Students' Perception of Digital Resources in Higher Education in Africa

Thesis

UNRESTRICTED

Students' Perception of Digital Resources in Higher Education in Africa

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Abstract

The purpose of this study was to investigate the perceptions of students on digital resources in universities in Africa. Digital resources in this study encompassed information resources from digital library and from e-learning. A mixed methods approach was employed with qualitative method being dominant, and was carried out within a case study design involving University of Nairobi students from two disciplines, lecturers and librarians. Interviews with students were triangulated with informal interviews with their lecturers and librarians, observations and documented quantitative data. The data was analyzed using thematic analytical approach.

The study found that students take control of their usage of digital resources. They perceive e-learning resources and digital library resources as intertwined into one learning resource. In addition, high IT skills among students and lecturers impact on students' expectations of roles and levels of engagement with lecturers and librarians. The librarians' role seems to be taken on by the lecturers. In this process, librarians are left out of participation in an e-learning environment. A related project suggests a user-focused, more collaborative model in which librarians, lecturers and students can engage with each other more in order to leverage the benefits of digital resources for learning.

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Chapter One: Aims and Objectives

1.1 Background of the study

Developments in information communication technologies (ICTs) have significant potential for use in higher education. In many parts of the world this is already apparent. In the USA, for example, over 96% of the very largest universities have some online offerings (Allen & Seaman, 2006). The UK's Higher Education Funding Council for England (HEFCE) has a ten year e-learning strategy that aims at having all universities embed e-learning as a 'normal' part of their practices and processes (HEFCE, 2005). Digital libraries (see section 1.3 for definition) too have great potential for teaching and learning in higher education (Borgman *et al.*, 2000). However, some parts of the developing world are faced with contextual factors such as limited ICT infrastructure, local connectivity costs and funding arrangements that impede the spread of technology in education (Observatory on Borderless Higher Education, 2006). This study focuses on university education in Africa, a continent of challenge for expanding access to new technologies but also one with huge opportunity for the deployment of such technologies for educational expansion.

There is significant international activity around the extent and quality of education in Africa. The midway review of the Millennium Development Goals indicates that around 30% of primary school age children are still without access to schooling (UN Department of Public Information, 2007). Training of extra teachers to cater for expanded access at this level is primarily the concern of higher education. The recent international 'Growth Commission' report highlighted the importance of education and health as basic prerequisites for the sustained economic growth so crucial to Africa (The International Bank for Reconstruction and Development / The World Bank, 2008). The Report of the Commission for Africa (2005) was influential in suggesting that educational development,

whilst clearly important, at the primary phase, also needed sustained commitment at the secondary and higher levels.

But higher education institutions in this region are not prepared for this demand. The Gross Enrolment Ratio is below 5% in most of the countries (UNESCO Institute for Statistics, 2008). Even then, many of these countries struggle to maintain these low enrolment levels (Bloom *et al.,* 2006). According the Report of the Commission for Africa,

> ...many of Africa's higher education institutions are still in a state of crisis. They lack physical infrastructure, such as internet access, libraries, textbooks, equipment and laboratory space...yet demand for higher education is increasing... (Report of the Commission for Africa, 2005 p. 137)

Consequently, higher education in Africa must expand and the role that ICT can play through e-learning programmes and access to the vast scholarly digital resources is incontestable. The Association of African Universities (2000) has already acknowledged the potential of ICTs in transforming education on the continent.

There are many initiatives that now focus on the development of e-learning, i.e. the open educational resources (OERs). An example is the Open University of UK's OpenLearn initiative. In Africa, a successful OER project is TESSA (Teacher Education in Sub-Saharan Africa) which is creating 'open content' multimedia resources and course design guidance for teachers and teacher educators. This project is making a contribution towards expanding tertiary education as well as transforming teaching and learning experiences (Wolfenden, in press).

In addition, advancements in the development of digital libraries are making a remarkable contribution towards e-learning and in Africa, there is a general acknowledgement of the role digital libraries can play in education (e.g. Mutula, 2007). Contextual challenges such as technological factors that would impact negatively on the general usage of digital libraries in Africa are forcing key players to look for alternative means of providing access to these resources. For example, problems of accessibility and connectivity have led to the introduction of mobile digital libraries in healthcare e-learning among community health workers (e.g. Iluyemi, in press).

1.2 The problem statement

In the context of the above background, the organisers of digital resources have the potential to become highly important in the future of higher education in Africa. Librarians as well as e-learning experts (i.e. academics) are experiencing globally, as well as in Africa, a profound change in their role and importance. On one hand, experts of e-learning are focused on content production, collaboration and exchange of knowledge. Their interest is on digital resources as instructional and cognitive tools that enable learners to think and construct knowledge. However, they tend to overlook issues of content organisation and retrieval, often resulting in excellent resources that are not always easy to search or retrieve. Some people attribute this to the complexities involved such as subject indexing or choice of quality metadata (e.g. Secker, cited in Littlejohn *et al.,* 2006 p.137).

On the other hand, librarians perceive digital resources as information repositories and databases that are neatly organised to form digital libraries. Their focus is mainly on the organisation of these resources for easy retrieval. They are also concerned with issues of ownership and access e.g. copyright and authentication, and the technology i.e. system design, infrastructure and connectivity.

Digital resources can therefore be seen from two perspectives: (i) the e-learning perspective which lays emphasis on content production, collaboration and exchange of knowledge; and (ii) the libraries' perspective which focuses on content organisation, retrieval and access. Evidently, there is interplay between these two perspectives and it is expected that they should depend on each other. The two have a role in mediating and providing the interface between the extraordinary riches of the digital resources and the planning and presentation of the e-learning resources. As the two perspectives exist essentially to provide support to students, it is necessary to establish if the African experience makes the connection between the two perspectives easier for the student. How do students in higher education in Africa perceive digital resources as they try to make sense of these resources from the two perspectives? The specific research questions of the study are:

1. What is the students' level of awareness and general usage of the digital resources available to them?
2. How do they perceive the support provided to them by the librarians and the academics?
3. Does subject discipline of the students play any part in the students' perception of digital resources?
4. In the context of the responses to questions 1 to 3 above, do any cultural (including technological) issues impinge on students' perceptions of digital resources?

1.3 Definition of key terms

The term "digital resources" has been used broadly to cover both digital library and e-learning resources.

"Digital library" is a term that has several synonyms and a number of definitions. In this study, Appleton's definition has been used: "a variety of electronic and digital sources of information available to university teachers and students in an academic context" (Appleton, 2006 p. 619).

The term "E-learning resources" has been used to mean digital learning resources used for teaching and learning in e-learning e.g. courseware.

Chapter Two: Literature Review

2.1 Introduction

This chapter reviews literature on students' perceptions of digital resources in higher education. It begins with an overview of digital libraries in higher education and highlights findings of related past studies. This is followed by a review of literature on digital libraries in higher education in Africa. The next section is an examination of studies on students' perceptions of digital resources in higher education. This includes studies on (i) students' characteristics such as gender and subject discipline and how these impact on the students' perceptions; (ii) students' perceptions of digital resources as reflected in their preference for some resources over others; (iii) learners' perceptions of the support provided by their lecturers and librarians; and finally (iv) contextual issues i.e. technology and culture.

2.2 An overview of digital libraries in higher education

As highlighted in the previous chapter, advancements in application of ICTs in higher education are significantly transforming teaching and learning. For example, developments in digital libraries have several benefits for teaching and learning, namely: remote access to scholarly databases, easy and speedy searching capabilities, ability to share resources across geographical boundaries (Adams & Blandford, 2002; Borgman *et al.,* 2005; Appleton, 2006). Blandford (2006) views them as a place where learners engage with information and with each other.

However, studies show a slow adoption of these resources and cite lack of appropriate resources, over-reliance on web resources, inadequate information skills and user support, poor usability, low visibility, inadequate financial resources and unsuitable library

strategies as contributing factors (see Adams & Blandford, 2002; Appleton, 2006). Other studies show disciplinary differences in the use of the term digital libraries. For example, Blandford (2006) observes that while the librarians refer to digital libraries as databases, in the sciences they are referred to as libraries. People in the arts and humanities call them electronic archives. This terminology inconsistency can create challenges in the way digital libraries are presented to the users as was revealed in Adams and Blandford's study (2002). Use of different terminologies has also been noted in the way librarians and academics perceive digital libraries. For example, literature authored by librarians tends to use terms such as 'information databases' and 'information resources' while academics lay emphasis on the learning processes. For instance, Sumner *et al.* (2003) in their article 'Understanding educator perceptions of "quality" in digital libraries' refer to them as (i) cognitive tools, enabling students to think about and work with ideas and knowledge to support learning and sense-making; (ii) component repositories; and (iii) knowledge networks. In view of these observations, it is necessary to establish if such disciplinary and professional differences in relation to digital libraries have any impact on the perceptions of these resources by the university students and hence the current study.

2.3 A review of digital libraries in higher education in Africa

Literature on digital libraries in higher education in Africa is predominantly a documentation of practitioners' experiences and observations. There is limited documented empirical work. Most of the literature reports negatively on the development of digital libraries, highlighting challenges of providing the service but ignores positive developments and potential for future improvement. For example there is a lot of emphasis on the effects of the digital divide conceived in terms of inadequate computer software and hardware; unreliable electricity and telecommunication networks resulting in considerable downtime on library systems; and high cost of access to telecommunication services

(Muswazi, 2000; Kebede, 2004; Mutula, 2004; Ajegbomogun, 2007; Mutula, 2007). Digital libraries in the universities are often underfunded and underutilized because of low levels of information literacy caused by limited expertise (Muswazi, 2000; Mutula, 2004). Two small-scale studies carried out by the African Virtual University established that low bandwidth also lowers the usage of digital resources (Ngimwa, 2008). This massive coverage of challenges shows an obsession in Africa to concentrate on difficulties of implementing a digital library service and ignores students' perceptions which are important. Investigating the perceptions of these students on the resources might paint a different picture and hence the current study.

Coverage of positive initiatives is scanty and includes a survey on the state of digitization in university libraries in Anglophone Sub Saharan Africa (Rosenberg, 2006). This survey revealed existence of digital resources mostly from external projects, in majority of libraries despite their poor accessibility by users. There is also digitization of university theses and dissertations e.g. Association of African Universities' project called DATAD (Kavulya, 2007). Despite the existence of these digital resources, there is a gap in knowledge of their appropriateness to the students. The current study aimed at evaluating the students' perceptions of these resources in Africa, and specifically establishing their level of awareness and general usage of these resources.

There are a few e-learning projects which focus on the development of knowledge portals. For example TESSA which has created open content multimedia resources and course design guidance for teachers and teacher educators in Sub-Saharan Africa, and VeSeL (Village e-Science for Life) which is developing a community based knowledge management system for agricultural resources. Although these examples are knowledge systems that link to e-learning, there is no obvious connection between them and digital libraries. A project that attempts to make this connection is being initiated by the World

Health Organisation and some national health authorities in Sub-Sahara African states. This project aims at creating a model for delivering continuing medical education including treatment and drug guidelines to community based health workers, through the use of mobile library technology (Iluyemi, in press). However, this is a community based e-learning project that is not connected to higher education. It therefore seems like the students in universities in Africa have to put up with the "siloed" digital resources from the library and from the e-learning, hence the need to investigate their perceptions of these resources.

While the above review of literature presents a rough picture of digital library development in higher education in Africa, it fails to provide information on how the students access or make use of the available resources, and how they perceive these resources. It is also surprising to note that unlike other studies that focus on the impact of new technology on culture, there is no known study that has focused on the impact of culture on digital libraries in the African context. There is also no mention of the role of academics in the delivery of digital library resources to learners. It is important to establish what learners perceive of the role of their lecturers in their (students) usage of digital library. The current study therefore aimed at establishing how students in universities in Africa perceive digital resources with a focus on their perception of user support provided by academics and librarians. Also if there is impact of their disciplinary differences on their perceptions and if there exist contextual factors such as technology and culture that impinge on their perceptions.

2.4 Students' perceptions of digital libraries

Studies that have been conducted on learner's perceptions of digital libraries in higher education range from those concerned with the impact of their characteristics such as

gender and their discipline of study, to those focusing on issues such as resource preference, user support and the impact of technology (e.g. Adams & Blandford, 2002; Koohang & Ondracek, 2005). In addition, most of these studies have been conducted in environments that have good technological infrastructure including broadband internet connection and among IT literate participants who have prior experience of using digital libraries. However, as noted, very limited research seems to have been done on African universities where IT infrastructure is not fully developed and the majority of students do not have appropriate experience of using digital libraries. Research question four of this study addressed the issue of whether contextual factors impact on the students' perceptions of the resources.

The sub-sections below form a review of studies that have focused on the impact of learners' characteristics on their perceptions of the resources; their perceptions of these resources and the user support provided; and finally the impact of contextual factors (i.e. technological and cultural) on their perceptions.

2.4.1 Students' characteristics

Past research findings reveal that learner' characteristics such as gender and subject disciplines have an impact on their perceptions of digital resources. For example, Tenopir *et al.* (2003) and Liu (2006) revealed variations in students' perceptions of digital libraries across different subject disciplines. Tenopir *et al.*'s study reported that chemistry and astronomy students placed more importance on journal literature than those in engineering and physics who did not see much importance in electronic journals until later in their studies. This variation can be explained by the fact that different disciplines have different information needs that shape their requirements for information resources as suggested by

Blandford (2006). Research question three of this study addresses the issue of whether there exists this disciplinary difference among students in Africa.

Koohang's (2004) study, reported significant difference in the way digital libraries are perceived by female and male students. Male students had more positive perceptions towards the use of digital libraries than female students. While this study did not establish the reasons behind this difference, it made suggestions that differing levels of confidence towards online learning between male and female may have contributed to this difference. Although the question of gender differentiation goes beyond the scope identified for this research, it is interesting to note that user characteristics related to gender do impact on the perceptions of digital resources.

2.4.2 Students' resource preference

Interestingly, not all students favour digital library resources. Lombardo and Miree (2002) in their study on the impact of instructions on student's perceptions and use of print, the web (i.e. directly from the internet) and online databases (i.e. digital library resources) found that prior to instruction, students considered web resources as easier to use and more convenient than digital library and print resources. In addition, students perceived the web as a comprehensive resource where they were more likely to find all they needed as compared to the other two resources. Similar findings were established by Tenopir *et al.* (2003). This preference for web resources confirms the general notion that learners tend to prefer information on the web over the carefully selected and validated online resources in digital libraries. However, concerns have been raised by academics as to the validity and quality of these web resources and the possible negative impact they have on students' learning experiences (McDowell, 2002).

Preference for non-digital library resources was also observed in Liu's (2006) study. It established that although graduate students were heavy users of digital resources, the majority (75.9% of respondents) indicated that they would still use print resources even after having consulted the digital library. Reasons for this supplementation included: to confirm information in the digital library, to find out more from printed books, to browse book shelves for quality and reliable sources and to look at older materials. Similarly, Tenopir *et al.* (2003) established that students perceived learning of basic digital library concepts as time consuming and difficult, preferring to use textbooks and lecture notes. However, Lombardo and Miree's (2002) study revealed that library instruction courses helped change the learners' perception of web resources. In their post instruction testing, they discovered that students' perception of the comprehensiveness of the web had changed as they perceived it to be less inclusive compared to the online databases. This indicates a possibility that students had acquired critical skills for evaluating the usefulness of the information obtained from the web.

While the above studies show a general preference for non-digital library materials, they do not clearly establish students' perceptions of what makes digital libraries better learning resources. In addition, none of these studies included universities in Africa, hence the current study.

2.4.3 Students' perceptions of user support

As observed in Lombardo and Miree's (2002) study, there is evidence to suggest that user support does affect students' perception of digital libraries. The field of user support is broad. It covers the acquisition of basic information literacy and IT skills as well as direct support provided by librarians and academics. Related studies suggest that IT and information skills are necessary. For example Koohang's (2004) study reported a

significant difference in perceptions of the use of digital library among undergraduate students with varying levels of prior experience with the internet. Students who had more prior experience with the internet had more positive perceptions than those who had less prior experience. These studies also suggest that user support should be offered collaboratively by librarians and lecturers throughout student's academic life (e.g. Lombardo & Miree, 2002; Tenopir *et al.*, 2003; Koohang, 2004). However, according to some studies (e.g. Adams & Blandford, 2002 and Appleton, 2006) academics have poor awareness and understanding of the digital libraries and this leads to their preference for the web and online personal collections. This raises a concern over the role played by the academics in encouraging their students to use digital libraries, particularly in the African context where not every academic has good IT and information skills, and hence making the librarian's role more important. It is therefore necessary to establish the perceptions of learners on the role played by academics and librarians in providing support in the use of digital libraries. In this study, research question two aimed at establishing how students perceive this support.

2.4.4 Impact of contextual factors on students' perceptions

Contextual factors are important as they can affect how the digital libraries are used. Technology is one such factor and includes issues of system design and technological infrastructure. However, existing studies (e.g. Hong *et al.*, 2002; Nov & Ye, 2002; Sumner *et al.,* 2003) tend to concentrate on the design and usability aspects of the system, leaving out issues of ICT infrastructure. This can be attributed to the fact that users are only able to interact with a system through its user interface which is dependant on system design. These studies have shown that well designed user interfaces influence users' perceptions of the system. Although these findings are significant for the overall design of digital libraries, they contain certain limitations. For instance, some research (e.g. Koohang &

Ondracek, 2005) has targeted students who are already familiar with the internet and digital libraries, leaving out the views of non-users which might have shed light on usability limitations that put them off from using the libraries. In addition, most of these studies have been carried out under well designed technological infrastructures e.g. Sumner *et al.*'s (2003) study which was conducted in purpose built computer laboratories that were equipped with high-speed Internet connections. In this context, would the students' perceptions be the same in Africa where the technological infrastructure is not well developed? Making investigation in this area is crucial, and hence the current study.

Another contextual factor is culture, i.e. community culture. Cultural factors do affect the way people engage with technology. However, there is very little known documented research on the impact of culture on digital libraries other than Duncker's (2002) study which focused on cross-cultural usability of the digital library metaphor among the Maori community. This study established that the Maori's cultural value of information as sacred and not a public entity, their collectivist nature versus the individualistic usage of information emphasised by libraries, and their fearful approach to the unfamiliar territory of the library made the digital libraries unusable by this community. Given that majority of digital libraries are developed in Europe and North America, it was found necessary to establish if there is any cultural impact on the way the university students in Africa perceive digital resources.

2.5 Literature review conclusion

While the above review of literature has provided a context for the current study, it has also established the need for further investigations into how university students perceive digital resources. The current study therefore investigated students' perceptions of digital libraries in higher education in Africa and focused on resources, the support provided, and

the effect of technology and culture on their perception. It also sought to establish if there are disciplinary differences across two subject disciplines.

Chapter Three: Methods of Data Collection

3.1 Introduction

This study adopted a mixed methods approach by combining quantitative and qualitative methods. This was primarily to enhance validity of the research findings. Several authors (e.g. Seale, 1999; Denzin & Lincoln, 2005; Maxwell, 2005) support this approach as it underpins the principle of triangulation by avoiding overreliance on a single method in order to enhance confidence in the validity of research findings. However qualitative method was more dominant, as per the view of Adams and Cox (2008) that more researchers in the field of technology are adopting this method because they are more interested in understanding the qualities rather than quantities of technology and how people use it in their lives. The focus of this study was to find out how learners perceive digital resources, an exploration into their lives in which the researcher's interest was to gain an insight into their perceptions of the technology and how they interact with it. In this sense, the study could be considered as a partial ethnography in which the researcher according to Hammersley and Atkinson (2007 p.3) "participates in people's daily lives ... watching what happens, listening to what is said, and/or asking questions through informal and formal interviews, collecting documents and artefacts". In so doing, the study also triangulated sources of data in order to enrich and validate the data collected. Hence, qualitative data from formal interviews was triangulated with informal interviews, observations and documents in form of quantitative data from statistical reports available in the library; one of the characteristics of quantitative data is that it is factual.

This investigation was carried out within a case study design. Blaxter *et al.,* (2006) view case studies as suitable for small-scale research as they allow researchers to focus on fewer cases. Burns (2000) also observes that case studies involve the observation of an individual unit to gain an in-depth understanding of the unit. Case studies are the preferred design in

studies that seek to answer the 'how' or 'why' questions (Yin, 2003). The study sought to answer the 'how' question of learners' perceptions of digital resources.

