

**INFORMATION LITERACY AND ITS ROLE IN BRIDGING THE DIGITAL DIVIDE
IN KENYAN INSTITUTIONS OF HIGHER EDUCATION AND LEARNING: SURVEY
OF THE UNIVERSITY OF NAIROBI**

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DECLARATION

This research project is my original work and has not been presented for award of a degree in any other university or any other institution of higher learning for examination.

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DEDICATION

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LIST OF ABBREVIATIONS AND ACRONYMS

CD-ROM:	Compact Disk Read Only Memory
DIS:	Digital Information Services
DL:	Digital Library
DLF:	Digital Library Federation
E-Age:	Electronic Age
E-Books:	Electronic Books
E-Democracy:	Electronic Democracy
E- Governance:	Electronic Governance
E-Government:	Electronic Government
E-Journals:	Electronic Journals
E-Resources:	Electronic Resources
ICT:	Information and Communication Technologies
IT:	Information Technology
IT Literacy:	Information Technology Literacy
IT Skills:	Information Technology Skills
JKML:	Jomo Kenyatta Memorial Library
OPAC:	Online Public Access Catalogue
TAM:	Technology Acceptance Model
UGC:	User-Generated Content
UoN:	University of Nairobi
VSAT:	Very Small Aperture Terminal
WWW:	World Wide Web

ABSTRACT

The digital age is heavily characterized by the merits of advanced technologies where digital divide is one of the major issues affecting the development of the knowledgeable geographical society. Due to this development, the innovation of new technology is unfairly utilized by the rich members of society at the expense of poor ones. Quite a lot of research work done in developed and developing countries testify to the evidence of this technological divide. This study sought to examine the information literacy and its role in bridging the digital divide in Kenyan institutions of higher education and learning, and has suggested appropriate solutions to reduce the technological imbalance. The objectives of the study were to examine fundamental indicators of information literacy in bridging the digital divide in institutions of higher learning, to assess information literacy initiatives being undertaken in bridging the digital divide, to examine how broadband subscription can be applied to support learning and research in universities, and to find out factors that influence ownership, use and non-use of digital information devices. Data analysis involved both qualitative and quantitative aspects, so as to provide opportunities for the integration of a variety of theoretical perspectives and enhance the meaning of a singular perspective. This was a case-control study that looked into the role which information literacy has played on one group of students, comparing them with another group with characteristics of such deficiency. The study particularly sought to explore the situation in the institutions of higher learning with reference to the University of Nairobi. In total, 283 respondents were selected through stratified and purposeful sampling methods. Questionnaires with closed and open ended questions were used to collect data and information. The study led to an effective remedy and equal access to information and communications technology in institutions of higher learning. The study found that the major factors hampering access and utility of digital information is the transition of digitization of resources, poor internet connectivity, insufficient ICT devices, and lack of skills and familiarity in the use of the same. The major recommendations of the study include the need to train and reposition the information professionals and custodians, formulation of literacy programs, sufficient acquisition of ICT resources, enhancement of bandwidth management, and imparting information literacy in schools. The study finally concluded that it is crucial for institutions of higher education and learning to do everything possible to bridge digital divide, without disregarding the need for enhancing information literacy and ICT courses in pre-university learning institution.

CHAPTER ONE

INTRODUCTION

1.1 Introduction

This chapter discusses the background to the study, statement of the problem, aim and objectives of the study and research questions. In addition, the importance of the study, scope, limitations as well as the conceptual framework is also outlined here.

1.2 Background to the Study

The future does not so much belong to those peoples who have achieved today a high standard of well-being, but to those ones who can induce new ideas in the field of high technologies in their relations with nature (Leslie, 2014:xvi). These are the kind of people who are aware of how to interact with information, and not just reverting to long-standing habits only because of familiarity (Bernnard, 2014:1). For this reason, there is a strong and immediate need to address information literacy as an important issue. Individuals and families increasingly need sophisticated digital information skills and knowledge to take advantage of educational opportunities; to apply for government services or student loans; to manage their health care, finances, and retirement investments; to participate in the political process; and otherwise to make the choices that affect their lives. For this reason, information literacy has almost everything it takes to lead people to the required depth in information technology in order to acquire, access and utilize information in relation to learning and research.

