are you and your staff able to deal with these enquiries effectively? [*Please tick one*].

Yes No

If not, what would enable you to offer more help to users?

More training/knowledge specialist support staff
More time
Other [*please give details*].

10. Does your library have any of the following? [*Please tick all that apply*].

- a. Secure intranet
- b. Firewall in place
- c. Encryption techniques

11. Which of the problems listed below are experienced by users wishing to access e-resources from the library?

No known problems No terminals available
Network down Difficulties with logins
Lack of necessary skills
Other [*please give details*]

12. Please rank the following e-resources by circling a number between 1 to 4 in the in the box that best describes their importance to you.

Very important=1	Important =2	Not important =3	
E-journals	1	2	3
E-books	1	2	3
Online databases	1	2	3
CD-ROMs	1	2	3
Course materials e.g. electronic text books, exam papers	1	2	3
Multimedia materials	1	2	3
Student project/theses available	1	2	3
Training in the use of library resources	1	2	3

13. Please rank the following library services by placing a circling a number between 1 to 4 in the in the box that best describes the impact of the library on the quality of teaching.

Strongly agree=1	Agree=2	Disagree=3	Strongly disagree=4	
The library supports teaching by providing resources for each course.	1	2	3	4
The library supports teaching by encouraging new teaching methods.	1	2	3	4
The librarians are involved in the development of courses.	1	2	3	4
The library staff are informed about changes to courses.	1	2	3	4
The academic staff participates in selection of library resources.	1	2	3	4
The librarians provide induction and or training for academic staff on use of resources focused on supporting teaching.	1	2	3	4

14. What role do you play in the teaching of library related information literacy skills?

Active Passive No role

15. Have you received training to help you to teach information literacy skills?

Yes No

16. Please rank the following statements regarding effectiveness of the library on information literacy to the students on a scale of 1 to 4 by circling a number in the appropriate box.

Very effective=1 Effective=2 Fairly effective=3 Ineffective=4

Library's response to the learning needs of individual students.	1	2	3	4
Students are able to express their information need and match this to e-resources available.	1	2	3	4
Students are able to extract information from the library to match their information need.	1	2	3	4
Students display of an understanding of the unique characteristics of e-resources.	1	2	3	4
Students choose appropriate searching techniques when using the e-resources.	1	2	3	4
Students fully understand issues of currency, accuracy, relevance and comprehensiveness of the library resources.	1	2	3	4
The training on the use of library resources given to students.	1	2	3	4

17. Any further comments.

Thank you very much for your time

APPENDIX C
QUESTIONNAIRE FOR LIBRARY COMMITTEE MEMBERS

INFORMATION AND COMMUNICATION TECHNOLOGIES IN TEACHING AND LEARNING: A
COMPARATIVE EVALUATION OF TWO UNIVERSITY LIBRARIES IN KENYA

Department:

Gender: Male Female [*Please tick one*].

1. When did you last visit the university library? [*Please tick one*].

Within the last week

Within the last month

Within the last semester

Never

2. Which library resources have you used in the last month? [*Tick all that apply*]

Archives Bibliographic databases

Book chapters CD ROM network

Course materials E-books

E-journals Exam papers

Journal articles Multimedia/AV materials

Reading lists Student projects/Theses

Other [*Please specify*]

3. Indicate your computer experience [*Please tick one*].

No experience at all

Novice (little skill, basic options only)

Intermediate (perform most tasks correctly)

Expert (no help needed)

4. Do you prefer to use electronic or printed resources from the main library? [Please *tick one*].

Electronic resources Printed resources No preference

5. Is your own use of digital/ electronic information increasing?

Yes No

6. Please rate the following e-resources by circling a number between 1 to 4 in the in the box that best describes their importance to you.

Very important=1 Important=2 Slightly important=3 Of no importance=4

	1	2	3	4
E-journals	1	2	3	4
E-books	1	2	3	4
Online databases	1	2	3	4
CD-ROMs	1	2	3	4
Multimedia materials	1	2	3	4
Student project/theses	1	2	3	4
Accessing library e-resources off campus	1	2	3	4

7. Are you aware of the potential of the library resources for students? [Please *tick one*].

Yes No

8. Do you consider library resources to be relevant for the needs of the students? [Please *tick one*].

Always

Sometimes

Never

9. How effectively do academic staff work with library staff to identify suitable subject-specific resources? [Please *tick one*].

Very effectively

Effectively

Not effectively

10. Please rank the following statements conveying the role of the library on teaching and learning by circling a number between 1 to 4 in the appropriate box.

Strongly disagree=1 Disagree=2 Agree=3 Strongly agree=4

	1	2	3	4
The library provides training in the use of library resources.	1	2	3	4
The library supports teaching by providing resources.	1	2	3	4
The library supports teaching by participating in the development of new course material.	1	2	3	4
Teaching staff participate in selection of library resources.	1	2	3	4
There is effective communication between library staff and academic departments regarding changes to courses.	1	2	3	4
Library staff must have a role in the students' assessment process	1	2	3	4

11. Any further comments:

Thank you very much for your time

APPENDIX D
INTERVIEW SCHEDULE FOR CHIEF LIBRARIANS AND ICT MANAGERS

INFORMATION AND COMMUNICATION TECHNOLOGIES IN TEACHING AND LEARNING: A
COMPARATIVE EVALUATION OF TWO UNIVERSITY LIBRARIES IN KENYA

1. How long have ICTs had in your library?
2. Do you consider your ICT infrastructure adequate?
3. What are some of the common ICT related problems you experience
 - a. With students
 - b. With ICT facilities
 - c. With electronic resources
4. Are there future plans to improve ICT facilities?
5. Do you have a budget for ICT?
6. Do you train students on ICT use?
7. What kind of training do you offer?
8. Have the librarians been trained in ICT use?

Thank you for your time.