3.2 Procedure

Qualitative data was primarily collected from in-depth formal interviews with the key informants (i.e. university students) as these allowed them to describe their experiences, explain their answers and give examples (see Rubin and Rubin, 2005). In addition informal interviews with librarians and lecturers were held in order to confirm students' responses. These were less detailed and took the format of conversations with fewer questions from the interviewer. Both the formal and informal interviews followed a semi-structured interview schedule (see appendix 1) with generic questions to guide the process. The open-ended nature of the generic questions created flexibility (see Rubin and Rubin, 2005) where the interviewees described freely their experiences. At the same time the interviewer was able to probe or seek clarifications. This was considered important for a study of perceptions as the students were able to talk about their perceptions of the digital resources while the researcher got the opportunity of probing further as issues emerged out of the discussions. In-depth interviews also allowed for naturalistic data to be collected. Adams and Cox (2008) recommend that the interview setting should be natural in order to get more naturalistic responses. In this regard, the interviews were conducted at the university at a time convenient for the interviewee. Adams and Cox further recommend the 'Student-Tutor' style of interaction for studies of Information Technology. When the interviewer takes the role of a student who asks questions from an 'expert', the user of the technology is able to see how much his or her opinion is valued and even novice users are encouraged to tell their stories in a friendly environment. In this study, the students were considered as experts of their own perceptions of the digital resources (technology). This style of interaction was adopted throughout the interview process.

In order to encourage natural interaction, note-taking was kept at minimal so as to maintain eye contact. Instead, an unobtrusive audio record device was used to record the interviews. Blaxter *et al.*, (2006) assert that use of recording devices ensures that one is able to concentrate on the interview process, give attention to the interviewee and maintain appropriate eye contact and non-verbal communication. However, they caution that recording can make interviewee anxious and less likely to reveal confidential information. In order to reduce chances of this happening, the participants were given the reasons for using the device and were assured of confidentiality. Their consent was also obtained.

The study included non-participative observations as a method of data collection to supplement interviews. This is a view supported by Wilkinson and Birmingham, 2003 (cited in Blaxter *et al.*, 2006 p.178). They see observations as an extremely handy tool for researchers because they allow them gain a deeper understanding of the complexities of the real world of those being studied, an understanding they can never get by just asking questions. This included observing student's technology interactions, layout of resources, support systems and positioning of the library with regard to the academic units, as well as taking photographs of the environment.

According to Yin, "documents corroborate and augment evidence from other sources" (Yin, 2003 p. 86-7). Taking this advice, the study also used quantitative data consisting of statistical reports available from the library, to validate the responses obtained from the students.

3.3 Participants

According to Bryman (2004), most writers of qualitative research based on interviews recommend purposive sampling because it allows the researchers to sample their participants on the basis of their relevance to the research questions. Consequently, participants for this study were selected from students in two faculties at the University of Nairobi in Kenya, who are involved directly or indirectly in the VeSeL project mentioned in section 2.3. These were chosen based on the assumption that they are familiar with the concept of digital resources because of their involvement in the project and therefore likely to have perceptions of these resources. VeSeL is developing an agricultural knowledge database for the use by rural communities in developing countries and has involved students from the Faculty of Agriculture and the School of Computing and Informatics, who are collaborating with their lecturers and a research team from UK based institutions to develop this system. Further, this combination of the two faculties allowed the researcher the opportunity to study students in two disciplines as per research question three. The VeSeL project also made it possible to include lecturers to participate in the informal interviews for the reasons of triangulation as discussed above. It was therefore possible to carry out interviews with students and lecturers within a very short span of time. The total participants included 13 students, four lecturers and four librarians. This is not an ideal size but due to time constraint of the study, the researcher settled for a smaller size. The researcher was also cognisant of potential bias in the responses from the students who were not only consumers of digital resources but developers of these resources in the project. Consequently further studies will be required to verify findings.

3.4 Data analysis

There are several analytical approaches open to social researchers e.g. discourse analysis, content analysis, grounded theory and thematic analysis (see Aronson, 1994; Blaxter *et al.*,

2006; Adams & Lunt, 2008). Discourse analysis is mainly used in the study of talk and texts usually found in investigation of language in use and language in social context (Wetherell *et al.,* 2001). On this basis, this approach was disqualified for the current study. Content analysis mainly involves identifying words or phrases and counting how many times they occur in a text to determine their significance. This is more of a quantitative approach as confirmed by Blaxter *et al.* (2006) and was therefore deemed as unsuitable for this study. Thematic analysis and grounded theory are similar to the extent that both approaches focus on identifiable themes and patterns and are grounded in the informants' narratives and interpretation of their behaviour within their context. As the study was mainly concerned about the students' perceptions, these two analytical approaches qualified for consideration. However, grounded theory was seen to be too elaborate for the size of and time dedicated to the study (see Strauss & Corbin, 1990 and Charmaz, 2003). On this basis, thematic analysis was preferred as the analytical method for the study. Besides, thematic analysis is perceived as a tool that can be used across different methods (Boyatzis, 1998) and thereby allowing to relate data from different sources. It therefore supported the analysis of the limited quantitative data of usage statistics from the library.

3.5 Ethical issues

Reviewing ethical issues is critical for the success of any investigation particularly in social research (Blaxter *et al.,* 2006). Researchers must negotiate for access and consent from the individual participants. They must also ensure privacy and confidentiality of the information provided. This study adhered to the British Educational Research Association's (BERA) ethical guidelines. Access to the participants was obtained through the VeSeL project coordinator at the university. Information sheets and consent forms were given to potential participants and if they agreed to continue, they were requested to sign the consent form. They were also made aware that any information they provided would be

treated with confidentiality and that they had a right to withdraw from the study if they were not comfortable. In addition, they were assured that data provided would be anonymised before dissemination. Their permission to disseminate was sought. Before the commencement of the interview, interviewees were informed that the interview would be audio recorded and their permission was obtained. The Kenya Government requires that any research be registered with the Ministry of Education. This was done before the commencement of the study and a research permit obtained (see appendix 2). In addition, the study was cleared by the Open University ethical committee (see appendix 3).

Chapter Four: Data Collection, Analysis and Presentation

4.1 Introduction

This chapter consists of two main sections. The first section provides an account of how data was collected in the field by first setting the study context, followed by a discussion of how data collection instruments were used and how data was analysed. The second section presents the analysed data following the main themes identified during the analysis stage.

4.2 Data collection and analysis

4.2.1 Research Context

The study setting is three geographically separated sites of the University of Nairobi, i.e. Faculty of Agriculture located at Lower Kabete Campus about 9 miles Northwest of Nairobi City; School of Computing and Informatics in Chiromo Campus which is about a mile away from the main university campus; and the main library (Jomo Kenyatta Memorial Library) which is at the main campus.

From its size (see figure 1) and location, it is clear that the university lays great importance on the library and highly regards it as the central nerve for its scholarship and research functions. The main administrative services of the library are housed here, but the information services are decentralised across the various college libraries located in each of the campuses. Therefore, both Faculty of Agriculture and School of Computing and Informatics are serviced by their respective college libraries. However, as the researcher observed during the study, there are also faculty libraries that have emerged out of the faculties' initiative. These are autonomous and not part of the university library network,

thus generating a culture within departments and schools of stocking specialist academic resources.

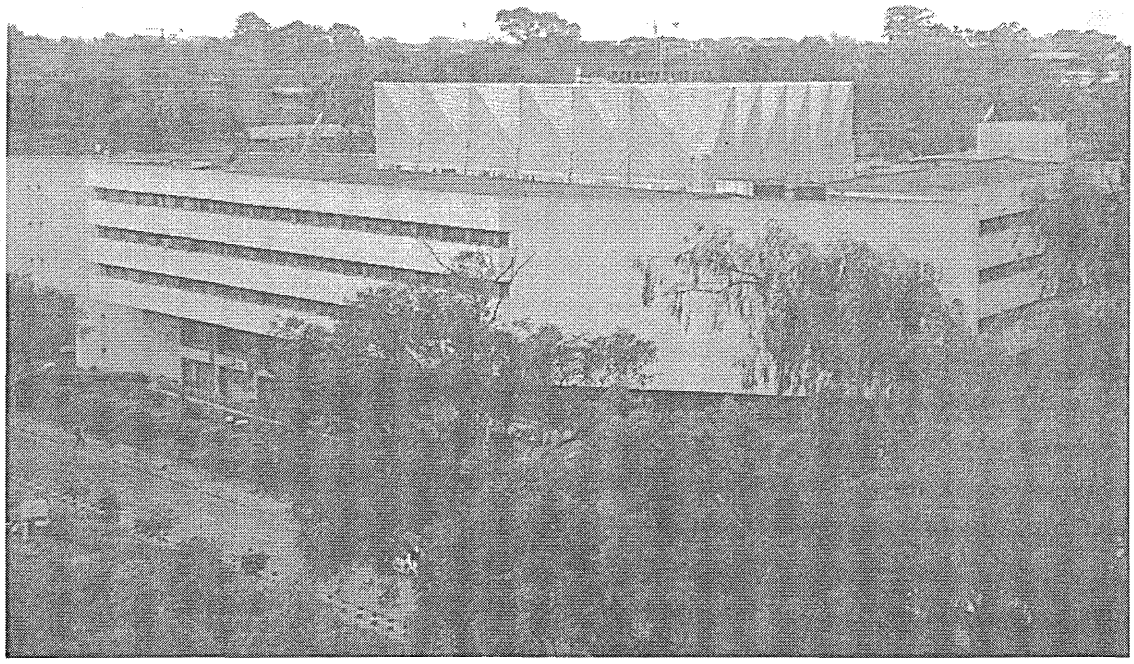

Figure 1: Photograph of Jomo Kenyatta Memorial Library

The library provides a digital collection which is perceived by the library administration as one way of bringing down the library's resources budget allocation. Subscriptions are done through a consortium of universities and colleges called the Kenya Library and Information Services Consortium. The consortium is able to negotiate better subscription prices with the publishers.

Access to these resources is largely by IP (Internet Protocol) authentication with the exception of a few resources that are accessed by passwords and usernames. This means that majority of the resources can only be accessed through the university network as remote access is not possible, therefore undermining one of the benefits of digital libraries.

Promotion of this service is mainly through emails sent to the lecturers and notices posted in the university's intranet. College librarians also receive notices of new subscriptions.

4.2.2 Interview process

Interviews were carried out between 30th April and 21st May, 2008. These consisted of 13 formal interviews with students and 8 informal interviews with lecturers, librarians and the university's ICT director (who is also an academic). Interviews with students lasted between 30 minutes to an hour while the informal ones took between 15 minutes to one and a half hours. All these interviews followed a carefully designed interview schedule (see appendix 3) as discussed in chapter three.

Student participants were recruited with the help of their project supervisors because they knew those who are familiar with digital resources and are in the VeSeL project. The original plan was to interview only postgraduate students who were involved directly or indirectly with the VeSeL project; five in each faculty. However, it turned out that there were three final year Computer Science undergraduate students whose projects are in the VeSeL project. It was considered necessary to include them due to their interest in digital resources. They provided invaluable data. Consequently, a total of eight Computer Science students were interviewed. It is important to note that all the three Computer Science postgraduate students are following a program known as Module II. These are students in fulltime employment and only attend classes in the evenings and weekends. This is significant to the study as will be observed in data presentation because it impacts on access of the resources. Limited time on campus for these Module II students implies that they cannot adequately access resources via the university network and hence require remote access which is not available. In the Faculty of Agriculture, six instead of five postgraduate students were interviewed. This was because when interviewing one of these students, it turned out that she was a visiting economics student from a university in America and was doing her electives in Agricultural economics at University of Nairobi. A decision was made to complete the interview with the hope that she would provide useful data. However, this turned out not to be the case as most of her responses were out of

context and therefore excluded from the analysis. As a result, a sixth student was interviewed.

It was easy to recruit participants for informal conversations as they were identified by the roles they play in relation to this study. For example, the librarians contacted were those directly concerned with the provision of digital resources or the college librarians. It is important to point out that the study coincided with a library audit and hence a very busy time for the library personnel. Some of the librarians interviewed went out of their way to make themselves available. In the case of lecturers, those who supervise the students were interviewed. In addition, the university ICT director who is also a lecturer was interviewed by the virtual of his role as the university's ICT infrastructure implementer. The researcher was aware of potential for bias in the participants' selection process and how this could affect the validity of the findings. With this in mind, she corroborated their responses with what the students had said as well as her observations and documentation gathered from the library. A detailed summary of the participants and their characteristics is provided in appendix 4.

Most of the interviews were audio recorded. Responses from each interview were transcribed the same day where possible. This helped in preparing for the next day's interviews and also in testing the quality of the recording in case there was need for repeat while still in the field, as was the case with the Agricultural student noted above. However, some librarians were wary and preferred not to be audio recorded. For these, hand written notes were used to record the main points in the discussions.

4.2.3 Documentation and statistics

The study had originally assumed that the library keeps sizeable usage statistics for quantitative data which would be used to validate qualitative data. However, it turned out that the only available statistics were publishers reports sent on monthly basis to the library. This came as a surprise given that it is a common practice for libraries to record usage patterns of their resources. Besides, it was an expectation to find well organised data at such a time when the library was being audited. The publishers' reports, though useful did not provide the whole picture as only three publishers' report could be accessed and this weakened the quantitative data. Nevertheless, statistics from one publisher who provides e-journals relevant to the two faculties provided useful data.

4.2.4 Observations

The researcher made observations on the facilities provided i.e. computer laboratories, the library, opening hours and peak times when the facilities were most used by the students. In addition, observations were made on how computers were used to see if there was any usage of digital resources and which resources in particular were being used. For example, when visiting one computer laboratory the researcher was able to confirm that students do indeed access some resources. The researcher was also able to log on to the internet from the laboratories and confirmed that the internet was very slow as will be discussed in the data presentation section. Notice boards were frequently checked in the course of the study to see if library notices existed and the nature of these notices e.g. if they contained information related to the digital library service. One notice board had a notice from a lecturer advising students to refer to some e-journal articles in the library.

4.2.5 The reflexive account of the researcher

The researcher is a trained librarian with extensive working experience in providing a digital library service in Africa. She has also interacted extensively with academics and students in e-learning environments. There was therefore potential for bias and to get emotionally involved in the study. In particular, she constantly struggled with the temptation to interfere with the responses provided by the respondents. For example in certain instances where students expressed their frustrations at not being able to use the resources, the researcher had to exercise restraint from sympathising with the students, which had potential to influence the responses. This was achieved by exercising self-reflection through "sensitizing [herself] to these biases..." (Rubin and Rubin, 2005 p. 32).

4.2.6 Data Analysis

Thematic analysis was done in phases following a systematic order. The first phase involved close reading of transcriptions. Each individual phrase was read and re-read in order to "know one's data" as advised by Hammersley and Atkinson (2007 p. 162) and secondly to see what the respondent was saying. This was important in order to ensure that data analysed reflected the views of the respondent rather than a confirmation of what the interviewer was expecting to find, a view supported by Rubin and Rubin (2005). Concepts were derived from data and given a label or a code that best represented what was reflected in the phrases. This is supported by Hammersley and Atkinson (2007) who state that the first step in analysing qualitative data is to read through the corpus of data and generate concepts that make sense of the data. These codes were noted on the margins of the transcriptions. Appendix 5 summarises these codes. In the next phase, similar codes were grouped together to form categories. These categories were then studied in order to identify relationships, linkages and patterns.

It should be noted that introductory questions in the interview schedule were excluded as they simply provided the background for the discussion. This is a recommendation by Litosseliti, 2003 (cited in Blaxter *et al.* 2006 p.210). The statistical data was summarized in form of tabular description.

4.3 Data Presentation

This study investigated how students in Higher Education in Africa perceive digital resources. This was premised on an initial hypothesis that students are caught in the middle of two perspectives: one driven by the academics that considers these resources as e-learning resources; and the other from the librarians which view them as information resources or digital libraries. The study established that students have more control of how they use these resources. Their perception of the resources is one where the e-learning resources are intertwined with digital library resources, hence making no distinction between the two. Levels of IT skills of both the students and lecturers impact on the students' expectations of the role played by their lecturers as well as how they engage with these lecturers. They see their lecturers as facilitators of information resources usage and access. In this mix, the librarians' role as facilitators of access and usage of information resources is overshadowed as they appear to be excluded from active participation in the learning process. The study also identified a parallel project in which the participants are involved that has some relevance on the current study. The sections below present in details these findings in relation to the four research questions posed in chapter one.

4.3.1 Students' perception of digital resources

In response to the research question about students' level of awareness and usage of the digital resources available to them, findings suggest that students make no differentiation between digital library resources and e-learning resources (see section 1.3 for definitions)

where these two appear to be well connected and are seen as one learning resource. This interconnection became obvious where IT skills were higher among both the students and lecturers. For example students particularly in the Faculty of Computer Science mentioned lecturer-generated resources when asked about the digital resources they have encountered:

> .... A few lecturers would copy their notes on a PC in the class and you can then copy them on to you flash disks. A few lecturers out of their personal initiatives have their personal portals where they put assignments, your marks, course work, the next class what would be studied, the next exams dates. ***(Computer Science Postgraduate student 2)***

This was corroborated by the Computer Science lecturers who are IT skilled. They talked of how they provide digital lecture notes in CDs and on university website expecting students to use them:

> ...I upload all my courses online in the university website, and I give them passwords and even cut CDs for them.... ***(Academic 3)***

The findings also revealed that students are taking more charge of their usage of digital resources. This was exhibited in various ways. The most obvious example is how they look for these resources and use them independently once they become aware of them:

> Basically I handle them on my own. As time goes on, you acquire more experience than your lecturers, or the librarians because you are the one who is interested ... You are the one who knows what you want. Actually it is not like when you are using the library books and you have problems and you have to go and ask the

librarian. But these ones, you tend to separate yourself from the librarian as time goes by. ***(Agricultural student 3)***

This was also confirmed during informal discussions with two Computer Science lecturers:

> … You sometimes don't necessarily have to introduce something, you just suggest and they [students] figure it out, why? Because it is easy for them because they have digital resources like the internet. With time you can see that students have stuff you have not taught. So they basically have mastered on their own… ***(Academic 1)***

Another example is in the response to the research question on whether contextual issues i.e. culture and technology impinged on their perceptions of digital resources. The findings suggest that there were technological factors like limited bandwidth, power failure and inadequate computers in the library that could impinge on the perceptions as well as usage of the resources. In addition, students exhibited a behaviour of persistent determination to access information regardless of these technological hardships. Under normal circumstances, one would expect students to get discouraged and not show interest in using these resources in the face of such access challenges. On the contrary, these students look for solutions such as turning to cybercafés (at their own expense) when internet is down at the university:

> ... We are used to the net being down, so we just go and come back, or maybe you come in the morning … Or you go to a cyber in town. ***(IT undergrad3)***

Could this behaviour of tenacity be a sign of the culture of university students in Africa, who persist in adversity where they have to make do with what is available or look for a way out instead of surrendering? More of this will be discussed in the next chapter.

This tenacity was again observed in how they dealt with what they perceived as a weak library service. Students and their lecturers complained of inappropriate digital library resources and passwords that did not work. This was corroborated by usage statistical reports from one of the publishers as shown in Table1:

Table 1: 10 most popular journals denied access due to lack of subscription license

Month (2008)	**No. of cases denied**
January	55
February	109
March	113
April	77
May	66

Source: data obtained from Wiley Interscience Publishers (2008)

The table shows that there are popular journals among students which the library has not subscribed to. However, this mismatch between what the students require and what is provided by the library did not deter them from using the digital resources; they looked for alternative sources such as their lecturers, free resources from the internet or visited other institutions that have better access to these resources. This is a confirmation that the students have taken control of their usage of the digital resources and will look for different ways of overcoming access barriers in order to meet their objective.

During interviews with the lecturers, it became evident that these students have taken their usage of the resources to a higher level where they have identified gaps in these resources and tried to find solutions. For example, agricultural students have established that there is limited local content available electronically. Local content is very important to them because their projects are locally based. Some students are studying tropical plants that only grow under certain tropical climatic conditions. They would want to compare these plants with other plants under same conditions, but such kind of information is not readily available electronically, even in the university library. Due to this absence of local information in digital format, some students in consultation with their lecturer have decided to create a website (www.try-african-food.com) that contains local information about different types of food grown in Africa. This is an example of how the students have taken control of the usage of these resources.

4.3.2 Impact of students' IT skills on roles of lecturers and librarians

The findings showed that IT skills among the students impacted on how they perceived the support provided by the lecturers and librarians. This was in response to the research question on their perceptions about the support provided by lecturers and librarians. It should be noted that this finding came about while comparing different subject disciplines in efforts to answer research question three: "Does subject discipline of the students play any part in the students' perception of the digital resources?" While there was nothing to indicate that subject disciplines affected the students' perceptions of the resources, two Agricultural students exhibited similar perceptions of the support provided as the Computer Science students. What was common was that both sets of students (i.e. the two Agricultural students and the Computer Science students) had high IT skills, as presented in appendix 4.