Manifestations of the digital divide vary in different countries such that it is actually impossible to offer a common approach for its solution. The traditional conceptualization of the digital divide is inadequate to depict the complex processes that create, maintain and ultimately challenge digital divides (Gilbert & Masucci, 2011:15). The authors underscore the need to shift the focus from merely addressing disparities in accessing computers and the internet towards one that incorporates and examines how internet information resources are differently accessed and

used. The understanding of digital divide among many others is based on examination of differences in individual information literacy skills acquisition and the understanding of demography and socioeconomic aspects between users and non-users of digital tools (Ferro, Helbig & Gil-garcia, 2011). As the problem is basically social rather than technological, the ways of overcoming it depend on the degree of the democratization of a society, standard of living, level of population's literacy depth, polish and breadth, and on cultural and ethnic features of the specific community of people. Computer literacy is a process of acquiring computer knowledge, skills, attitudes and behaviours for the overall development of the individual and for the general good of the society (Eneh, 2010:1741). Presence of information and communication technologies (ICT) infrastructure is necessary, but this is only the necessary condition because if information literacy abstains from taking its active role in orienting the users of technology, then the availability of such equipments won't avail its purpose of bridging the divide. The study also brings basic indicators of the digital divide in order to pave way for subsequent initiatives to the solution.

Global digital divide, as measured by cross-national differences in internet use, is the result of the economic, regulatory and socio-political characteristics of countries and respective evolution over time. The global pattern of social, economic, and political influences on technology utilization is analyzed through a combination of linear regression and spatial analysis (Nishida & Pick, 2013). Statistics predict that the internet use will keep being afforded by the few privileged members of societies. Less than ten percent of the world's population use the internet, and the gap between developed and developing countries has continued to widen since the early 1990s (Nishida, 2013). Nearly 75% (2.1 billion) of all internet users in the world (2.8 billion)

live in the top 20 countries, while the remaining 25% (0.7 billion) is distributed among the other 178 countries, each representing less than 1% of total users (Internet Live Stats, 2014).

China, the country with most users (642 million in 2014), represents nearly 22% of total, and has more users than the next three countries combined (United States, India and Japan). Among the top 20 countries, India is the one with the lowest penetration: 19% and the highest yearly growth rate. At the opposite end of the range, United States, Germany, France, U.K., and Canada have the highest penetration: over 80% of population in these countries has an internet connection. However much there could be a big number of communities in developed countries who are able to reap benefits from these valuable resources, members of less technologically advanced communities are unable to take full advantage of the information resources that could very well help to improve socio-economic status (Ayanso, 2014). Theoretical account for the effects of the digital divide is currently lacking despite the fact that digital divide has been the public policy issue for over a decade (Wei, 2011: 170).

Much has been done in the field of technology to help institutions initiate faster learning, as well as enabling learners to easily achieve greater retention of content. In many disciplines of education ICT is used to accelerate learning and enhance the capacity of students substantially and faster. This enables the achievement of both co-operative and collaborative learning techniques in training programmes and institutions. Co-operative and collaborative learning is significant for enhancing the ability of students to work concurrently on different aspects of a research project (co-operative) on one hand, and the ability of the same students working together sequentially on different aspects of the same research project (collaborative) (Curtin University, 2013). In this regard, ICT is doing a lot to prepare students in modern life by establishing curriculum that utilizes internet and technology, so as to prepare students for

intellectual challenges ahead of their academic completion. However, the capacity of ICT's is deficiently catered for in institutions of higher learning, when it comes to the issue of its role in providing appropriate curriculum in areas such as mathematics and natural sciences which are widely valued for the contribution to the stable economy. There is urgent need to review and restructure the curriculum of such programmes (Akanwa, 2015:95). The well-being, success and impact of any profession depend to the large extent on the curriculum used in training them as well as the competence of the teachers and this apparently validates the need for an expansion of all curriculums.

Digital divide refers to the gap between people with effective access to digital and information technology and those without access to the same (Min, 2010:2). Research evidence indicates that very few people are linked to internet, and quite a lot from the rest are still dreaming of acquiring the first mobile phone gadget (Ayanso, 2014). This brings into view the imbalances in physical access to technology as well as the resources and skills needed to effectively participate as a digital citizen. There remains a lack of consensus regarding the definition of the digital divide (Hilbert, 2011). There is a definitive complement describing the concept of digital divide as the unequal provision and distribution of internet infrastructure, access, and usage (Perkins and Neumayer, 2011:55-72).

Digital divide has different connotations and perspectives that takes on a range of comparisons within various groups (Hilbert, 2011). First, socioeconomic perspective that involves the analysis of the betterment of access to computers by the rich compared to the poor (Gilbert, 2010:20). Second, the geographic argument, that is, the utility of technological communication devices in the rural areas compared to the same in the urban areas (Nishida & Pick, 2013). Third, the racial and communal aspects, considering the majority and minority aspects of utility

of digital technology (Gaved & Mulholland, 2010). Fourth, the literacy point of view, comparing the digital technology in the hands of the highly literate, with the same in the hands of the illiterate (Wilkinson, 2010:32). The fourth perspective also highlights the aspect of greater effectiveness of the use of ICT by more literate members of a society compared to those who are less literate in the same society. This also extends to a divide between those proficient in the English language and those who are not. The final aspect involves higher computer/information literacy among the young compared to the old, and among one gender compared to the other (Brandtzæg, Lüders & Skjetne, 2012).