It was noted that the highly IT skilled students perceive their lecturers as facilitators of the access and usage of digital resources. This is traditionally the role of librarians. For example, the students claimed that besides lecturers expecting them to use of these resources, they (lecturers) provide guidance of what resources to use, where these resources are located and even provide access to these resources as illustrated in the following excerpt:

> I have got a lot of assistance from the lecturer, in pointing me to the materials; sometimes he has a personal material that he can email me. ***(Computer Science Postgraduate student 1)***

These highly IT skilled students perceived the librarians as having minimal role in the provision of digital resources and instead saw them mainly as providers of print based information resources, typical of what to expect in a traditional print-based library.

> ...we assume that she [librarian] would only be of some help in hardcopies ... the books. For non-print resources, am not aware I can get assistance from there. ***(Computer Science Undergraduate student 1)***

The support provided by the lecturers was deemed to be superior to what the librarians provide even though the librarians have the capacity to provide similar support. For example, when asked whether librarians should provide more support besides providing resources one student responded:

> Not beyond availing the resources that I need, because to be honest, how would he help assuming I had a problem that needed some clarification. I wouldn't expect the

librarian to know how to guide me forward. I would go back to my lecturer to direct me to other resources. ***(Computer Science Postgraduate student 5)***

Another example is with the perception that it is easier to obtain digital resources from the lecturers than from the library because the lecturers can still provide the same. When asked whether digital resources cannot be accessed from the library, a student answered:

> ...why start from the scratch when you can liaise with the supervisors who can tell you where to begin from and it's appropriate because you will get your information. ... ***Agricultural student 4 (IT skilled)***

The highly IT skilled students saw themselves as having the same skills as the librarians when it came to searching for the resources. For example when asked whether he would consider going to seek assistance from the librarian, one student responded:

> For finding resources, not really. I think we have the same expertise in searching for these resources. (***Computer Science undergraduate student 1)***

The less IT skilled students also expected their IT skilled lecturer to facilitate access and usage of digital resources as will be seen in section 4.3.3. However, the study revealed that their expectation of the role of their non-IT skilled lecturers and the librarians remained unchanged. They did not expect these lecturers to provide digital resources. They still went to the librarians for access and usage of the resources in a similar manner as they would for other library resources. Unlike their more IT skilled counterparts, these students exhibited an appreciation of the role played by the librarians as providers and facilitators of digital resources. This means that they perceived librarians in their traditional role as information providers:

> For the librarian, she is the one who introduced us to the electronic journals. Because they have the passwords… they normally assist us on how to get some particular information from certain websites. For us we have a website called Agora, it's a scientific website and very useful to us. So they are the ones who know which sites are relevant to us, at least they have a list of which sites are relevant for students doing this course... ***(Agricultural student 5)***

4.3.3 Impact of students' IT skills on their levels of engagement with lecturers and librarians

The different perceptions of roles presented above affected the way students engaged with their lecturers and librarians. The findings reveal that generally the highly IT skilled students were actively engaged with their lecturers in their usage of the digital resources. However, they interacted poorly with the librarians. They claimed that the lecturers are available; they are their friends and are closer to them.

> He [lecturer] is closer to me as a person, he is polite to me, and he is just a good friend… ***(Computer Science Postgraduate student 1)***

This suggests that they engage well with the lecturers and have an open communication with them. On the contrary, the same students claimed to have had limited interaction with the librarians and expressed having had bad and frustrating experiences with the librarians.

> If you are depending on the library, and you need to go to the librarian for example, you try to explain your problem, may get some resistance, at some point you may

get frustrated because there is no otherwise, it becomes difficult. (***Computer Science Postgraduate student 4)***

They stated that librarians are not available to support them. For example one student claimed how annoyed he had become when he needed assistance from the librarian who was never available and it was evident from his expression that he felt very frustrated by not being able to get support when he needed it.

> …I have tried to use the e-journals. The times I have been there, the librarian is not there. You find that the section is closed. The first time I was very annoyed, because it is a library. ***(Computer Science Postgraduate student 5)***

These negative experiences seemed to have affected their perceptions about the librarians. They saw librarians as running away from their responsibilities:

> In my opinion, the librarian is really somebody who would be able to do as much as possible in what they are asked to do, …if they are not told what to do they will also keep quiet and of course this means less work for them. So I think there isn't that much support and there is an element of laxity. ***(Computer Science Postgraduate student 3)***

However, the reaction of the less IT skilled students revealed a more improved level of engagement with the librarians. They consulted them when they encountered difficulties:

> Mostly when I encounter a problem, I try to enquire from the person seated next to me …or talk to the librarian. ***(Agricultural student 1)***

4.3.4 Impact of lecturers' IT skills levels on students' expectations

The study findings suggest that students expect their IT skilled lecturers to provide or be aware of the existence of digital resources. For example in the Faculty of Computer Science where the lecturers are IT skilled, students depended almost entirely on their lecturers to provide access to digital resources. Instead of going to the librarians, they went to the lecturers to direct them to suitable resources. They expected their lecturers to be aware of these resources. This can be explained by the fact that the lecturers know the value of these resources, they use them and have become proactive in encouraging their students to use the resources. This was confirmed by the lecturers during informal interviews.

> When we give them assignment, we give them tasks, we often say, "Please check this link, look for this material and look at what else you can get". ***(Academic 1)***

This was again corroborated by the researcher's observation of a notice on the notice board in the Faculty of Computer Science advising students to refer to a list of e-journals from the library.

The same was observed in the Faculty of Agriculture. This is a faculty where there is a mix of both IT skilled and non-IT skilled lecturers. It was observed that students expected their IT skilled lecturers to direct them to digital resources:

> They are the ones who direct me to particular websites that they themselves use, that they themselves were using and the ones they are confident can give me the kind of information I want. They can even direct you to a particular book in the library so you don't just go to the library without knowing what you are getting. ***(Agricultural student 4)***

However, they made it clear that their non-IT skilled lecturers had nothing to do with the use of digital resources and thus did not expect them to be aware of these resources let alone providing them. They saw them as traditional lecturers who still use their old notes, implying that they do not use more current information available from digital resources and hence could not expect them to use digital resources:

> The lecturers are not very much involved in this technology. I think they are still behind, because even the way they do their presentation, most of them still use their notes instead of using PowerPoint presentations which save a lot of time. So for the lecturers I think they are still behind, we could be ahead of them. ***(Agricultural student 5)***

This was confirmed by their more IT skilled supervisor during informal interview:

> ... in our university, if you look at the older generation of the professors, they are not using computers. In fact you can go to their offices, you find that they don't have them; they think they are a bother. Not all of us have embraced the technology. ... ***(Academic 3)***

4.3.5 The VeSeL project and the current study

As discussed in the methods chapter, this study focused on students and lecturers who are also directly or indirectly participating in the VeSeL project. This inadvertently presented the researcher with data that can be used to inform new directions in the future role of developers and facilitators of digital resources in e-learning environments. In this project, students are partnering with their lecturers and other stakeholders in a complex e-learning

environment where on one hand they are learning as they work through their final year projects based on VeSeL project. On the other hand, they are actively contributing towards an informal e-learning process for the community as creators of knowledge and facilitators of knowledge exchange. In this process, the Agricultural students go to the community, establish their information and learning needs and then look for information to meet these needs. They then work with their counterparts in the School of Computing and Informatics who are designing mobile devices with interfaces that are friendly to the community. Then they go back to the community to test these designs and the suitability of the information content.

At another level, the project team is designing online spaces for networking and knowledge exchange. This leads to creation of an informal e-learning environment, where the communities can access knowledge that will improve their livelihood and at the same time participate in knowledge exchange with other interested parties. This entire process is highly collaborative and user-focused.

The VeSeL project and University of Nairobi's provision of digital resources have similar objectives of providing these resources to end users whereby the VeSeL project is providing resources to the community and the university is providing the resources to the students. These two processes are happening in the same university but at different levels and in different ways, yet one seems to be more end user focused than the other. As will be discussed in section 5.3, the VeSeL project which is more end user focused could provide a model for digital resources provision in an e-learning environment where both librarians and lecturers can collaboratively work together to provide digital resources to the end user (i.e. the students).

4.4 Data presentation conclusion

The results indicate that students are taking more control of their usage of digital resources where they perceive e-learning resources and digital library resources as one resource. In addition, high IT skills among students and lecturers are impacting on students' expectations of roles and levels of engagement with lecturers and librarians where the librarian's role is being taken on by the lecturer. The findings also identified the VeSeL project as having some relevance to the current study. A detailed discussion of these findings is presented in the next chapter.

Chapter Five: Data Interpretation

This chapter presents conclusions based on the extraction of the main themes that have emerged out of the data analysis as presented in appendix 5. These include (i) the students take control of their usage of the digital resources while making no differentiation between the digital library resources and the e-learning resources; and (ii) the high IT skills among students and their lecturers impact on students' expectations of roles and levels of engagement with lecturers and librarians. The chapter also draws on conclusions from the VeSeL project.

5.1 Student's control of digital resources: breaking down the boundaries between digital library and e-learning resources

As discussed in chapter one, digital resources in universities can be seen from both an e-learning perspective and a library perspective. In this study, students appear to be heavily influenced by the e-learning perspective. They perceived e-learning resources provided by their lecturers in form of digital lecture notes as the same as what they obtained from digital resources from the internet or the university library. This interconnection between the two kinds of resources appeared to be greatly influenced by their IT skilled lecturers. As seen from the data analysis, these lecturers expected their students to access digital lecture notes provided in CDs or uploaded in the university website while at the same time use e-journals from the library and other online databases. This suggests that lecturers, like their students do not make any differentiation between the two resources. Digital resources are therefore seen by students and their lecturers as a learning tool that enables students achieve their learning goals such as pass exams, complete projects or class assignments. This demonstrates a situation where usage of these resources is driven by the learning perspective and the key players being the students and their lecturers. The findings of this study seem to agree with previous studies. For example, Sumner *et al.,* (2004) while

writing about educator's perceptions of quality digital libraries referred to the digital libraries as learning tools. They called them "cognitive tools" that enable students to think about and work with ideas and knowledge to support learning and sense-making.

The students interviewed in this study are self directed. Once they have been introduced to the digital resources, they take control of their usage process. They exhibit an independent usage of the resources. For example, when their lecturers guided them to these resources, they used them independently. They also showed determination against challenges to achieve their objectives. As already pointed out in chapter one, higher education in Africa faces technological challenges, i.e. poor internet connection, inadequate computers and unstable electricity supply. At the same time, the library service is weak; there are inadequate resources and staff are not fully skilled to provide a digital information service. These challenges can hinder effective usage of digital resources (Muswazi, 2000; Mutula, 2004; Ajegbomogun, 2007; Mutula, 2007). This study confirmed presence of these challenges. However the students studied showed persistent determination and the challenges did not deter them from using the digital resources. Under such situations, it is reasonable to expect the students to show preference for print-based resources such as textbooks which do not depend on technological conditions. However, this was not the case, thus contradicting previous studies by Tenopir *et al.* (2003) and Liu (2006) which revealed preference for print-based resources over digital resources.

The above raises an issue of whether the students in Africa have become hardened by the contextual challenges that have plagued the continent for a long time, and have decided to look for a way out by being tenacious. In this case, is this an issue of culture whereby these students have grown up knowing that they must persistently struggle in order to achieve their objectives, and hence an answer to the fourth research question of this study? Or

could this behaviour be an indication that digital resources have empowered these students to take charge of their learning? This raises need for further research.

The study also portrayed these self-directed students as exhibiting exploratory learning skills. These students have ingeniously developed a website to meet a gap they have observed while using digital resources. The Agricultural students expressed a need for local content as they use the resources to support their projects which are based locally. For example, they are researching on tropical plants under tropical conditions and would therefore want to access information that contains similar contexts. Unfortunately, most electronically available resources contain information that is not African, thus creating an information gap which students clearly identified. However, they have gone a step further and decided to look for ways to reduce it by developing a website that contains information about local food; how it is grown, scientifically proven nutritional values and some recipes. The concept of filling a gap that has been identified demonstrates that students are not just using the resources. Rather, they are well engaged with the resources and eager to explore opportunities.

These self-directed, independent students, who have taken control of their learning process while using digital resources, seem to fit within the constructivist theory of learning which assumes that learners learn by doing through a process of making sense (Kovalchick and Dawson, 2004). It also confirms Carnaby's (2005) assertion of what she refers to as the next generation learner who operates within "a learner-centric pedagogy that takes on a new meaning as the learner interacts with the educator and at times chooses to move from the prescribed e-leaning experience into a world of discovery and exploration of their own" (Carnaby, 2005 p. 352). This raises issues for consideration by the key players in e-learning environments including librarians. Perhaps all the students require is an enabling environment. Schneider (2006) commenting on what he calls a "free range librarian" sees a

transformed librarianship practice which is more user-focused. According to him, the most significant help librarians can give to their users "is to add value and meaning to the information experience, wherever it happens; defend their right to read; and get out of the way" (Schneider, 2006 p. 2). Web.2.0 tools that enhance creativity while promoting social networking and sharing provide a way of adding value to the provision of digital resources to this kind of students. Quintana and Zhang (2004) have explored a different method of providing value add service that is learner centred. They design scaffolding software for digital library users to support them use and make sense of information available in the library. Their IdeaKeeper notepads are scaffolded notepads which "support learners by connecting their goals to their reading, guiding reflection and articulation, and implementing a framework by which learners' notes and articles are linked, saved and viewed together to aid with seamless information management" (Quintana and Zhang, 2004 p.1329).

5.2 The impact of IT skills on role expectations and levels of engagement

Koohang (2004) established that IT skills affect students' perceptions of digital resources. His study revealed that those students who had prior experience with the internet perceived these resources more positively than those who did not have. This implies that presence of IT skills among the students impacted positively on how they perceived the resources. In the current study, IT skills also affected students perceptions albeit differently. Higher IT skills among students and lecturers affected roles expectations as well as levels of engagement in regards to user support unlike in Koohang's study where IT skills affected their perceptions of the resources.

Although the intention to compare two subject disciplines was driven by the need to see if disciplinary difference in students' perceptions exists, this instead presented the study with findings suggesting that it is not the disciplinary differences that affected perceptions but levels of IT skills. As was presented in the previous chapter, two highly IT skilled students in the Faculty of Agriculture that is perceived to have lesser IT skilled students, demonstrated similar perceptions as Computer Science students whose IT skills are superior. Equally, the perceptions of support from IT skilled lecturers at the School of Computing and Informatics were similar to those expressed by Agricultural students towards their IT skilled lecturer. In these two cases, the common denominator is IT skills which can be interpreted in a number of ways in this study:

Firstly, the fact that both more skilled and lesser skilled students expected their IT skilled lecturers to be information providers, a role played by librarians, suggests a learning driven perspective as was discussed in the previous section. This can be explained by the fact that IT skilled lecturers are more empowered to exploit the benefits of electronic tools such as creating e-learning environments and ability to access wealth of resources available electronically. These IT skilled lecturers seem to be aware of the resources around them and are driving the process without input from the librarians. This seems to agree with studies done by Adams and Blandford (2002) and Appleton (2006) which concluded that academics have poor awareness and understanding of digital libraries. However, like the lecturers in this current study, these academics still looked for alternatives such as web resources and online personal collections which did not depend on the librarians' assistance. Even though the current study revealed a weak digital library service at the university, lecturers did use other means to access digital libraries, hence demonstrating awareness and understanding of the value of these resources. This confirms Rasmussen's observation that "staff and students are seemingly managing to exist without the benefit of a general university library..." (Rasmussen, 1998 p. 2). The result is the change in role

expectation by the students towards their lecturers as well as high levels of engagement where students felt free to consult them for support and guidance. As Rasmussen further wonders, this raises a critical question of whether libraries are needed or what are their roles and functions.

Secondly, the study showed that the more IT skilled students perceived the support provided by the librarians differently from the less IT skilled students. The former seemed to downplay the role of the librarians. They perceived them as less helpful and less IT skilled. It can be argued that these students engage poorly with the librarians because their high IT skills put them in a position where they can the do a lot of digital information searching and access resources on their own without much need for the librarian's support. This is more evident in the African context where it was observed that the librarians are generally less IT skilled. On the contrary, the lesser IT skilled students valued the librarians' support. They consulted them for assistance and guidance. They also engaged well with them. In other words, to these less IT skilled students, the librarians were still information providers. It can be argued that unlike their more IT skilled colleagues who are comfortable with the use of technology and can find a lot of information on their own, these students depend on outside support and would therefore appreciate even basic assistance such as being told what information resources are available. This seems to suggest that the more IT skilled one is the less dependent she or he is on the support from the library in regards to usage of digital resources, particularly where the librarian has equal or lesser IT skills than the student. The implication is that there is an inevitable need for change in the role of the librarian to fit into the demands of an e-learner. A number of authors have alluded to this. For example, Sharifabadi asserts that "librarians have worked at translating what they do in a traditional library into virtual or digital environments, while customising their services and resources for e-learners" (Sharifabadi, 2006 p. 395).

Finally, these findings seem to suggest some implications for the profession of librarians and lecturers. Although the size of this study was too small to provide a basis for drawing firm conclusions, the findings suggest that the role of the librarians as mere information providers is being extinguished in e-learning environments. This is as a result of students taking charge of their learning and usage of digital resources, and lecturers gaining more IT skills to enable them exploit the wealth of digital information and tools. Yet the librarian has information management skills that can leverage learning and teaching in an e-learning environment as observed by Carnaby (2005). Carnaby's view is that the librarians are in a natural position to be a proactive partner in the development of "next generation" e-learning experience because of their background and understanding of standards-led architectures that have lead to information access and systems interoperability. Littlejohn *et al.* (2006) further emphasize the need for library and information professionals to work closely with the academics because managing educational content is a complex process that involves a number of elements e.g. storing, retrieving and re-using resources. Perhaps taking the constructivist approach where the provision of the digital resources is more student-centred and at the same time engaging more with the academics would make the librarian's role more visible in e-learning.

5.3 The VeSeL project and the current study

The VeSeL project in which the study participants (i.e. students and their lecturers) are involved presents a user-centred, more collaborative model. Students, their lecturers and a team of researchers are engaging actively with the communities (end users). Through this process of user engagement, the team is able to understand the needs of the end users and how best to meet them. This involves provision of appropriate information resources using appropriate technologies i.e. mobile phones. It also involves creation of virtual spaces for learning and knowledge exchange. This results in an informal e-learning environment,

where the communities can access knowledge that will improve their livelihood and at the same time participate in knowledge exchange with other interested parties. The team is taking the role of e-learning facilitators. At the same time they are also acting as information providers, a role that traditionally belongs to the librarians. Librarians, in a traditional print-based library setting provide information for learning to their students and lecturers. In these libraries, there are also seminar rooms and open physical spaces where their readers meet to exchange information and knowledge. In other words, librarians are facilitators of this process, just as the VeSeL team is facilitating information exchange in the e-learning environment.

Currently, two models exist at the University of Nairobi but at different levels (i) "Traditional librarian/lecturer model" which is less collaborative and non user-centred at the institution level; and (ii) "VeSeL's expert/end-user focused model" that is also highly collaborative, at the project level.

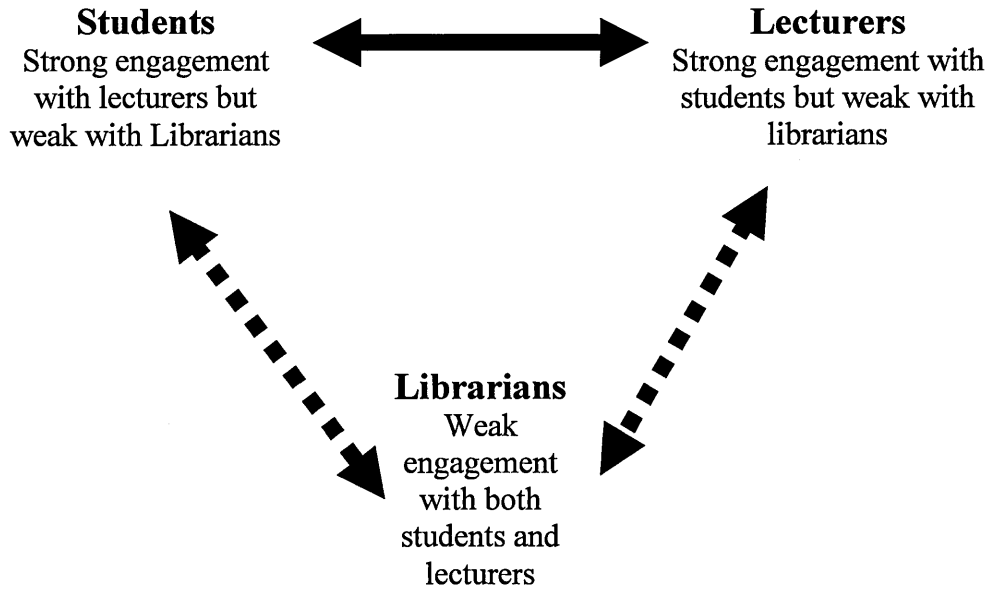

Figure 2: Traditional librarian/lecturer model

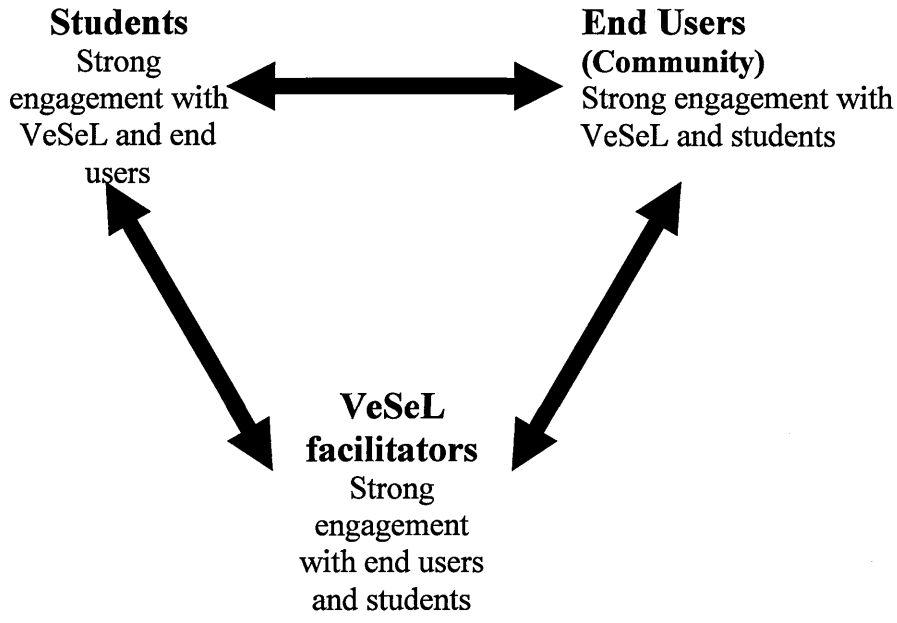

Figure 3: VeSeL's expert/end-user focused model

Even though librarians do not appear to take an active role in e-learning as revealed in this study, the VeSeL project provides a model where they can engage with the students better and allow for better support for the lecturers in developing and supporting e-learning through the use of digital resources. This model is similar to what Sharifabadi (2006) conceives as a collaboration between the library and the faculty which "promotes a responsive approach to course design and supports teaching and learning objectives, particularly when this collaboration incorporates students contributions and feedback" (Sharifabadi, 2006 p.394). Such a collaborative approach is emphasized by Borgman (2008) when she asserts that there is need for a broader more integrative conversation between the different stakeholders of scholarly communication.

Chapter Six: Summary of Findings and Conclusion

6.1 Introduction

Developments in ICTs are changing teaching and learning methods. For instance there is massive growth in e-learning and a wealth of scholarly publications is now available online. This study focused on university education in Africa. Demand for access to higher education is great; however the institutions of higher learning are constrained by limited resources to meet this demand. The Gross Enrolment Ratio has remained below 5% for most countries in the region. E-learning promises a way out and access to wealth of resources found in digital libraries adds quality to learning. Therefore, organisers of e-learning and digital resources have the potential to become highly critical to the future of higher education particularly in Africa.

In the above context, digital resources can be seen from two perspectives: (i) the e-learning perspective which lays emphasis on content production, collaboration and exchange of knowledge; and (ii) the libraries' perspective with the focus on content organisation, retrieval and access. Both perspectives have a role in mediating and providing the interface between the extraordinary riches of the digital world and the planning and presentation of the e-learning courses. As the two perspectives exist mainly to provide support to students, it is necessary to establish if the African experience makes the connection between the two perspectives easier for the student.

This chapter summarises findings of the study. A brief discussion of the study limitations is presented. The chapter concludes with suggestions for future research.

6.2 Summary of the findings

The specific purpose of the study was to investigate the perceptions of students on digital resources in universities in Africa. Four research questions were used, namely:

1. What is the students' level of awareness and general usage digital resources available to them?
2. How do they perceive the support provided to them by the librarians and the academics?
3. Does subject discipline of the students play any part in the students' perception of digital resources?
4. In the context of the responses to questions 1 to 3 above, do any cultural (including technological) issues impinge on students' perceptions of digital resources?

This study adopted a mixed methods approach with qualitative method being more dominant, and was carried out within a case study design involving University of Nairobi students, lecturers and librarians. A case study design was preferred because of its suitability for small- scale studies as it allows the researchers to focus on fewer cases. Case studies are also preferred in studies that seek to answer the 'how' questions. The study sought to answer the 'how' question of learners' perceptions of digital resources.

The main method of data collection was in depth interviews with students as they allowed the students describe their perceptions, explain their answers and give examples. A semi-structured interview schedule with open-ended questions was followed as it allowed students to tell their stories. At the same time the researcher was able to probe and make follow-ups for emerging issues. This was triangulated with informal interviews with librarians and lecturers; statistical data available from the library; and observations. Purposive sampling was used to identify students who are familiar with the use of digital

resources and from two different subject disciplines. The participants included five postgraduate students from the Faculty of Agriculture, five Computer Science postgraduate students and three Computer Science undergraduate students from the School of Informatics and Computing. In addition, there were four lecturers and four librarians. Thematic analytical approach was adopted to analyse the data.

The findings revealed that although the university places high importance on the role of the library in research and scholarship, there is poor usage of the library's digital resources, usability difficulties and inappropriate provisions of digital resources.

The study also found that high levels of IT skills among students and lecturers are impacting on students' perceptions of roles of the academics and librarians. They are also impacting on their levels of engagement. Lecturers take the role of facilitating access and usage of these resources in addition to their role as e-learning facilitators. Students have more engagement with their lecturers as they access and use the resources. This also results in a learning environment where digital resources and e-learning resources are intertwined. At the same time, students are taking more charge in their use of digital resources in an e-learning environment despite contextually related challenges i.e. poor technological infrastructure. These students are tenacious, self directed and exhibit exploratory learning skills. In this mix, the librarians' role as facilitators of access and usage of information resources is overshadowed as they appear to be excluded from active participation in the learning process. Besides being perceived as having inappropriate skills to provide a digital resources service, there is limited collaboration between lecturers and librarians and between librarians and students. As a result, there is a mismatch between what the library provides and what the lecturers and students expect from the library. However, where students have low IT skills and no e-learning going on, students perceive librarians as providers of information and their levels of engagement are high.

The study also identified a possible model within the VeSeL project in which some of the participants are participating. The VeSeL project is end-user focused and highly collaborative. Even though librarians do not appear to take an active role in e-learning as revealed in this study, the VeSeL project provides a model in which they can engage with the students and lecturers better and support the lecturers in developing and supporting e-learning programmes.

6.3 Limitations

There are a few limitations of this study. The first one relates to the fact that at the design of the study, it was assumed that the library maintains statistics of the usage of digital resources. These were seen as necessary quantitative data to triangulate qualitative data from the other sources for the purpose of validation. However, it turned out that the library does not keep these statistics and instead depends on the publishers' reports which were not comprehensive enough and hence limiting. For example it was not possible to tell the specific resources used by the students being investigated by merely looking at the figures and the only way was to look at the subject of the resources and align them with the subject disciplines of these students. In addition, the size of the data was too small for quantitative data envisaged during the design of the study. All the same the researcher was able to identify some useful reports although library generated reports would have added more strength to the study.

The second limitation was the scarcity of recorded empirical work done in Africa that relates to the subject of the study. This implied that a lot of the literature reviewed was mainly from Europe and America.

The third limitation relates to potential presence of bias in this study caused by the choice and size of participants who were also involved in a project (VeSeL) dealing with digital resources. It is possible that the participants drew their perceptions from their experiences in the VeSeL project as they repeatedly mentioned it. The researcher was conscious of this but due to time constraint as well as the suitability of these participants in answering the research questions, she decided to choose them and triangulate the methods of data collection in order to try and strengthen the findings validity. This however suggests the need for a larger sample that includes other participants not in the VeSeL project.

The final limitation related to the nature of this study. Being a small-scale study with limited time dedicated to it brought constraints on the choice of the methodology. For instance, grounded theory analytical approach would have been suitable for analysing the data as discussed in the methodology chapter, yet the time available was not enough to use that approach. Further, the fact that it was a small-scale case study in just one African country means that there is a limit on the extent to which the findings can be generalised as representing Africa. This suggests need for multiple cases involving more than one African country.

6.4 Suggestions for further study

Although this was a study of perceptions, the findings led to a conclusion related to the behaviour of students who are self-directed. One way of explaining this behaviour is that digital resources have empowered the students to take charge of their learning. It could also be the result of the tenacity exhibited by these students through the contextual challenges they are faced with. Additional research need to be done where students in two contexts (i.e. technologically enabled Western environments and less technologically

enabled environments like those in Africa) are compared in order to establish if they exhibit similar behaviour in order to draw more sound conclusion.

The VeSeL model of user-centred approach where both academics and librarians can collaborate in an e-learning environment is worth testing. The study established that librarians are left out of participation in an e-learning environment. Yet, they have skills that when combined with those of academics can leverage the benefits of ICT-enabled learning and provide a more student-centred service. The model provided by VeSeL project should be tested in order to identify ways in which librarians, lecturers and students can engage with each other within the framework presented in this model.

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Appendices

Appendix 1: Semi-structured interview schedule

The points listed below will provide the framework for the interviews. This should follow an introduction section mainly covering information contained in the participant information sheet and the signing of the consent form by the participant.

A. General background details of the participant

1. What academic program are you undertaking at the university?
2. For how long have you been doing it?
3. Can you describe your experience with any information technology/equipment you have used or are familiar with?

   Prompt: How long have you used this technology?
4. Is there anything you would like to tell me about digital libraries generally?

B. Level of awareness and general usage of digital resources available to the learner

5. How would you define the term digital resources?
6. Can you give me examples of the ones you are aware of?
7. Where have you encountered them?

   Prompt: Have you encountered them from the university?

   If not, where?
8. What digital resources have you ever used?
9. What was your motivation for using them?

   Prompt: What have you used them for?

   Where have you used them?

What made you use them?

10. Can you describe how often you have used them?

11. What your experience of using them has been like?

12. What is your general impression of these resources?

13. Do you think it makes a difference in your learning process whether you use the digital resources or not? Please explain your answer.

C. Learners' perception of the support provided to them by the librarians and the academics

14. What happens if you encounter difficulties when using these resources?

    Prompt: Do you seek assistance or do you just abandon the resources?

    If you seek assistance, from where/ whom? Librarian? Lecturer?

    What do you think of that assistance? How would you rate it?

15. Can you describe any support you get from the librarian?

    Prompt: Do you get this support after you have requested for it or the librarian provides it out of his/her own initiative? What are your views of this support?

16. Can you describe the part played by your lecturers in your usage of the digital resources? What are your views about this?

    Prompt: If they do not play any part, what is your view about this?

17. In order for you to become a successful learner, do you think it is necessary to get any support from both your lecturer and the librarian in your usage of digital libraries? Please explain your answer.

18. In your opinion, do you think the librarians and the lecturers in this university collaborate to provide a digital library service? Do you think this collaboration is necessary? Would it make any difference in the delivery of this service to you?

D. Technological and cultural factors that affect the learners' general usage of the digital resources

19. Can you describe any challenges you encounter in your usage of the resources?

    Prompt: check out for technology and cultural related challenges

20. Digital libraries have origin in the Western world. Does this facilitate or impede your usage of the digital resources? Can you explain your answer?

    Prompt: Does this affect the way you perceive digital resources?

21. What kind of influence do you see digital libraries having on our African culture?

22. Would this affect your choice of resources?

    Prompt: If yes, how and why?

        If no, why?

E. Influence of subject disciplines on the learners' perception of the digital resources

23. As an Agricultural /ICT student, what do you think about the digital resources provided to support your learning process?

24. What do you think supports your learning better: digital resources or printed resources? What are the reasons for your answer?

F. Conclusion

Round off the interview by summing up all the issues covered during the interview.

Informal interviews: Lecturers

1. How often do students come to you seeking for support, or advice on the use of digital resources?
    - Do they actually seek this kind of support from you?
    - Do you direct them to any of the resources?
    - Which ones?
    - Why?
2. Do you use any of the digital resources?
    - Which ones?
3. What are your views about students' perceptions of these resources?
    - Do they appreciate or value them?
    - Are they motivated to use them?

Informal interviews: Librarians

1. How often do students come to you seeking for support, or advice on the use of digital resources?
    a. Do they actually seek this kind of support from you?
    b. Do you direct them to any of the resources?
    c. Which ones?
    d. Why?
2. What are your views about students' perceptions of these resources?
3. Do they appreciate or value them?
4. Are they motivated to use them?

Appendix 2: A scanned copy of Ministry of Education (Kenya) research authorization

REPUBLIC OF KENYA

MINISTRY OF HIGHER EDUCATION SCIENCE & TECHNOLOGY

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

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

When Replying please quote

Ref. MOST 13/001/ 38C 89/2 **29th April 2008**

Pauline G. Ngimwa
Open University
UNITED KINGDOM

RE: RESEARCH AUTHORIZATION

Following your application for authority to carry out research on, ***'Students Perception of Educational Electronic Resources in African Higher Education'***

I am pleased to inform you that you have been authorized to carry out research in Nairobi for a period ending **30th April, 2009.**

You are advised to report to the Provincial Commissioner and the Provincial Director of Education, Nairobi Province before embarking on your research project.

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

M. O. ONDIEKI
FOR: PERMANENT SECRETARY

Copy to:

The Provincial Commissioner
NAIROBI

The Provincial Director of Education
NAIROBI

Appendix 3: The Open University Human Participants and Materials Ethics Committee Approval Letter

The Open University

MEMORANDUM

HUMAN PARTICIPANTS AND MATERIALS ETHICS COMMITTEE

FROM:	John Oates, Chair, HPMEC	**Email:**	**j.m.oates@open.ac.uk**
TO:	Pauline Ngimwa, research student IET	**TEL:**	52395
CC:		**DATE:**	April 17, 2008
SUBJECT:	**Ethics application:** AN EVALUATION OF LEARNERS' PERCEPTIONS OF DIGITAL LIBRARIES IN AFRICAN HIGHER EDUCATION	**Ref:**	**HPMEC/08/#417/1**

This memorandum is to confirm that the research protocol for the above-named research project, as submitted on 31st March 2008, is approved by the Open University Human Participants and Materials Ethics Committee, subject to satisfactory responses to the following:
You are asked to:

1. Add to the information sheet and consent forms a note that the participants' use of the digital library will be surveyed;

2. Add to the information sheet and consent forms a note that the information may be used for educational or research purposes, including publication;

3. Note that the word 'Educational' is missing from Dr. Anne Adams address and correct this;

4. Provide further information regarding your data storage protocol, including how long the recordings will be kept for, and whether personal data be kept separately from the interview schedules to protect confidentiality and preserve anonymity.

Please supply revised information sheet and consent form copy for review, and the further information asked for in 4 above, so that the completion of your ethics approval can be considered.
At the conclusion of your project, by the date that you stated in your application, the Committee would like to receive a summary report on the progress of this project, any ethical issues that have arisen and how they have been dealt with.

John Oates
Chair, OU HPMEC

Appendix 4: Characteristics of the participants

Names (coded)	Age range (yrs)	Gender	Digital Library user	Digital content developer	Computer experience (moderate/superior)
Computer Science Postgraduate student 1	30-45	Male	Yes	No	Superior
Computer Science Postgraduate student 2	30-45	Female	Yes	No	Superior
Computer Science Postgraduate student 3	30-45	Male	Yes	No	Superior
Computer Science Postgraduate student 4	30-45	Male	Yes	No	Superior
Computer Science Postgraduate student 5	30-45	Male	Yes	No	Superior
Computer Science undergraduate student 1	20-25	Male	Yes	No	Superior
Computer Science undergraduate student 2	20-25	Female	Yes	No	Superior
Computer Science undergraduate student 3	20-25	Male	Yes	No	Superior
Agricultural student 1	20-30	Male	Yes	Yes	Moderate
Agricultural student 2	20-30	Female	Yes	Yes	Moderate
Agricultural student 3	20-30	Male	Yes	Yes	Superior
Agricultural student 4	20-30	Male	Yes	Yes	Superior
Agricultural student 5	20-30	Female	Yes	Yes	Moderate
Academic 1	40-55	Male	Yes	Yes	Superior
Academic 2	40-55	Male	Yes	Yes	Superior
Academic 3	40-55	Male	Yes	Yes	Superior
Librarian 1	40-55	Male	Yes	No	Moderate
Librarian 2	40-55	Female	Yes	No	Moderate
Librarian 3	40-55	Male	Yes	No	Moderate
Librarian (ICT)	40-55	Male	Yes	No	Superior
ICT Director	40-55	Male	Yes	Yes	Superior

Appendix 5: Thematic codes

NB: Main headings have been drawn from research questions

1 Background

1.1 User characteristics

1.1.1 Experience with ICTs

1.1.2 Part time students [1]

2 Level of awareness and usage of digital resources

2.1 Awareness of e-resources for learning purpose

- Permission to access required[2]

2.2 Awareness of e-learning content[3]

- e-learning content created and usage facilitated by lecturers
- Accessible from the university
- An appreciation of these resources

2.3 Searching skills [4]

- Existence of searching skills
- Self acquired
- A necessity for effective usage
- Agric students do not have IT and searching skills but they consult among themselves

2.4 Usage of internet resources

- Ease of use
- Free downloads
- In search of credibility and quality[5]
- Frequency of usage
- Not enough time for frequent usage[6]
- Issue of quality

2.5 Access points[7]

2.5.1 University

- Free access due to subscriptions

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[1] Students registered in Module II (parallel program). They are mainly part time students in full time employment but meet in the evenings for studies. These are MSc. Computer Science students
[2] Pointed out by Agriculture student
[3] Mainly by IT students
[4] This is an emerging subtheme
[5] A contradiction – could fit well with user generated support as students do this in order to confirm credibility and give confidence
[6] A contradiction
[7] An emerging subtheme

2.5.2 Access at work[8]

2.5.3 Access from cybercafés

2.6 Perceptions of digital resources

2.6.1 Positive perception

- Invaluable resources for learning
- Provide wider perspectives
- Overcomes problems of book scarcity
- Provides wider access
- Good resources but hampered by challenges
- Limited access and need for subscriptions
- Challenges do not affect perceptions

2.6.2 University library weak in digital resources[9]

- Limited resources
- Inappropriate resources
- Poor perception of the library
- Passwords do not work
- Few computers
- Resources not properly marketed

2.7 Experience of using digital resources

2.7.1 Complicated by need for passwords and infrastructural challenges

2.8 Motivation and reason for use

2.8.1 Research work

2.8.2 Academic credibility

2.8.3 Provides an enriching learning experience

2.8.4 Provides current and free content

3 Perception of support provided by librarians and academics

3.1 Perceptions of Librarians support

3.1.1 Negative perception[10]

- Students' lack of appreciation of the support provided by librarians
- Bad experiences with the librarians
- Librarians not available to provide assistance
- Students consider themselves more skilled than the librarians
- Students do not consider obtaining support from librarians
- Students view that librarians should only provide information about the resources availability and their location

[8] Restrictive – no remote access
[9] Emerging theme
[10] This is IT students perception

- Librarians should not teach information skills program
- Librarians have not marketed their digital resources to students

3.1.2 Positive perception[11]

- Acknowledgement of support provided
  - Passwords
  - direction
- Librarians are proactive
- In defence of librarians....Does not know librarians can assist[12]

3.2 Perception of lecturers support

3.2.1 Preference for support from lecturers

- Lecturers are closer to students and have more contact hours with them
- Lecturers encourage use of resources
- Lecturers obtain digital resources for students
- Lecturers have low IT skills[13]

3.3 Support from both lecturers and librarians necessary

3.4 No collaboration between lecturers and librarians

3.5 Librarians should be academics

3.6 Students solve problems by themselves[14]

3.7 Persistent determination (tenacity)[15]

3.8 Library services[16]

3.8.1 Low perception

- Unfavourable library opening hours
- Inadequate computers
- Passwords not working
- Subscriptions are not renewed
- Low skills among librarians

3.9 Payment of resources[17]

3.9.1 Cannot access resources because passwords or payment required

[11] This is Agricultural students perception
[12] Contradiction
[13] A contradiction
[14] Emerging subtheme and a contradiction
[15] Emerging subtheme
[16] Emerging subtheme
[17] Emerging subtheme

4 Contextual factors affecting usage

4.1 Technical factors

4.1.1 Poor infrastructure

- Low bandwidth
- Power failure
- Inadequate computers
    - Agricultural students cannot afford the cost of acquiring computers
    - Creates need to go to the cybercafés

4.2 Cultural factors

4.2.1 Western origin of digital resources does not affect usage

4.2.2 Western origin encourages students seek contextual solutions

4.2.3 Local content

- Not well represented though preferred[18]

4.2.4 Mixed perceptions on the impact on African culture

5 Influence on subject disciplines

5.1 Preference for digital resources

5.2 No preference for print resources

[18] An observation made by Agricultural students because of the nature of their research which is locally based

Students' Perception of Digital Resources in Higher Education in Africa

Submitted in partial fulfilment for Master of Research in Educational Technology

The Open University

By Pauline Ngimwa, Bsc (Hons), MPhil.