Consequences of the divide in higher educational learning include the mandatory requirement of computer skills for any university student. There are still a lot more students entering institutions of higher learning today without basic computer skills. The reason for this is that there are still some high schools where students come from that are without a computer lab, hence basic computer skills are not taught (Breakthrough Learning, 2013). This is where technology tends to favour those students from high-income families which afford education in technologically equipped pre-university institutions, at the expense of counterparts from low-income families (Wilkinson, 2010:32). The issue is when it gets to be needful for disadvantaged students to catch up quickly as they get into universities. In this regard there is a fallacy that people stranded on the “have nots” side of the digital divide are undifferentiated and employ similar frameworks for ICT use as the “haves” (Gilbert, 2010:20). Even sometimes the student in the picture learned basic computer skills in high school but soon discovered the need to learn a lot more. Knowledge for the use spreadsheets and power point becomes essential for passing a test of basic skills needed for legibility in university admission. Psychological aspects are also an important factor affecting the relationship between socioeconomic status, technology use, and students’ academic

performance. This makes digital divide in higher learning institutions to be a social discrepancy (Gilbert, 2010:20). Attempts to be initiated in dealing with this menace must involve increase in provision and utility of technology, factoring in affirmative action by considering the less fortunate members of the affected societies (Jansen, 2010).

Project approach based on a particular learning institution has the greatest efficacy in current approaches to overcome the digital divide (Gaved & Mulholland: 2010). Communities of institutions of higher learning and students residing within geographical proximity and connected by existing network of social relationships, may provide one of the most effective methods of ensuring meaningful and sustained usage of the internet in such institutions (KNICTMP, 2014:24). Such communities offer shared academic purpose and existing students' interactions, bringing a reserve of social capital as a mechanism to overcome barriers, and resolve the lack of formal support (Nkanu & Okon, 2010:7). In particular, there has to be a day designated for recognition of initiatives for bridging the digital divide in universities, just like any other public holidays such as AIDS day and labour day. In America, there is Philadelphia Martin Luther King day of service focused on the digital divide (Clark, 2011).

Riddlesden and Singleton (2014) illustrate on how the availability and performance of broadband connectivity is becoming increasingly important issue across much of the developed world. This is subsequent to the prevalence of richer media services and growing population which has generated increasing demands on existing networks. The authors allude that although average broadband speeds have improved over time, inequity is shown to emerge between different societal groups and locations. Short-term dynamics also reveal that in areas of different density, speeds can fall dramatically during peak hours, thus influencing the availability of services. The apparent disparities in access and performance represent a major issue as internet use becomes

increasingly existent in everyday lives, with inequalities evoking social and economic disadvantage at local and national scales.

The diffusion of broadband is shaped by the penetration rates of individual locations of a given region (Kyriakidou, Michalakelis & Sphicopoulos, 2011). There is a clear correlation between the affordability of broadband services and the levels of broadband penetration, therefore presenting greater challenges in achieving the desired take-up targets. Affordability can best be tackled using other types of intervention since high-speed broadband usually consists of higher connection and monthly fees than basic broadband services. It is significant to author a policy of preventing the occurrence of “digital divide” in the use of telecommunication services among earners of different levels of income (Obutte, 2014). The author underscores the requirement of making the services affordable without discrimination to people of varied social status. With this principle in place, there will still be the opportunity to avail high-speed broadband take-up targets, by provision of such services to persons who prefer them and would be ready to pay for such services regardless of cost.

Number of authors emphasize on the focus on broadband access as the main effort to close the digital divide and unleash the potential of the internet (Straubhaar, et al., 2012). Many organizations in Kenya are developing broadband policies to address the digital divide, by stimulating investment in high-speed broadband infrastructure in rural areas, through the provision of public–private partnerships and structural funds. The focus here, however, is on the options available for tackling barriers to the adoption of high-speed broadband services among lower socio-economic groups/societies, to meet this noble requirement for high-speed broadband take-up.

Indeed, few institutions of higher learning in Kenya have taken up ultrafast broadband (UFB) subscriptions, meaning that many individual students in institutions are still digitally excluded. This insufficiency of UFB is attributed to the institution's vulnerability to "single points of failure" (SPOF) (McNeill, 2015). This is explained as a failure of part of a system that stops the entire system from working. SPOFs are a force to reckon with in institutions of higher education and learning of which the educational systems are highly reliable. McNeill gives the remedy to this vice by encouraging schools to invest significantly in building "redundancy" into their networks to reduce such a risk. This can be done by having spare hardware such as network switches / servers to replace a faulty unit, having multiple units running together at the same time, having alternative power supplies, such as generators, and replicating critical systems to off site locations. The primary barriers to broadband adoption include lack of understanding of the relevance and benefits of broadband, lack of skills or familiarity and confidence to use technologies; level of affordability of connection and access fees, and devices with which to access broadband. Consumer awareness and pricing are main factors that need to be addressed for a successful UFB rollout (Mirza & Beltran, 2013). The framework for ICT and empowerment is the same for mainstream and marginalized groups and therefore the problem of and solution to the digital divide is one of merely increasing access to ICTs and related information (Gilbert & Masucci, 2011).