November, 2008

Abstract

The purpose of this study was to investigate the perceptions of students on digital resources in universities in Africa. Digital resources in this study encompassed information resources from digital library and from e-learning. A mixed methods approach was employed with qualitative method being dominant, and was carried out within a case study design involving University of Nairobi students from two disciplines, lecturers and librarians. Interviews with students were triangulated with informal interviews with their lecturers and librarians, observations and documented quantitative data. The data was analyzed using thematic analytical approach.

The study found that students take control of their usage of digital resources. They perceive e-learning resources and digital library resources as intertwined into one learning resource. In addition, high IT skills among students and lecturers impact on students' expectations of roles and levels of engagement with lecturers and librarians. The librarians' role seems to be taken on by the lecturers. In this process, librarians are left out of participation in an e-learning environment. A related project suggests a user-focused, more collaborative model in which librarians, lecturers and students can engage with each other more in order to leverage the benefits of digital resources for learning.

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Most important, I thank my God who is the source of all knowledge and wisdom.

Table of Content

Chapter One: Aims and Objectives

1.1 Background of the study

Developments in information communication technologies (ICTs) have significant potential for use in higher education. In many parts of the world this is already apparent. In the USA, for example, over 96% of the very largest universities have some online offerings (Allen & Seaman, 2006). The UK's Higher Education Funding Council for England (HEFCE) has a ten year e-learning strategy that aims at having all universities embed e-learning as a 'normal' part of their practices and processes (HEFCE, 2005). Digital libraries (see section 1.3 for definition) too have great potential for teaching and learning in higher education (Borgman *et al.*, 2000). However, some parts of the developing world are faced with contextual factors such as limited ICT infrastructure, local connectivity costs and funding arrangements that impede the spread of technology in education (Observatory on Borderless Higher Education, 2006). This study focuses on university education in Africa, a continent of challenge for expanding access to new technologies but also one with huge opportunity for the deployment of such technologies for educational expansion.

There is significant international activity around the extent and quality of education in Africa. The midway review of the Millennium Development Goals indicates that around 30% of primary school age children are still without access to schooling (UN Department of Public Information, 2007). Training of extra teachers to cater for expanded access at this level is primarily the concern of higher education. The recent international 'Growth Commission' report highlighted the importance of education and health as basic prerequisites for the sustained economic growth so crucial to Africa (The International Bank for Reconstruction and Development / The World Bank, 2008). The Report of the Commission for Africa (2005) was influential in suggesting that educational development,

whilst clearly important, at the primary phase, also needed sustained commitment at the secondary and higher levels.

But higher education institutions in this region are not prepared for this demand. The Gross Enrolment Ratio is below 5% in most of the countries (UNESCO Institute for Statistics, 2008). Even then, many of these countries struggle to maintain these low enrolment levels (Bloom *et al.,* 2006). According the Report of the Commission for Africa,

> ...many of Africa's higher education institutions are still in a state of crisis. They lack physical infrastructure, such as internet access, libraries, textbooks, equipment and laboratory space...yet demand for higher education is increasing... (Report of the Commission for Africa, 2005 p. 137)

Consequently, higher education in Africa must expand and the role that ICT can play through e-learning programmes and access to the vast scholarly digital resources is incontestable. The Association of African Universities (2000) has already acknowledged the potential of ICTs in transforming education on the continent.

There are many initiatives that now focus on the development of e-learning, i.e. the open educational resources (OERs). An example is the Open University of UK's OpenLearn initiative. In Africa, a successful OER project is TESSA (Teacher Education in Sub-Saharan Africa) which is creating 'open content' multimedia resources and course design guidance for teachers and teacher educators. This project is making a contribution towards expanding tertiary education as well as transforming teaching and learning experiences (Wolfenden, in press).

In addition, advancements in the development of digital libraries are making a remarkable contribution towards e-learning and in Africa, there is a general acknowledgement of the role digital libraries can play in education (e.g. Mutula, 2007). Contextual challenges such as technological factors that would impact negatively on the general usage of digital libraries in Africa are forcing key players to look for alternative means of providing access to these resources. For example, problems of accessibility and connectivity have led to the introduction of mobile digital libraries in healthcare e-learning among community health workers (e.g. Iluyemi, in press).

1.2 The problem statement

In the context of the above background, the organisers of digital resources have the potential to become highly important in the future of higher education in Africa. Librarians as well as e-learning experts (i.e. academics) are experiencing globally, as well as in Africa, a profound change in their role and importance. On one hand, experts of e-learning are focused on content production, collaboration and exchange of knowledge. Their interest is on digital resources as instructional and cognitive tools that enable learners to think and construct knowledge. However, they tend to overlook issues of content organisation and retrieval, often resulting in excellent resources that are not always easy to search or retrieve. Some people attribute this to the complexities involved such as subject indexing or choice of quality metadata (e.g. Secker, cited in Littlejohn *et al.,* 2006 p.137).

On the other hand, librarians perceive digital resources as information repositories and databases that are neatly organised to form digital libraries. Their focus is mainly on the organisation of these resources for easy retrieval. They are also concerned with issues of ownership and access e.g. copyright and authentication, and the technology i.e. system design, infrastructure and connectivity.

Digital resources can therefore be seen from two perspectives: (i) the e-learning perspective which lays emphasis on content production, collaboration and exchange of knowledge; and (ii) the libraries' perspective which focuses on content organisation, retrieval and access. Evidently, there is interplay between these two perspectives and it is expected that they should depend on each other. The two have a role in mediating and providing the interface between the extraordinary riches of the digital resources and the planning and presentation of the e-learning resources. As the two perspectives exist essentially to provide support to students, it is necessary to establish if the African experience makes the connection between the two perspectives easier for the student. How do students in higher education in Africa perceive digital resources as they try to make sense of these resources from the two perspectives? The specific research questions of the study are:

1. What is the students' level of awareness and general usage of the digital resources available to them?
2. How do they perceive the support provided to them by the librarians and the academics?
3. Does subject discipline of the students play any part in the students' perception of digital resources?
4. In the context of the responses to questions 1 to 3 above, do any cultural (including technological) issues impinge on students' perceptions of digital resources?

1.3 Definition of key terms

The term "digital resources" has been used broadly to cover both digital library and e-learning resources.

"Digital library" is a term that has several synonyms and a number of definitions. In this study, Appleton's definition has been used: "a variety of electronic and digital sources of information available to university teachers and students in an academic context" (Appleton, 2006 p. 619).

The term "E-learning resources" has been used to mean digital learning resources used for teaching and learning in e-learning e.g. courseware.

Chapter Two: Literature Review

2.1 Introduction

This chapter reviews literature on students' perceptions of digital resources in higher education. It begins with an overview of digital libraries in higher education and highlights findings of related past studies. This is followed by a review of literature on digital libraries in higher education in Africa. The next section is an examination of studies on students' perceptions of digital resources in higher education. This includes studies on (i) students' characteristics such as gender and subject discipline and how these impact on the students' perceptions; (ii) students' perceptions of digital resources as reflected in their preference for some resources over others; (iii) learners' perceptions of the support provided by their lecturers and librarians; and finally (iv) contextual issues i.e. technology and culture.

2.2 An overview of digital libraries in higher education

As highlighted in the previous chapter, advancements in application of ICTs in higher education are significantly transforming teaching and learning. For example, developments in digital libraries have several benefits for teaching and learning, namely: remote access to scholarly databases, easy and speedy searching capabilities, ability to share resources across geographical boundaries (Adams & Blandford, 2002; Borgman *et al.,* 2005; Appleton, 2006). Blandford (2006) views them as a place where learners engage with information and with each other.

However, studies show a slow adoption of these resources and cite lack of appropriate resources, over-reliance on web resources, inadequate information skills and user support, poor usability, low visibility, inadequate financial resources and unsuitable library

strategies as contributing factors (see Adams & Blandford, 2002; Appleton, 2006). Other studies show disciplinary differences in the use of the term digital libraries. For example, Blandford (2006) observes that while the librarians refer to digital libraries as databases, in the sciences they are referred to as libraries. People in the arts and humanities call them electronic archives. This terminology inconsistency can create challenges in the way digital libraries are presented to the users as was revealed in Adams and Blandford's study (2002). Use of different terminologies has also been noted in the way librarians and academics perceive digital libraries. For example, literature authored by librarians tends to use terms such as 'information databases' and 'information resources' while academics lay emphasis on the learning processes. For instance, Sumner *et al.* (2003) in their article 'Understanding educator perceptions of "quality" in digital libraries' refer to them as (i) cognitive tools, enabling students to think about and work with ideas and knowledge to support learning and sense-making; (ii) component repositories; and (iii) knowledge networks. In view of these observations, it is necessary to establish if such disciplinary and professional differences in relation to digital libraries have any impact on the perceptions of these resources by the university students and hence the current study.

2.3 A review of digital libraries in higher education in Africa

Literature on digital libraries in higher education in Africa is predominantly a documentation of practitioners' experiences and observations. There is limited documented empirical work. Most of the literature reports negatively on the development of digital libraries, highlighting challenges of providing the service but ignores positive developments and potential for future improvement. For example there is a lot of emphasis on the effects of the digital divide conceived in terms of inadequate computer software and hardware; unreliable electricity and telecommunication networks resulting in considerable downtime on library systems; and high cost of access to telecommunication services

(Muswazi, 2000; Kebede, 2004; Mutula, 2004; Ajegbomogun, 2007; Mutula, 2007). Digital libraries in the universities are often underfunded and underutilized because of low levels of information literacy caused by limited expertise (Muswazi, 2000; Mutula, 2004). Two small-scale studies carried out by the African Virtual University established that low bandwidth also lowers the usage of digital resources (Ngimwa, 2008). This massive coverage of challenges shows an obsession in Africa to concentrate on difficulties of implementing a digital library service and ignores students' perceptions which are important. Investigating the perceptions of these students on the resources might paint a different picture and hence the current study.

Coverage of positive initiatives is scanty and includes a survey on the state of digitization in university libraries in Anglophone Sub Saharan Africa (Rosenberg, 2006). This survey revealed existence of digital resources mostly from external projects, in majority of libraries despite their poor accessibility by users. There is also digitization of university theses and dissertations e.g. Association of African Universities' project called DATAD (Kavulya, 2007). Despite the existence of these digital resources, there is a gap in knowledge of their appropriateness to the students. The current study aimed at evaluating the students' perceptions of these resources in Africa, and specifically establishing their level of awareness and general usage of these resources.

There are a few e-learning projects which focus on the development of knowledge portals. For example TESSA which has created open content multimedia resources and course design guidance for teachers and teacher educators in Sub-Saharan Africa, and VeSeL (Village e-Science for Life) which is developing a community based knowledge management system for agricultural resources. Although these examples are knowledge systems that link to e-learning, there is no obvious connection between them and digital libraries. A project that attempts to make this connection is being initiated by the World

Health Organisation and some national health authorities in Sub-Sahara African states. This project aims at creating a model for delivering continuing medical education including treatment and drug guidelines to community based health workers, through the use of mobile library technology (Iluyemi, in press). However, this is a community based e-learning project that is not connected to higher education. It therefore seems like the students in universities in Africa have to put up with the "siloed" digital resources from the library and from the e-learning, hence the need to investigate their perceptions of these resources.

While the above review of literature presents a rough picture of digital library development in higher education in Africa, it fails to provide information on how the students access or make use of the available resources, and how they perceive these resources. It is also surprising to note that unlike other studies that focus on the impact of new technology on culture, there is no known study that has focused on the impact of culture on digital libraries in the African context. There is also no mention of the role of academics in the delivery of digital library resources to learners. It is important to establish what learners perceive of the role of their lecturers in their (students) usage of digital library. The current study therefore aimed at establishing how students in universities in Africa perceive digital resources with a focus on their perception of user support provided by academics and librarians. Also if there is impact of their disciplinary differences on their perceptions and if there exist contextual factors such as technology and culture that impinge on their perceptions.

2.4 Students' perceptions of digital libraries

Studies that have been conducted on learner's perceptions of digital libraries in higher education range from those concerned with the impact of their characteristics such as

gender and their discipline of study, to those focusing on issues such as resource preference, user support and the impact of technology (e.g. Adams & Blandford, 2002; Koohang & Ondracek, 2005). In addition, most of these studies have been conducted in environments that have good technological infrastructure including broadband internet connection and among IT literate participants who have prior experience of using digital libraries. However, as noted, very limited research seems to have been done on African universities where IT infrastructure is not fully developed and the majority of students do not have appropriate experience of using digital libraries. Research question four of this study addressed the issue of whether contextual factors impact on the students' perceptions of the resources.

The sub-sections below form a review of studies that have focused on the impact of learners' characteristics on their perceptions of the resources; their perceptions of these resources and the user support provided; and finally the impact of contextual factors (i.e. technological and cultural) on their perceptions.

2.4.1 Students' characteristics

Past research findings reveal that learner' characteristics such as gender and subject disciplines have an impact on their perceptions of digital resources. For example, Tenopir *et al.* (2003) and Liu (2006) revealed variations in students' perceptions of digital libraries across different subject disciplines. Tenopir *et al.*'s study reported that chemistry and astronomy students placed more importance on journal literature than those in engineering and physics who did not see much importance in electronic journals until later in their studies. This variation can be explained by the fact that different disciplines have different information needs that shape their requirements for information resources as suggested by

Blandford (2006). Research question three of this study addresses the issue of whether there exists this disciplinary difference among students in Africa.

Koohang's (2004) study, reported significant difference in the way digital libraries are perceived by female and male students. Male students had more positive perceptions towards the use of digital libraries than female students. While this study did not establish the reasons behind this difference, it made suggestions that differing levels of confidence towards online learning between male and female may have contributed to this difference. Although the question of gender differentiation goes beyond the scope identified for this research, it is interesting to note that user characteristics related to gender do impact on the perceptions of digital resources.

2.4.2 Students' resource preference

Interestingly, not all students favour digital library resources. Lombardo and Miree (2002) in their study on the impact of instructions on student's perceptions and use of print, the web (i.e. directly from the internet) and online databases (i.e. digital library resources) found that prior to instruction, students considered web resources as easier to use and more convenient than digital library and print resources. In addition, students perceived the web as a comprehensive resource where they were more likely to find all they needed as compared to the other two resources. Similar findings were established by Tenopir *et al.* (2003). This preference for web resources confirms the general notion that learners tend to prefer information on the web over the carefully selected and validated online resources in digital libraries. However, concerns have been raised by academics as to the validity and quality of these web resources and the possible negative impact they have on students' learning experiences (McDowell, 2002).

Preference for non-digital library resources was also observed in Liu's (2006) study. It established that although graduate students were heavy users of digital resources, the majority (75.9% of respondents) indicated that they would still use print resources even after having consulted the digital library. Reasons for this supplementation included: to confirm information in the digital library, to find out more from printed books, to browse book shelves for quality and reliable sources and to look at older materials. Similarly, Tenopir *et al.* (2003) established that students perceived learning of basic digital library concepts as time consuming and difficult, preferring to use textbooks and lecture notes. However, Lombardo and Miree's (2002) study revealed that library instruction courses helped change the learners' perception of web resources. In their post instruction testing, they discovered that students' perception of the comprehensiveness of the web had changed as they perceived it to be less inclusive compared to the online databases. This indicates a possibility that students had acquired critical skills for evaluating the usefulness of the information obtained from the web.

While the above studies show a general preference for non-digital library materials, they do not clearly establish students' perceptions of what makes digital libraries better learning resources. In addition, none of these studies included universities in Africa, hence the current study.

2.4.3 Students' perceptions of user support

As observed in Lombardo and Miree's (2002) study, there is evidence to suggest that user support does affect students' perception of digital libraries. The field of user support is broad. It covers the acquisition of basic information literacy and IT skills as well as direct support provided by librarians and academics. Related studies suggest that IT and information skills are necessary. For example Koohang's (2004) study reported a

significant difference in perceptions of the use of digital library among undergraduate students with varying levels of prior experience with the internet. Students who had more prior experience with the internet had more positive perceptions than those who had less prior experience. These studies also suggest that user support should be offered collaboratively by librarians and lecturers throughout student's academic life (e.g. Lombardo & Miree, 2002; Tenopir *et al.*, 2003; Koohang, 2004). However, according to some studies (e.g. Adams & Blandford, 2002 and Appleton, 2006) academics have poor awareness and understanding of the digital libraries and this leads to their preference for the web and online personal collections. This raises a concern over the role played by the academics in encouraging their students to use digital libraries, particularly in the African context where not every academic has good IT and information skills, and hence making the librarian's role more important. It is therefore necessary to establish the perceptions of learners on the role played by academics and librarians in providing support in the use of digital libraries. In this study, research question two aimed at establishing how students perceive this support.

2.4.4 Impact of contextual factors on students' perceptions

Contextual factors are important as they can affect how the digital libraries are used. Technology is one such factor and includes issues of system design and technological infrastructure. However, existing studies (e.g. Hong *et al.*, 2002; Nov & Ye, 2002; Sumner *et al.,* 2003) tend to concentrate on the design and usability aspects of the system, leaving out issues of ICT infrastructure. This can be attributed to the fact that users are only able to interact with a system through its user interface which is dependant on system design. These studies have shown that well designed user interfaces influence users' perceptions of the system. Although these findings are significant for the overall design of digital libraries, they contain certain limitations. For instance, some research (e.g. Koohang &

Ondracek, 2005) has targeted students who are already familiar with the internet and digital libraries, leaving out the views of non-users which might have shed light on usability limitations that put them off from using the libraries. In addition, most of these studies have been carried out under well designed technological infrastructures e.g. Sumner *et al.*'s (2003) study which was conducted in purpose built computer laboratories that were equipped with high-speed Internet connections. In this context, would the students' perceptions be the same in Africa where the technological infrastructure is not well developed? Making investigation in this area is crucial, and hence the current study.

Another contextual factor is culture, i.e. community culture. Cultural factors do affect the way people engage with technology. However, there is very little known documented research on the impact of culture on digital libraries other than Duncker's (2002) study which focused on cross-cultural usability of the digital library metaphor among the Maori community. This study established that the Maori's cultural value of information as sacred and not a public entity, their collectivist nature versus the individualistic usage of information emphasised by libraries, and their fearful approach to the unfamiliar territory of the library made the digital libraries unusable by this community. Given that majority of digital libraries are developed in Europe and North America, it was found necessary to establish if there is any cultural impact on the way the university students in Africa perceive digital resources.

2.5 Literature review conclusion

While the above review of literature has provided a context for the current study, it has also established the need for further investigations into how university students perceive digital resources. The current study therefore investigated students' perceptions of digital libraries in higher education in Africa and focused on resources, the support provided, and

the effect of technology and culture on their perception. It also sought to establish if there are disciplinary differences across two subject disciplines.

Chapter Three: Methods of Data Collection

3.1 Introduction

This study adopted a mixed methods approach by combining quantitative and qualitative methods. This was primarily to enhance validity of the research findings. Several authors (e.g. Seale, 1999; Denzin & Lincoln, 2005; Maxwell, 2005) support this approach as it underpins the principle of triangulation by avoiding overreliance on a single method in order to enhance confidence in the validity of research findings. However qualitative method was more dominant, as per the view of Adams and Cox (2008) that more researchers in the field of technology are adopting this method because they are more interested in understanding the qualities rather than quantities of technology and how people use it in their lives. The focus of this study was to find out how learners perceive digital resources, an exploration into their lives in which the researcher's interest was to gain an insight into their perceptions of the technology and how they interact with it. In this sense, the study could be considered as a partial ethnography in which the researcher according to Hammersley and Atkinson (2007 p.3) "participates in people's daily lives ... watching what happens, listening to what is said, and/or asking questions through informal and formal interviews, collecting documents and artefacts". In so doing, the study also triangulated sources of data in order to enrich and validate the data collected. Hence, qualitative data from formal interviews was triangulated with informal interviews, observations and documents in form of quantitative data from statistical reports available in the library; one of the characteristics of quantitative data is that it is factual.

This investigation was carried out within a case study design. Blaxter *et al.,* (2006) view case studies as suitable for small-scale research as they allow researchers to focus on fewer cases. Burns (2000) also observes that case studies involve the observation of an individual unit to gain an in-depth understanding of the unit. Case studies are the preferred design in

studies that seek to answer the 'how' or 'why' questions (Yin, 2003). The study sought to answer the 'how' question of learners' perceptions of digital resources.

3.2 Procedure

Qualitative data was primarily collected from in-depth formal interviews with the key informants (i.e. university students) as these allowed them to describe their experiences, explain their answers and give examples (see Rubin and Rubin, 2005). In addition informal interviews with librarians and lecturers were held in order to confirm students' responses. These were less detailed and took the format of conversations with fewer questions from the interviewer. Both the formal and informal interviews followed a semi-structured interview schedule (see appendix 1) with generic questions to guide the process. The open-ended nature of the generic questions created flexibility (see Rubin and Rubin, 2005) where the interviewees described freely their experiences. At the same time the interviewer was able to probe or seek clarifications. This was considered important for a study of perceptions as the students were able to talk about their perceptions of the digital resources while the researcher got the opportunity of probing further as issues emerged out of the discussions. In-depth interviews also allowed for naturalistic data to be collected. Adams and Cox (2008) recommend that the interview setting should be natural in order to get more naturalistic responses. In this regard, the interviews were conducted at the university at a time convenient for the interviewee. Adams and Cox further recommend the 'Student-Tutor' style of interaction for studies of Information Technology. When the interviewer takes the role of a student who asks questions from an 'expert', the user of the technology is able to see how much his or her opinion is valued and even novice users are encouraged to tell their stories in a friendly environment. In this study, the students were considered as experts of their own perceptions of the digital resources (technology). This style of interaction was adopted throughout the interview process.

In order to encourage natural interaction, note-taking was kept at minimal so as to maintain eye contact. Instead, an unobtrusive audio record device was used to record the interviews. Blaxter *et al.*, (2006) assert that use of recording devices ensures that one is able to concentrate on the interview process, give attention to the interviewee and maintain appropriate eye contact and non-verbal communication. However, they caution that recording can make interviewee anxious and less likely to reveal confidential information. In order to reduce chances of this happening, the participants were given the reasons for using the device and were assured of confidentiality. Their consent was also obtained.

The study included non-participative observations as a method of data collection to supplement interviews. This is a view supported by Wilkinson and Birmingham, 2003 (cited in Blaxter *et al.*, 2006 p.178). They see observations as an extremely handy tool for researchers because they allow them gain a deeper understanding of the complexities of the real world of those being studied, an understanding they can never get by just asking questions. This included observing student's technology interactions, layout of resources, support systems and positioning of the library with regard to the academic units, as well as taking photographs of the environment.

According to Yin, "documents corroborate and augment evidence from other sources" (Yin, 2003 p. 86-7). Taking this advice, the study also used quantitative data consisting of statistical reports available from the library, to validate the responses obtained from the students.

3.3 Participants

According to Bryman (2004), most writers of qualitative research based on interviews recommend purposive sampling because it allows the researchers to sample their participants on the basis of their relevance to the research questions. Consequently, participants for this study were selected from students in two faculties at the University of Nairobi in Kenya, who are involved directly or indirectly in the VeSeL project mentioned in section 2.3. These were chosen based on the assumption that they are familiar with the concept of digital resources because of their involvement in the project and therefore likely to have perceptions of these resources. VeSeL is developing an agricultural knowledge database for the use by rural communities in developing countries and has involved students from the Faculty of Agriculture and the School of Computing and Informatics, who are collaborating with their lecturers and a research team from UK based institutions to develop this system. Further, this combination of the two faculties allowed the researcher the opportunity to study students in two disciplines as per research question three. The VeSeL project also made it possible to include lecturers to participate in the informal interviews for the reasons of triangulation as discussed above. It was therefore possible to carry out interviews with students and lecturers within a very short span of time. The total participants included 13 students, four lecturers and four librarians. This is not an ideal size but due to time constraint of the study, the researcher settled for a smaller size. The researcher was also cognisant of potential bias in the responses from the students who were not only consumers of digital resources but developers of these resources in the project. Consequently further studies will be required to verify findings.

3.4 Data analysis

There are several analytical approaches open to social researchers e.g. discourse analysis, content analysis, grounded theory and thematic analysis (see Aronson, 1994; Blaxter *et al.*,

2006; Adams & Lunt, 2008). Discourse analysis is mainly used in the study of talk and texts usually found in investigation of language in use and language in social context (Wetherell *et al.,* 2001). On this basis, this approach was disqualified for the current study. Content analysis mainly involves identifying words or phrases and counting how many times they occur in a text to determine their significance. This is more of a quantitative approach as confirmed by Blaxter *et al.* (2006) and was therefore deemed as unsuitable for this study. Thematic analysis and grounded theory are similar to the extent that both approaches focus on identifiable themes and patterns and are grounded in the informants' narratives and interpretation of their behaviour within their context. As the study was mainly concerned about the students' perceptions, these two analytical approaches qualified for consideration. However, grounded theory was seen to be too elaborate for the size of and time dedicated to the study (see Strauss & Corbin, 1990 and Charmaz, 2003). On this basis, thematic analysis was preferred as the analytical method for the study. Besides, thematic analysis is perceived as a tool that can be used across different methods (Boyatzis, 1998) and thereby allowing to relate data from different sources. It therefore supported the analysis of the limited quantitative data of usage statistics from the library.

3.5 Ethical issues

Reviewing ethical issues is critical for the success of any investigation particularly in social research (Blaxter *et al.,* 2006). Researchers must negotiate for access and consent from the individual participants. They must also ensure privacy and confidentiality of the information provided. This study adhered to the British Educational Research Association's (BERA) ethical guidelines. Access to the participants was obtained through the VeSeL project coordinator at the university. Information sheets and consent forms were given to potential participants and if they agreed to continue, they were requested to sign the consent form. They were also made aware that any information they provided would be

treated with confidentiality and that they had a right to withdraw from the study if they were not comfortable. In addition, they were assured that data provided would be anonymised before dissemination. Their permission to disseminate was sought. Before the commencement of the interview, interviewees were informed that the interview would be audio recorded and their permission was obtained. The Kenya Government requires that any research be registered with the Ministry of Education. This was done before the commencement of the study and a research permit obtained (see appendix 2). In addition, the study was cleared by the Open University ethical committee (see appendix 3).

Chapter Four: Data Collection, Analysis and Presentation

4.1 Introduction

This chapter consists of two main sections. The first section provides an account of how data was collected in the field by first setting the study context, followed by a discussion of how data collection instruments were used and how data was analysed. The second section presents the analysed data following the main themes identified during the analysis stage.

4.2 Data collection and analysis

4.2.1 Research Context

The study setting is three geographically separated sites of the University of Nairobi, i.e. Faculty of Agriculture located at Lower Kabete Campus about 9 miles Northwest of Nairobi City; School of Computing and Informatics in Chiromo Campus which is about a mile away from the main university campus; and the main library (Jomo Kenyatta Memorial Library) which is at the main campus.

From its size (see figure 1) and location, it is clear that the university lays great importance on the library and highly regards it as the central nerve for its scholarship and research functions. The main administrative services of the library are housed here, but the information services are decentralised across the various college libraries located in each of the campuses. Therefore, both Faculty of Agriculture and School of Computing and Informatics are serviced by their respective college libraries. However, as the researcher observed during the study, there are also faculty libraries that have emerged out of the faculties' initiative. These are autonomous and not part of the university library network,

thus generating a culture within departments and schools of stocking specialist academic resources.

Figure 1: Photograph of Jomo Kenyatta Memorial Library

The library provides a digital collection which is perceived by the library administration as one way of bringing down the library's resources budget allocation. Subscriptions are done through a consortium of universities and colleges called the Kenya Library and Information Services Consortium. The consortium is able to negotiate better subscription prices with the publishers.

Access to these resources is largely by IP (Internet Protocol) authentication with the exception of a few resources that are accessed by passwords and usernames. This means that majority of the resources can only be accessed through the university network as remote access is not possible, therefore undermining one of the benefits of digital libraries.

Promotion of this service is mainly through emails sent to the lecturers and notices posted in the university's intranet. College librarians also receive notices of new subscriptions.

4.2.2 Interview process

Interviews were carried out between 30th April and 21st May, 2008. These consisted of 13 formal interviews with students and 8 informal interviews with lecturers, librarians and the university's ICT director (who is also an academic). Interviews with students lasted between 30 minutes to an hour while the informal ones took between 15 minutes to one and a half hours. All these interviews followed a carefully designed interview schedule (see appendix 3) as discussed in chapter three.

Student participants were recruited with the help of their project supervisors because they knew those who are familiar with digital resources and are in the VeSeL project. The original plan was to interview only postgraduate students who were involved directly or indirectly with the VeSeL project; five in each faculty. However, it turned out that there were three final year Computer Science undergraduate students whose projects are in the VeSeL project. It was considered necessary to include them due to their interest in digital resources. They provided invaluable data. Consequently, a total of eight Computer Science students were interviewed. It is important to note that all the three Computer Science postgraduate students are following a program known as Module II. These are students in fulltime employment and only attend classes in the evenings and weekends. This is significant to the study as will be observed in data presentation because it impacts on access of the resources. Limited time on campus for these Module II students implies that they cannot adequately access resources via the university network and hence require remote access which is not available. In the Faculty of Agriculture, six instead of five postgraduate students were interviewed. This was because when interviewing one of these students, it turned out that she was a visiting economics student from a university in America and was doing her electives in Agricultural economics at University of Nairobi. A decision was made to complete the interview with the hope that she would provide useful data. However, this turned out not to be the case as most of her responses were out of

context and therefore excluded from the analysis. As a result, a sixth student was interviewed.

It was easy to recruit participants for informal conversations as they were identified by the roles they play in relation to this study. For example, the librarians contacted were those directly concerned with the provision of digital resources or the college librarians. It is important to point out that the study coincided with a library audit and hence a very busy time for the library personnel. Some of the librarians interviewed went out of their way to make themselves available. In the case of lecturers, those who supervise the students were interviewed. In addition, the university ICT director who is also a lecturer was interviewed by the virtual of his role as the university's ICT infrastructure implementer. The researcher was aware of potential for bias in the participants' selection process and how this could affect the validity of the findings. With this in mind, she corroborated their responses with what the students had said as well as her observations and documentation gathered from the library. A detailed summary of the participants and their characteristics is provided in appendix 4.

Most of the interviews were audio recorded. Responses from each interview were transcribed the same day where possible. This helped in preparing for the next day's interviews and also in testing the quality of the recording in case there was need for repeat while still in the field, as was the case with the Agricultural student noted above. However, some librarians were wary and preferred not to be audio recorded. For these, hand written notes were used to record the main points in the discussions.

4.2.3 Documentation and statistics

The study had originally assumed that the library keeps sizeable usage statistics for quantitative data which would be used to validate qualitative data. However, it turned out that the only available statistics were publishers reports sent on monthly basis to the library. This came as a surprise given that it is a common practice for libraries to record usage patterns of their resources. Besides, it was an expectation to find well organised data at such a time when the library was being audited. The publishers' reports, though useful did not provide the whole picture as only three publishers' report could be accessed and this weakened the quantitative data. Nevertheless, statistics from one publisher who provides e-journals relevant to the two faculties provided useful data.

4.2.4 Observations

The researcher made observations on the facilities provided i.e. computer laboratories, the library, opening hours and peak times when the facilities were most used by the students. In addition, observations were made on how computers were used to see if there was any usage of digital resources and which resources in particular were being used. For example, when visiting one computer laboratory the researcher was able to confirm that students do indeed access some resources. The researcher was also able to log on to the internet from the laboratories and confirmed that the internet was very slow as will be discussed in the data presentation section. Notice boards were frequently checked in the course of the study to see if library notices existed and the nature of these notices e.g. if they contained information related to the digital library service. One notice board had a notice from a lecturer advising students to refer to some e-journal articles in the library.

4.2.5 The reflexive account of the researcher

The researcher is a trained librarian with extensive working experience in providing a digital library service in Africa. She has also interacted extensively with academics and students in e-learning environments. There was therefore potential for bias and to get emotionally involved in the study. In particular, she constantly struggled with the temptation to interfere with the responses provided by the respondents. For example in certain instances where students expressed their frustrations at not being able to use the resources, the researcher had to exercise restraint from sympathising with the students, which had potential to influence the responses. This was achieved by exercising self-reflection through "sensitizing [herself] to these biases..." (Rubin and Rubin, 2005 p. 32).

4.2.6 Data Analysis

Thematic analysis was done in phases following a systematic order. The first phase involved close reading of transcriptions. Each individual phrase was read and re-read in order to "know one's data" as advised by Hammersley and Atkinson (2007 p. 162) and secondly to see what the respondent was saying. This was important in order to ensure that data analysed reflected the views of the respondent rather than a confirmation of what the interviewer was expecting to find, a view supported by Rubin and Rubin (2005). Concepts were derived from data and given a label or a code that best represented what was reflected in the phrases. This is supported by Hammersley and Atkinson (2007) who state that the first step in analysing qualitative data is to read through the corpus of data and generate concepts that make sense of the data. These codes were noted on the margins of the transcriptions. Appendix 5 summarises these codes. In the next phase, similar codes were grouped together to form categories. These categories were then studied in order to identify relationships, linkages and patterns.

It should be noted that introductory questions in the interview schedule were excluded as they simply provided the background for the discussion. This is a recommendation by Litosseliti, 2003 (cited in Blaxter *et al.* 2006 p.210). The statistical data was summarized in form of tabular description.

4.3 Data Presentation

This study investigated how students in Higher Education in Africa perceive digital resources. This was premised on an initial hypothesis that students are caught in the middle of two perspectives: one driven by the academics that considers these resources as e-learning resources; and the other from the librarians which view them as information resources or digital libraries. The study established that students have more control of how they use these resources. Their perception of the resources is one where the e-learning resources are intertwined with digital library resources, hence making no distinction between the two. Levels of IT skills of both the students and lecturers impact on the students' expectations of the role played by their lecturers as well as how they engage with these lecturers. They see their lecturers as facilitators of information resources usage and access. In this mix, the librarians' role as facilitators of access and usage of information resources is overshadowed as they appear to be excluded from active participation in the learning process. The study also identified a parallel project in which the participants are involved that has some relevance on the current study. The sections below present in details these findings in relation to the four research questions posed in chapter one.

4.3.1 Students' perception of digital resources

In response to the research question about students' level of awareness and usage of the digital resources available to them, findings suggest that students make no differentiation between digital library resources and e-learning resources (see section 1.3 for definitions)

where these two appear to be well connected and are seen as one learning resource. This interconnection became obvious where IT skills were higher among both the students and lecturers. For example students particularly in the Faculty of Computer Science mentioned lecturer-generated resources when asked about the digital resources they have encountered:

> .... A few lecturers would copy their notes on a PC in the class and you can then copy them on to you flash disks. A few lecturers out of their personal initiatives have their personal portals where they put assignments, your marks, course work, the next class what would be studied, the next exams dates. (***Computer Science Postgraduate student 2)***

This was corroborated by the Computer Science lecturers who are IT skilled. They talked of how they provide digital lecture notes in CDs and on university website expecting students to use them:

> ...I upload all my courses online in the university website, and I give them passwords and even cut CDs for them.... ***(Academic 3)***

The findings also revealed that students are taking more charge of their usage of digital resources. This was exhibited in various ways. The most obvious example is how they look for these resources and use them independently once they become aware of them:

> Basically I handle them on my own. As time goes on, you acquire more experience than your lecturers, or the librarians because you are the one who is interested ... You are the one who knows what you want. Actually it is not like when you are using the library books and you have problems and you have to go and ask the

librarian. But these ones, you tend to separate yourself from the librarian as time goes by. ***(Agricultural student 3)***

This was also confirmed during informal discussions with two Computer Science lecturers:

> ... You sometimes don't necessarily have to introduce something, you just suggest and they [students] figure it out, why? Because it is easy for them because they have digital resources like the internet. With time you can see that students have stuff you have not taught. So they basically have mastered on their own... ***(Academic 1)***

Another example is in the response to the research question on whether contextual issues i.e. culture and technology impinged on their perceptions of digital resources. The findings suggest that there were technological factors like limited bandwidth, power failure and inadequate computers in the library that could impinge on the perceptions as well as usage of the resources. In addition, students exhibited a behaviour of persistent determination to access information regardless of these technological hardships. Under normal circumstances, one would expect students to get discouraged and not show interest in using these resources in the face of such access challenges. On the contrary, these students look for solutions such as turning to cybercafés (at their own expense) when internet is down at the university:

> ... We are used to the net being down, so we just go and come back, or maybe you come in the morning ... Or you go to a cyber in town. ***(IT undergrad3)***

Could this behaviour of tenacity be a sign of the culture of university students in Africa, who persist in adversity where they have to make do with what is available or look for a way out instead of surrendering? More of this will be discussed in the next chapter.

This tenacity was again observed in how they dealt with what they perceived as a weak library service. Students and their lecturers complained of inappropriate digital library resources and passwords that did not work. This was corroborated by usage statistical reports from one of the publishers as shown in Table1:

Table 1: 10 most popular journals denied access due to lack of subscription license

Month (2008)	**No. of cases denied**
January	55
February	109
March	113
April	77
May	66

Source: data obtained from Wiley Interscience Publishers (2008)

The table shows that there are popular journals among students which the library has not subscribed to. However, this mismatch between what the students require and what is provided by the library did not deter them from using the digital resources; they looked for alternative sources such as their lecturers, free resources from the internet or visited other institutions that have better access to these resources. This is a confirmation that the students have taken control of their usage of the digital resources and will look for different ways of overcoming access barriers in order to meet their objective.

During interviews with the lecturers, it became evident that these students have taken their usage of the resources to a higher level where they have identified gaps in these resources and tried to find solutions. For example, agricultural students have established that there is limited local content available electronically. Local content is very important to them because their projects are locally based. Some students are studying tropical plants that only grow under certain tropical climatic conditions. They would want to compare these plants with other plants under same conditions, but such kind of information is not readily available electronically, even in the university library. Due to this absence of local information in digital format, some students in consultation with their lecturer have decided to create a website (www.try-african-food.com) that contains local information about different types of food grown in Africa. This is an example of how the students have taken control of the usage of these resources.

4.3.2 Impact of students' IT skills on roles of lecturers and librarians

The findings showed that IT skills among the students impacted on how they perceived the support provided by the lecturers and librarians. This was in response to the research question on their perceptions about the support provided by lecturers and librarians. It should be noted that this finding came about while comparing different subject disciplines in efforts to answer research question three: "Does subject discipline of the students play any part in the students' perception of the digital resources?" While there was nothing to indicate that subject disciplines affected the students' perceptions of the resources, two Agricultural students exhibited similar perceptions of the support provided as the Computer Science students. What was common was that both sets of students (i.e. the two Agricultural students and the Computer Science students) had high IT skills, as presented in appendix 4.

It was noted that the highly IT skilled students perceive their lecturers as facilitators of the access and usage of digital resources. This is traditionally the role of librarians. For example, the students claimed that besides lecturers expecting them to use of these resources, they (lecturers) provide guidance of what resources to use, where these resources are located and even provide access to these resources as illustrated in the following excerpt:

> I have got a lot of assistance from the lecturer, in pointing me to the materials; sometimes he has a personal material that he can email me. ***(Computer Science Postgraduate student 1)***

These highly IT skilled students perceived the librarians as having minimal role in the provision of digital resources and instead saw them mainly as providers of print based information resources, typical of what to expect in a traditional print-based library.

> …we assume that she [librarian] would only be of some help in hardcopies … the books. For non-print resources, am not aware I can get assistance from there. ***(Computer Science Undergraduate student 1)***

The support provided by the lecturers was deemed to be superior to what the librarians provide even though the librarians have the capacity to provide similar support. For example, when asked whether librarians should provide more support besides providing resources one student responded:

> Not beyond availing the resources that I need, because to be honest, how would he help assuming I had a problem that needed some clarification. I wouldn't expect the

librarian to know how to guide me forward. I would go back to my lecturer to direct me to other resources. ***(Computer Science Postgraduate student 5)***

Another example is with the perception that it is easier to obtain digital resources from the lecturers than from the library because the lecturers can still provide the same. When asked whether digital resources cannot be accessed from the library, a student answered:

> ...why start from the scratch when you can liaise with the supervisors who can tell you where to begin from and it's appropriate because you will get your information. ... ***Agricultural student 4 (IT skilled)***

The highly IT skilled students saw themselves as having the same skills as the librarians when it came to searching for the resources. For example when asked whether he would consider going to seek assistance from the librarian, one student responded:

> For finding resources, not really. I think we have the same expertise in searching for these resources. (***Computer Science undergraduate student 1)***

The less IT skilled students also expected their IT skilled lecturer to facilitate access and usage of digital resources as will be seen in section 4.3.3. However, the study revealed that their expectation of the role of their non-IT skilled lecturers and the librarians remained unchanged. They did not expect these lecturers to provide digital resources. They still went to the librarians for access and usage of the resources in a similar manner as they would for other library resources. Unlike their more IT skilled counterparts, these students exhibited an appreciation of the role played by the librarians as providers and facilitators of digital resources. This means that they perceived librarians in their traditional role as information providers:

> For the librarian, she is the one who introduced us to the electronic journals. Because they have the passwords... they normally assist us on how to get some particular information from certain websites. For us we have a website called Agora, it's a scientific website and very useful to us. So they are the ones who know which sites are relevant to us, at least they have a list of which sites are relevant for students doing this course... ***(Agricultural student 5)***

4.3.3 Impact of students' IT skills on their levels of engagement with lecturers and librarians

The different perceptions of roles presented above affected the way students engaged with their lecturers and librarians. The findings reveal that generally the highly IT skilled students were actively engaged with their lecturers in their usage of the digital resources. However, they interacted poorly with the librarians. They claimed that the lecturers are available; they are their friends and are closer to them.

> He [lecturer] is closer to me as a person, he is polite to me, and he is just a good friend... ***(Computer Science Postgraduate student 1)***

This suggests that they engage well with the lecturers and have an open communication with them. On the contrary, the same students claimed to have had limited interaction with the librarians and expressed having had bad and frustrating experiences with the librarians.

> If you are depending on the library, and you need to go to the librarian for example, you try to explain your problem, may get some resistance, at some point you may

get frustrated because there is no otherwise, it becomes difficult. (***Computer Science Postgraduate student 4)***

They stated that librarians are not available to support them. For example one student claimed how annoyed he had become when he needed assistance from the librarian who was never available and it was evident from his expression that he felt very frustrated by not being able to get support when he needed it.

> …I have tried to use the e-journals. The times I have been there, the librarian is not there. You find that the section is closed. The first time I was very annoyed, because it is a library. (***Computer Science Postgraduate student 5)***

These negative experiences seemed to have affected their perceptions about the librarians. They saw librarians as running away from their responsibilities:

> In my opinion, the librarian is really somebody who would be able to do as much as possible in what they are asked to do, …if they are not told what to do they will also keep quiet and of course this means less work for them. So I think there isn't that much support and there is an element of laxity. ***(Computer Science Postgraduate student 3)***

However, the reaction of the less IT skilled students revealed a more improved level of engagement with the librarians. They consulted them when they encountered difficulties:

> Mostly when I encounter a problem, I try to enquire from the person seated next to me …or talk to the librarian. ***(Agricultural student 1)***

4.3.4 Impact of lecturers' IT skills levels on students' expectations

The study findings suggest that students expect their IT skilled lecturers to provide or be aware of the existence of digital resources. For example in the Faculty of Computer Science where the lecturers are IT skilled, students depended almost entirely on their lecturers to provide access to digital resources. Instead of going to the librarians, they went to the lecturers to direct them to suitable resources. They expected their lecturers to be aware of these resources. This can be explained by the fact that the lecturers know the value of these resources, they use them and have become proactive in encouraging their students to use the resources. This was confirmed by the lecturers during informal interviews.

> When we give them assignment, we give them tasks, we often say, "Please check this link, look for this material and look at what else you can get". ***(Academic 1)***

This was again corroborated by the researcher's observation of a notice on the notice board in the Faculty of Computer Science advising students to refer to a list of e-journals from the library.

The same was observed in the Faculty of Agriculture. This is a faculty where there is a mix of both IT skilled and non-IT skilled lecturers. It was observed that students expected their IT skilled lecturers to direct them to digital resources:

> They are the ones who direct me to particular websites that they themselves use, that they themselves were using and the ones they are confident can give me the kind of information I want. They can even direct you to a particular book in the library so you don't just go to the library without knowing what you are getting. ***(Agricultural student 4)***

However, they made it clear that their non-IT skilled lecturers had nothing to do with the use of digital resources and thus did not expect them to be aware of these resources let alone providing them. They saw them as traditional lecturers who still use their old notes, implying that they do not use more current information available from digital resources and hence could not expect them to use digital resources:

> The lecturers are not very much involved in this technology. I think they are still behind, because even the way they do their presentation, most of them still use their notes instead of using PowerPoint presentations which save a lot of time. So for the lecturers I think they are still behind, we could be ahead of them. ***(Agricultural student 5)***

This was confirmed by their more IT skilled supervisor during informal interview:

> ... in our university, if you look at the older generation of the professors, they are not using computers. In fact you can go to their offices, you find that they don't have them; they think they are a bother. Not all of us have embraced the technology. ... ***(Academic 3)***

4.3.5 The VeSeL project and the current study

As discussed in the methods chapter, this study focused on students and lecturers who are also directly or indirectly participating in the VeSeL project. This inadvertently presented the researcher with data that can be used to inform new directions in the future role of developers and facilitators of digital resources in e-learning environments. In this project, students are partnering with their lecturers and other stakeholders in a complex e-learning

environment where on one hand they are learning as they work through their final year projects based on VeSeL project. On the other hand, they are actively contributing towards an informal e-learning process for the community as creators of knowledge and facilitators of knowledge exchange. In this process, the Agricultural students go to the community, establish their information and learning needs and then look for information to meet these needs. They then work with their counterparts in the School of Computing and Informatics who are designing mobile devices with interfaces that are friendly to the community. Then they go back to the community to test these designs and the suitability of the information content.

At another level, the project team is designing online spaces for networking and knowledge exchange. This leads to creation of an informal e-learning environment, where the communities can access knowledge that will improve their livelihood and at the same time participate in knowledge exchange with other interested parties. This entire process is highly collaborative and user-focused.

The VeSeL project and University of Nairobi's provision of digital resources have similar objectives of providing these resources to end users whereby the VeSeL project is providing resources to the community and the university is providing the resources to the students. These two processes are happening in the same university but at different levels and in different ways, yet one seems to be more end user focused than the other. As will be discussed in section 5.3, the VeSeL project which is more end user focused could provide a model for digital resources provision in an e-learning environment where both librarians and lecturers can collaboratively work together to provide digital resources to the end user (i.e. the students).

4.4 Data presentation conclusion

The results indicate that students are taking more control of their usage of digital resources where they perceive e-learning resources and digital library resources as one resource. In addition, high IT skills among students and lecturers are impacting on students' expectations of roles and levels of engagement with lecturers and librarians where the librarian's role is being taken on by the lecturer. The findings also identified the VeSeL project as having some relevance to the current study. A detailed discussion of these findings is presented in the next chapter.

Chapter Five: Data Interpretation

This chapter presents conclusions based on the extraction of the main themes that have emerged out of the data analysis as presented in appendix 5. These include (i) the students take control of their usage of the digital resources while making no differentiation between the digital library resources and the e-learning resources; and (ii) the high IT skills among students and their lecturers impact on students' expectations of roles and levels of engagement with lecturers and librarians. The chapter also draws on conclusions from the VeSeL project.

5.1 Student's control of digital resources: breaking down the boundaries between digital library and e-learning resources

As discussed in chapter one, digital resources in universities can be seen from both an e-learning perspective and a library perspective. In this study, students appear to be heavily influenced by the e-learning perspective. They perceived e-learning resources provided by their lecturers in form of digital lecture notes as the same as what they obtained from digital resources from the internet or the university library. This interconnection between the two kinds of resources appeared to be greatly influenced by their IT skilled lecturers. As seen from the data analysis, these lecturers expected their students to access digital lecture notes provided in CDs or uploaded in the university website while at the same time use e-journals from the library and other online databases. This suggests that lecturers, like their students do not make any differentiation between the two resources. Digital resources are therefore seen by students and their lecturers as a learning tool that enables students achieve their learning goals such as pass exams, complete projects or class assignments. This demonstrates a situation where usage of these resources is driven by the learning perspective and the key players being the students and their lecturers. The findings of this study seem to agree with previous studies. For example, Sumner *et al.,* (2004) while

writing about educator's perceptions of quality digital libraries referred to the digital libraries as learning tools. They called them "cognitive tools" that enable students to think about and work with ideas and knowledge to support learning and sense-making.

The students interviewed in this study are self directed. Once they have been introduced to the digital resources, they take control of their usage process. They exhibit an independent usage of the resources. For example, when their lecturers guided them to these resources, they used them independently. They also showed determination against challenges to achieve their objectives. As already pointed out in chapter one, higher education in Africa faces technological challenges, i.e. poor internet connection, inadequate computers and unstable electricity supply. At the same time, the library service is weak; there are inadequate resources and staff are not fully skilled to provide a digital information service. These challenges can hinder effective usage of digital resources (Muswazi, 2000; Mutula, 2004; Ajegbomogun, 2007; Mutula, 2007). This study confirmed presence of these challenges. However the students studied showed persistent determination and the challenges did not deter them from using the digital resources. Under such situations, it is reasonable to expect the students to show preference for print-based resources such as textbooks which do not depend on technological conditions. However, this was not the case, thus contradicting previous studies by Tenopir *et al.* (2003) and Liu (2006) which revealed preference for print-based resources over digital resources.

The above raises an issue of whether the students in Africa have become hardened by the contextual challenges that have plagued the continent for a long time, and have decided to look for a way out by being tenacious. In this case, is this an issue of culture whereby these students have grown up knowing that they must persistently struggle in order to achieve their objectives, and hence an answer to the fourth research question of this study? Or

could this behaviour be an indication that digital resources have empowered these students to take charge of their learning? This raises need for further research.

The study also portrayed these self-directed students as exhibiting exploratory learning skills. These students have ingeniously developed a website to meet a gap they have observed while using digital resources. The Agricultural students expressed a need for local content as they use the resources to support their projects which are based locally. For example, they are researching on tropical plants under tropical conditions and would therefore want to access information that contains similar contexts. Unfortunately, most electronically available resources contain information that is not African, thus creating an information gap which students clearly identified. However, they have gone a step further and decided to look for ways to reduce it by developing a website that contains information about local food; how it is grown, scientifically proven nutritional values and some recipes. The concept of filling a gap that has been identified demonstrates that students are not just using the resources. Rather, they are well engaged with the resources and eager to explore opportunities.

These self-directed, independent students, who have taken control of their learning process while using digital resources, seem to fit within the constructivist theory of learning which assumes that learners learn by doing through a process of making sense (Kovalchick and Dawson, 2004). It also confirms Carnaby's (2005) assertion of what she refers to as the next generation learner who operates within "a learner-centric pedagogy that takes on a new meaning as the learner interacts with the educator and at times chooses to move from the prescribed e-leaning experience into a world of discovery and exploration of their own" (Carnaby, 2005 p. 352). This raises issues for consideration by the key players in e-learning environments including librarians. Perhaps all the students require is an enabling environment. Schneider (2006) commenting on what he calls a "free range librarian" sees a

transformed librarianship practice which is more user-focused. According to him, the most significant help librarians can give to their users "is to add value and meaning to the information experience, wherever it happens; defend their right to read; and get out of the way" (Schneider, 2006 p. 2). Web.2.0 tools that enhance creativity while promoting social networking and sharing provide a way of adding value to the provision of digital resources to this kind of students. Quintana and Zhang (2004) have explored a different method of providing value add service that is learner centred. They design scaffolding software for digital library users to support them use and make sense of information available in the library. Their IdeaKeeper notepads are scaffolded notepads which "support learners by connecting their goals to their reading, guiding reflection and articulation, and implementing a framework by which learners' notes and articles are linked, saved and viewed together to aid with seamless information management" (Quintana and Zhang, 2004 p.1329).

5.2 *The impact of IT skills on role expectations and levels of engagement*

Koohang (2004) established that IT skills affect students' perceptions of digital resources. His study revealed that those students who had prior experience with the internet perceived these resources more positively than those who did not have. This implies that presence of IT skills among the students impacted positively on how they perceived the resources. In the current study, IT skills also affected students perceptions albeit differently. Higher IT skills among students and lecturers affected roles expectations as well as levels of engagement in regards to user support unlike in Koohang's study where IT skills affected their perceptions of the resources.

Although the intention to compare two subject disciplines was driven by the need to see if disciplinary difference in students' perceptions exists, this instead presented the study with findings suggesting that it is not the disciplinary differences that affected perceptions but levels of IT skills. As was presented in the previous chapter, two highly IT skilled students in the Faculty of Agriculture that is perceived to have lesser IT skilled students, demonstrated similar perceptions as Computer Science students whose IT skills are superior. Equally, the perceptions of support from IT skilled lecturers at the School of Computing and Informatics were similar to those expressed by Agricultural students towards their IT skilled lecturer. In these two cases, the common denominator is IT skills which can be interpreted in a number of ways in this study:

Firstly, the fact that both more skilled and lesser skilled students expected their IT skilled lecturers to be information providers, a role played by librarians, suggests a learning driven perspective as was discussed in the previous section. This can be explained by the fact that IT skilled lecturers are more empowered to exploit the benefits of electronic tools such as creating e-learning environments and ability to access wealth of resources available electronically. These IT skilled lecturers seem to be aware of the resources around them and are driving the process without input from the librarians. This seems to agree with studies done by Adams and Blandford (2002) and Appleton (2006) which concluded that academics have poor awareness and understanding of digital libraries. However, like the lecturers in this current study, these academics still looked for alternatives such as web resources and online personal collections which did not depend on the librarians' assistance. Even though the current study revealed a weak digital library service at the university, lecturers did use other means to access digital libraries, hence demonstrating awareness and understanding of the value of these resources. This confirms Rasmussen's observation that "staff and students are seemingly managing to exist without the benefit of a general university library..." (Rasmussen, 1998 p. 2). The result is the change in role

expectation by the students towards their lecturers as well as high levels of engagement where students felt free to consult them for support and guidance. As Rasmussen further wonders, this raises a critical question of whether libraries are needed or what are their roles and functions.

Secondly, the study showed that the more IT skilled students perceived the support provided by the librarians differently from the less IT skilled students. The former seemed to downplay the role of the librarians. They perceived them as less helpful and less IT skilled. It can be argued that these students engage poorly with the librarians because their high IT skills put them in a position where they can the do a lot of digital information searching and access resources on their own without much need for the librarian's support. This is more evident in the African context where it was observed that the librarians are generally less IT skilled. On the contrary, the lesser IT skilled students valued the librarians' support. They consulted them for assistance and guidance. They also engaged well with them. In other words, to these less IT skilled students, the librarians were still information providers. It can be argued that unlike their more IT skilled colleagues who are comfortable with the use of technology and can find a lot of information on their own, these students depend on outside support and would therefore appreciate even basic assistance such as being told what information resources are available. This seems to suggest that the more IT skilled one is the less dependent she or he is on the support from the library in regards to usage of digital resources, particularly where the librarian has equal or lesser IT skills than the student. The implication is that there is an inevitable need for change in the role of the librarian to fit into the demands of an e-learner. A number of authors have alluded to this. For example, Sharifabadi asserts that "librarians have worked at translating what they do in a traditional library into virtual or digital environments, while customising their services and resources for e-learners" (Sharifabadi, 2006 p. 395).

Finally, these findings seem to suggest some implications for the profession of librarians and lecturers. Although the size of this study was too small to provide a basis for drawing firm conclusions, the findings suggest that the role of the librarians as mere information providers is being extinguished in e-learning environments. This is as a result of students taking charge of their learning and usage of digital resources, and lecturers gaining more IT skills to enable them exploit the wealth of digital information and tools. Yet the librarian has information management skills that can leverage learning and teaching in an e-learning environment as observed by Carnaby (2005). Carnaby's view is that the librarians are in a natural position to be a proactive partner in the development of "next generation" e-learning experience because of their background and understanding of standards-led architectures that have lead to information access and systems interoperability. Littlejohn *et al.* (2006) further emphasize the need for library and information professionals to work closely with the academics because managing educational content is a complex process that involves a number of elements e.g. storing, retrieving and re-using resources. Perhaps taking the constructivist approach where the provision of the digital resources is more student-centred and at the same time engaging more with the academics would make the librarian's role more visible in e-learning.

5.3 The VeSeL project and the current study

The VeSeL project in which the study participants (i.e. students and their lecturers) are involved presents a user-centred, more collaborative model. Students, their lecturers and a team of researchers are engaging actively with the communities (end users). Through this process of user engagement, the team is able to understand the needs of the end users and how best to meet them. This involves provision of appropriate information resources using appropriate technologies i.e. mobile phones. It also involves creation of virtual spaces for learning and knowledge exchange. This results in an informal e-learning environment,

where the communities can access knowledge that will improve their livelihood and at the same time participate in knowledge exchange with other interested parties. The team is taking the role of e-learning facilitators. At the same time they are also acting as information providers, a role that traditionally belongs to the librarians. Librarians, in a traditional print-based library setting provide information for learning to their students and lecturers. In these libraries, there are also seminar rooms and open physical spaces where their readers meet to exchange information and knowledge. In other words, librarians are facilitators of this process, just as the VeSeL team is facilitating information exchange in the e-learning environment.

Currently, two models exist at the University of Nairobi but at different levels (i) "Traditional librarian/lecturer model" which is less collaborative and non user-centred at the institution level; and (ii) "VeSeL's expert/end-user focused model" that is also highly collaborative, at the project level.

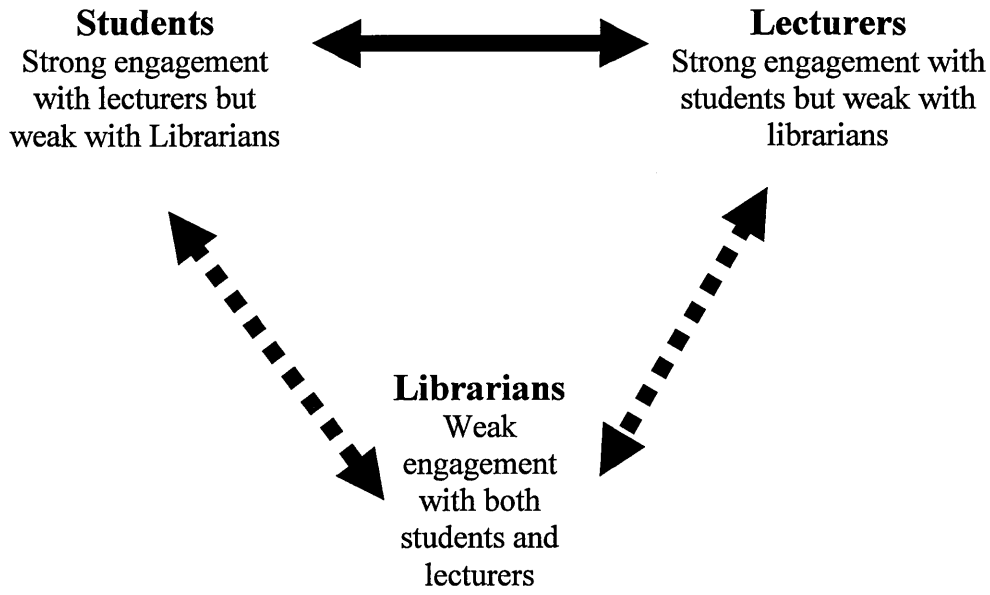

Figure 2: Traditional librarian/lecturer model

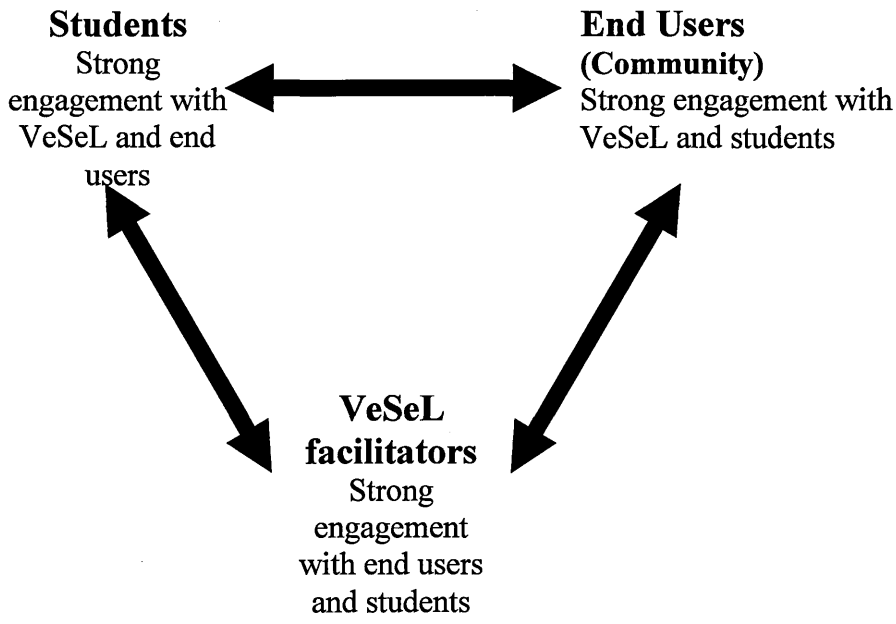

Figure 3: VeSeL's expert/end-user focused model

Even though librarians do not appear to take an active role in e-learning as revealed in this study, the VeSeL project provides a model where they can engage with the students better and allow for better support for the lecturers in developing and supporting e-learning through the use of digital resources. This model is similar to what Sharifabadi (2006) conceives as a collaboration between the library and the faculty which "promotes a responsive approach to course design and supports teaching and learning objectives, particularly when this collaboration incorporates students contributions and feedback" (Sharifabadi, 2006 p.394). Such a collaborative approach is emphasized by Borgman (2008) when she asserts that there is need for a broader more integrative conversation between the different stakeholders of scholarly communication.

Chapter Six: Summary of Findings and Conclusion

6.1 Introduction

Developments in ICTs are changing teaching and learning methods. For instance there is massive growth in e-learning and a wealth of scholarly publications is now available online. This study focused on university education in Africa. Demand for access to higher education is great; however the institutions of higher learning are constrained by limited resources to meet this demand. The Gross Enrolment Ratio has remained below 5% for most countries in the region. E-learning promises a way out and access to wealth of resources found in digital libraries adds quality to learning. Therefore, organisers of e-learning and digital resources have the potential to become highly critical to the future of higher education particularly in Africa.

In the above context, digital resources can be seen from two perspectives: (i) the e-learning perspective which lays emphasis on content production, collaboration and exchange of knowledge; and (ii) the libraries' perspective with the focus on content organisation, retrieval and access. Both perspectives have a role in mediating and providing the interface between the extraordinary riches of the digital world and the planning and presentation of the e-learning courses. As the two perspectives exist mainly to provide support to students, it is necessary to establish if the African experience makes the connection between the two perspectives easier for the student.

This chapter summarises findings of the study. A brief discussion of the study limitations is presented. The chapter concludes with suggestions for future research.

6.2 Summary of the findings

The specific purpose of the study was to investigate the perceptions of students on digital resources in universities in Africa. Four research questions were used, namely:

1. What is the students' level of awareness and general usage digital resources available to them?
2. How do they perceive the support provided to them by the librarians and the academics?
3. Does subject discipline of the students play any part in the students' perception of digital resources?
4. In the context of the responses to questions 1 to 3 above, do any cultural (including technological) issues impinge on students' perceptions of digital resources?

This study adopted a mixed methods approach with qualitative method being more dominant, and was carried out within a case study design involving University of Nairobi students, lecturers and librarians. A case study design was preferred because of its suitability for small- scale studies as it allows the researchers to focus on fewer cases. Case studies are also preferred in studies that seek to answer the 'how' questions. The study sought to answer the 'how' question of learners' perceptions of digital resources.

The main method of data collection was in depth interviews with students as they allowed the students describe their perceptions, explain their answers and give examples. A semi-structured interview schedule with open-ended questions was followed as it allowed students to tell their stories. At the same time the researcher was able to probe and make follow-ups for emerging issues. This was triangulated with informal interviews with librarians and lecturers; statistical data available from the library; and observations. Purposive sampling was used to identify students who are familiar with the use of digital

resources and from two different subject disciplines. The participants included five postgraduate students from the Faculty of Agriculture, five Computer Science postgraduate students and three Computer Science undergraduate students from the School of Informatics and Computing. In addition, there were four lecturers and four librarians. Thematic analytical approach was adopted to analyse the data.

The findings revealed that although the university places high importance on the role of the library in research and scholarship, there is poor usage of the library's digital resources, usability difficulties and inappropriate provisions of digital resources.

The study also found that high levels of IT skills among students and lecturers are impacting on students' perceptions of roles of the academics and librarians. They are also impacting on their levels of engagement. Lecturers take the role of facilitating access and usage of these resources in addition to their role as e-learning facilitators. Students have more engagement with their lecturers as they access and use the resources. This also results in a learning environment where digital resources and e-learning resources are intertwined. At the same time, students are taking more charge in their use of digital resources in an e-learning environment despite contextually related challenges i.e. poor technological infrastructure. These students are tenacious, self directed and exhibit exploratory learning skills. In this mix, the librarians' role as facilitators of access and usage of information resources is overshadowed as they appear to be excluded from active participation in the learning process. Besides being perceived as having inappropriate skills to provide a digital resources service, there is limited collaboration between lecturers and librarians and between librarians and students. As a result, there is a mismatch between what the library provides and what the lecturers and students expect from the library. However, where students have low IT skills and no e-learning going on, students perceive librarians as providers of information and their levels of engagement are high.

The study also identified a possible model within the VeSeL project in which some of the participants are participating. The VeSeL project is end-user focused and highly collaborative. Even though librarians do not appear to take an active role in e-learning as revealed in this study, the VeSeL project provides a model in which they can engage with the students and lecturers better and support the lecturers in developing and supporting e-learning programmes.

6.3 Limitations

There are a few limitations of this study. The first one relates to the fact that at the design of the study, it was assumed that the library maintains statistics of the usage of digital resources. These were seen as necessary quantitative data to triangulate qualitative data from the other sources for the purpose of validation. However, it turned out that the library does not keep these statistics and instead depends on the publishers' reports which were not comprehensive enough and hence limiting. For example it was not possible to tell the specific resources used by the students being investigated by merely looking at the figures and the only way was to look at the subject of the resources and align them with the subject disciplines of these students. In addition, the size of the data was too small for quantitative data envisaged during the design of the study. All the same the researcher was able to identify some useful reports although library generated reports would have added more strength to the study.

The second limitation was the scarcity of recorded empirical work done in Africa that relates to the subject of the study. This implied that a lot of the literature reviewed was mainly from Europe and America.

The third limitation relates to potential presence of bias in this study caused by the choice and size of participants who were also involved in a project (VeSeL) dealing with digital resources. It is possible that the participants drew their perceptions from their experiences in the VeSeL project as they repeatedly mentioned it. The researcher was conscious of this but due to time constraint as well as the suitability of these participants in answering the research questions, she decided to choose them and triangulate the methods of data collection in order to try and strengthen the findings validity. This however suggests the need for a larger sample that includes other participants not in the VeSeL project.

The final limitation related to the nature of this study. Being a small-scale study with limited time dedicated to it brought constraints on the choice of the methodology. For instance, grounded theory analytical approach would have been suitable for analysing the data as discussed in the methodology chapter, yet the time available was not enough to use that approach. Further, the fact that it was a small-scale case study in just one African country means that there is a limit on the extent to which the findings can be generalised as representing Africa. This suggests need for multiple cases involving more than one African country.

6.4 Suggestions for further study

Although this was a study of perceptions, the findings led to a conclusion related to the behaviour of students who are self-directed. One way of explaining this behaviour is that digital resources have empowered the students to take charge of their learning. It could also be the result of the tenacity exhibited by these students through the contextual challenges they are faced with. Additional research need to be done where students in two contexts (i.e. technologically enabled Western environments and less technologically

enabled environments like those in Africa) are compared in order to establish if they exhibit similar behaviour in order to draw more sound conclusion.

The VeSeL model of user-centred approach where both academics and librarians can collaborate in an e-learning environment is worth testing. The study established that librarians are left out of participation in an e-learning environment. Yet, they have skills that when combined with those of academics can leverage the benefits of ICT-enabled learning and provide a more student-centred service. The model provided by VeSeL project should be tested in order to identify ways in which librarians, lecturers and students can engage with each other within the framework presented in this model.

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Appendices

Appendix 1: Semi-structured interview schedule

The points listed below will provide the framework for the interviews. This should follow an introduction section mainly covering information contained in the participant information sheet and the signing of the consent form by the participant.

A. General background details of the participant

1. What academic program are you undertaking at the university?
2. For how long have you been doing it?
3. Can you describe your experience with any information technology/equipment you have used or are familiar with?

   Prompt: How long have you used this technology?
4. Is there anything you would like to tell me about digital libraries generally?

B. Level of awareness and general usage of digital resources available to the learner

5. How would you define the term digital resources?
6. Can you give me examples of the ones you are aware of?
7. Where have you encountered them?

   Prompt: Have you encountered them from the university?

   If not, where?
8. What digital resources have you ever used?
9. What was your motivation for using them?

   Prompt: What have you used them for?

   Where have you used them?

What made you use them?

10. Can you describe how often you have used them?

11. What your experience of using them has been like?

12. What is your general impression of these resources?

13. Do you think it makes a difference in your learning process whether you use the digital resources or not? Please explain your answer.

C. Learners' perception of the support provided to them by the librarians and the academics

14. What happens if you encounter difficulties when using these resources?

    Prompt: Do you seek assistance or do you just abandon the resources?

    If you seek assistance, from where/ whom? Librarian? Lecturer?

    What do you think of that assistance? How would you rate it?

15. Can you describe any support you get from the librarian?

    Prompt: Do you get this support after you have requested for it or the librarian provides it out of his/her own initiative? What are your views of this support?

16. Can you describe the part played by your lecturers in your usage of the digital resources? What are your views about this?

    Prompt: If they do not play any part, what is your view about this?

17. In order for you to become a successful learner, do you think it is necessary to get any support from both your lecturer and the librarian in your usage of digital libraries? Please explain your answer.

18. In your opinion, do you think the librarians and the lecturers in this university collaborate to provide a digital library service? Do you think this collaboration is necessary? Would it make any difference in the delivery of this service to you?

D. Technological and cultural factors that affect the learners' general usage of the digital resources

19. Can you describe any challenges you encounter in your usage of the resources?

    Prompt: check out for technology and cultural related challenges

20. Digital libraries have origin in the Western world. Does this facilitate or impede your usage of the digital resources? Can you explain your answer?

    Prompt: Does this affect the way you perceive digital resources?

21. What kind of influence do you see digital libraries having on our African culture?

22. Would this affect your choice of resources?

    Prompt: If yes, how and why?

        If no, why?

E. Influence of subject disciplines on the learners' perception of the digital resources

23. As an Agricultural /ICT student, what do you think about the digital resources provided to support your learning process?

24. What do you think supports your learning better: digital resources or printed resources? What are the reasons for your answer?

F. Conclusion

Round off the interview by summing up all the issues covered during the interview.

Informal interviews: Lecturers

1. How often do students come to you seeking for support, or advice on the use of digital resources?
    - Do they actually seek this kind of support from you?
    - Do you direct them to any of the resources?
    - Which ones?
    - Why?
2. Do you use any of the digital resources?
    - Which ones?
3. What are your views about students' perceptions of these resources?
    - Do they appreciate or value them?
    - Are they motivated to use them?

Informal interviews: Librarians

1. How often do students come to you seeking for support, or advice on the use of digital resources?
    a. Do they actually seek this kind of support from you?
    b. Do you direct them to any of the resources?
    c. Which ones?
    d. Why?
2. What are your views about students' perceptions of these resources?
3. Do they appreciate or value them?
4. Are they motivated to use them?

Appendix 2: A scanned copy of Ministry of Education (Kenya) research authorization

REPUBLIC OF KENYA

MINISTRY OF HIGHER EDUCATION SCIENCE & TECHNOLOGY

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

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

When Replying please quote

Ref. MOST 13/001/ 38C 89/2 **29th April 2008**

Pauline G. Ngimwa
Open University
UNITED KINGDOM

RE: RESEARCH AUTHORIZATION

Following your application for authority to carry out research on, ***'Students Perception of Educational Electronic Resources in African Higher Education'***

I am pleased to inform you that you have been authorized to carry out research in Nairobi for a period ending **30th April, 2009.**

You are advised to report to the Provincial Commissioner and the Provincial Director of Education, Nairobi Province before embarking on your research project.

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

M. O. ONDIEKI
FOR: PERMANENT SECRETARY

Copy to:

The Provincial Commissioner
NAIROBI

The Provincial Director of Education
NAIROBI

Appendix 3: The Open University Human Participants and Materials Ethics Committee Approval Letter

The Open University

MEMORANDUM

HUMAN PARTICIPANTS AND MATERIALS ETHICS COMMITTEE

FROM:	John Oates, Chair, HPMEC	**Email:**	**j.m.oates@open.ac.uk**
TO:	Pauline Ngimwa, research student IET	**TEL:**	52395
CC:		**DATE:**	April 17, 2008
SUBJECT:	**Ethics application:** AN EVALUATION OF LEARNERS' PERCEPTIONS OF DIGITAL LIBRARIES IN AFRICAN HIGHER EDUCATION	**Ref:**	**HPMEC/08/#417/1**

This memorandum is to confirm that the research protocol for the above-named research project, as submitted on 31st March 2008, is approved by the Open University Human Participants and Materials Ethics Committee, subject to satisfactory responses to the following:
You are asked to:

1. Add to the information sheet and consent forms a note that the participants' use of the digital library will be surveyed;

2. Add to the information sheet and consent forms a note that the information may be used for educational or research purposes, including publication;

3. Note that the word 'Educational' is missing from Dr. Anne Adams address and correct this;

4. Provide further information regarding your data storage protocol, including how long the recordings will be kept for, and whether personal data be kept separately from the interview schedules to protect confidentiality and preserve anonymity.

Please supply revised information sheet and consent form copy for review, and the further information asked for in 4 above, so that the completion of your ethics approval can be considered.
At the conclusion of your project, by the date that you stated in your application, the Committee would like to receive a summary report on the progress of this project, any ethical issues that have arisen and how they have been dealt with.

John Oates
Chair, OU HPMEC

Appendix 4: Characteristics of the participants

Names (coded)	Age range (yrs)	Gender	Digital Library user	Digital content developer	Computer experience (moderate/superior)
Computer Science Postgraduate student 1	30-45	Male	Yes	No	Superior
Computer Science Postgraduate student 2	30-45	Female	Yes	No	Superior
Computer Science Postgraduate student 3	30-45	Male	Yes	No	Superior
Computer Science Postgraduate student 4	30-45	Male	Yes	No	Superior
Computer Science Postgraduate student 5	30-45	Male	Yes	No	Superior
Computer Science undergraduate student 1	20-25	Male	Yes	No	Superior
Computer Science undergraduate student 2	20-25	Female	Yes	No	Superior
Computer Science undergraduate student 3	20-25	Male	Yes	No	Superior
Agricultural student 1	20-30	Male	Yes	Yes	Moderate
Agricultural student 2	20-30	Female	Yes	Yes	Moderate
Agricultural student 3	20-30	Male	Yes	Yes	Superior
Agricultural student 4	20-30	Male	Yes	Yes	Superior
Agricultural student 5	20-30	Female	Yes	Yes	Moderate
Academic 1	40-55	Male	Yes	Yes	Superior
Academic 2	40-55	Male	Yes	Yes	Superior
Academic 3	40-55	Male	Yes	Yes	Superior
Librarian 1	40-55	Male	Yes	No	Moderate
Librarian 2	40-55	Female	Yes	No	Moderate
Librarian 3	40-55	Male	Yes	No	Moderate
Librarian (ICT)	40-55	Male	Yes	No	Superior
ICT Director	40-55	Male	Yes	Yes	Superior

Appendix 5: Thematic codes

NB: Main headings have been drawn from research questions

1 Background

1.1 User characteristics

1.1.1 Experience with ICTs

1.1.2 Part time students [1]

2 Level of awareness and usage of digital resources

2.1 Awareness of e-resources for learning purpose

- Permission to access required[2]

2.2 Awareness of e-learning content[3]

- e-learning content created and usage facilitated by lecturers
- Accessible from the university
- An appreciation of these resources

2.3 Searching skills [4]

- Existence of searching skills
- Self acquired
- A necessity for effective usage
- Agric students do not have IT and searching skills but they consult among themselves

2.4 Usage of internet resources

- Ease of use
- Free downloads
- In search of credibility and quality[5]
- Frequency of usage
- Not enough time for frequent usage[6]
- Issue of quality

2.5 Access points[7]

2.5.1 University

- Free access due to subscriptions

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[1] Students registered in Module II (parallel program). They are mainly part time students in full time employment but meet in the evenings for studies. These are MSc. Computer Science students
[2] Pointed out by Agriculture student
[3] Mainly by IT students
[4] This is an emerging subtheme
[5] A contradiction – could fit well with user generated support as students do this in order to confirm credibility and give confidence
[6] A contradiction
[7] An emerging subtheme

2.5.2 Access at work[8]

2.5.3 Access from cybercafés

2.6 Perceptions of digital resources

2.6.1 Positive perception

- Invaluable resources for learning
- Provide wider perspectives
- Overcomes problems of book scarcity
- Provides wider access
- Good resources but hampered by challenges
- Limited access and need for subscriptions
- Challenges do not affect perceptions

2.6.2 University library weak in digital resources[9]

- Limited resources
- Inappropriate resources
- Poor perception of the library
- Passwords do not work
- Few computers
- Resources not properly marketed

2.7 Experience of using digital resources

2.7.1 Complicated by need for passwords and infrastructural challenges

2.8 Motivation and reason for use

2.8.1 Research work

2.8.2 Academic credibility

2.8.3 Provides an enriching learning experience

2.8.4 Provides current and free content

3 Perception of support provided by librarians and academics

3.1 Perceptions of Librarians support

3.1.1 Negative perception[10]

- Students' lack of appreciation of the support provided by librarians
- Bad experiences with the librarians
- Librarians not available to provide assistance
- Students consider themselves more skilled than the librarians
- Students do not consider obtaining support from librarians
- Students view that librarians should only provide information about the resources availability and their location

[8] Restrictive – no remote access
[9] Emerging theme
[10] This is IT students perception

- Librarians should not teach information skills program
- Librarians have not marketed their digital resources to students

3.1.2 Positive perception[11]

- Acknowledgement of support provided
  - Passwords
  - direction
- Librarians are proactive
- In defence of librarians....Does not know librarians can assist[12]

3.2 Perception of lecturers support

3.2.1 Preference for support from lecturers

- Lecturers are closer to students and have more contact hours with them
- Lecturers encourage use of resources
- Lecturers obtain digital resources for students
- Lecturers have low IT skills[13]

3.3 Support from both lecturers and librarians necessary

3.4 No collaboration between lecturers and librarians

3.5 Librarians should be academics

3.6 Students solve problems by themselves[14]

3.7 Persistent determination (tenacity)[15]

3.8 Library services[16]

3.8.1 Low perception

- Unfavourable library opening hours
- Inadequate computers
- Passwords not working
- Subscriptions are not renewed
- Low skills among librarians

3.9 Payment of resources[17]

3.9.1 Cannot access resources because passwords or payment required

[11] This is Agricultural students perception
[12] Contradiction
[13] A contradiction
[14] Emerging subtheme and a contradiction
[15] Emerging subtheme
[16] Emerging subtheme
[17] Emerging subtheme

4 Contextual factors affecting usage

4.1 Technical factors

4.1.1 Poor infrastructure

- Low bandwidth
- Power failure
- Inadequate computers
    - Agricultural students cannot afford the cost of acquiring computers
    - Creates need to go to the cybercafés

4.2 Cultural factors

4.2.1 Western origin of digital resources does not affect usage

4.2.2 Western origin encourages students seek contextual solutions

4.2.3 Local content

- Not well represented though preferred[18]

4.2.4 Mixed perceptions on the impact on African culture

5 Influence on subject disciplines

5.1 Preference for digital resources

5.2 No preference for print resources

[18] An observation made by Agricultural students because of the nature of their research which is locally based