As the infusion of mass media information into educational system increases, higher socioeconomic status segments tend to acquire this information faster than lower socioeconomic-status population segments so that the gap in literacy levels between the two tends to increase rather than decrease. This hypothesis explains that information literacy, like other forms of wealth, is often differently distributed throughout the social system. Since gender, age, racial,

income, and literacy gaps in the digital divide have lessened compared to past levels, where some studies suggest that the digital divide is shifting from the gap in access and connectivity to ICTs to the knowledge divide (Graham, 2011:211-227). Such knowledge/literacy divide concerning technology presents the possibility that the gap has moved beyond access and having the resources to connect to ICTs, interpreting and understanding information presented once connected. With regard to this trend of events, and in perspective of existing scholarly research and quantitative data on the issue, digital divide is diminishing gradually (Nawaz, 2012). The advancements in technology particularly the integrative features of modern technology along with increasing affordability is denting the digital divide.

Age has been regarded as the most important variable in institutions of higher learning, explaining acceptance of new technologies in learning, whereby elderly people's adoption of new technology lags behind that of younger age groups in the United States (Gibson et al., 2010) and Norway (Vaage, 2014). Perceptions of new communication technology among the elderly students on master's and doctorate programs affect willingness to learn about and use the technology (Xie, Watkins & Huang, 2012). Barriers include feelings of alienation and perceptions of being too old to learn to use new technologies, lack of realization concerning the relevance and benefits of technologies, pre-established negative attitudes, as well as privacy and information-security concerns (Bloch & Bruce, 2011; Hakkarainen, 2012). Additionally, older students often regard the internet as the functional tool rather than the tool for social interaction and participation. Conversely, the young students are the new generation that has emerged, which is more accustomed to modern technology and feel it as part and parcel of life (Comba, 2011). The desire to work together, learn and share information might be a generational phenomenon (Badger, 2011). Younger students in higher learning institutions, who are between

ages eighteen to thirty-four are the most likely to share media and other normally private possessions in what has been called the “sharing economy.”

Institutions of higher education and learning in Kenya have strongly embraced social network service (SNS), which has interactive exchange of information anytime and anywhere. This is due to the fact that SNS has played a role in forming the concept of community in a virtual space beyond constraints of time and space as the internet began to affect interactions of people in the concept of community, not individuals (Lee & Son, 2012:4). Students use smart phones that have been installed by several applications which enable the posting and recognition of any information with real-time feedback without necessarily connecting to the website. Performance and enthusiasm of students is elevated by such real-time access in collaborative smart learning. Collaborative learning is the interaction between a learner and a learner, and a learner and an instructor. SNS such as Facebook and Twitter, enable student to have collaborative learning without boundary of non-real-time and real-time communications (Lee & Son, 2011). Cooperative learning institutions is also afforded by SNS adoption, together with making effective the model of interactive learning environment.

Smart learning service is a new type of educational service integrating smart devices such as Smart Phone or tablet PCs and brand new e-learning technology. This is learner-directed and human-oriented learning method which lets learners be easily accessed to source information for learning by integrating smart IT technology with learning activities, supports interaction among learners or learners and teachers effectively, and designs self-directed learning environment (Noh, Ju & Jung, 2011). There are four functions of SNS in institutions of higher learning (Noh, 2011:5). First, SNS introduces state-of-the-art IT technology known as smart technology, through smart learning. Second, it realizes cooperative learning practically and maximizes

learning effects through cooperative learning as freed from unilateral knowledge transmission. In particular, the concept of social learning utilizing social network computing is very crucial in smart learning. It is expected to play roles in complementing cooperative function which was regarded as the limitation of previous e-learning. Third, it can contribute to forming environment for designing self-directed learning. Fourth, it realizes informal learning practically which tears down the walls between everyday life, work, leisure, and learning. Other advantages of this system include real-time exchange of opinions and enhanced lecturer-student interactions that results in higher skills in solving problems and effective group learning. Popularity of SNS naturally influences students' adaptation to the system and elevate interest and performance in learning. SNS system enables students to become teachers as well, and this reduces a sense of inferiority alongside raising performance levels academically.

1.2.1 Context of the Study

Kenya university education has undergone remarkable transformation with the enactment of University Act No. 42 of 2012, which ushered in a raft of changes in the management and operations of higher education in the country. This act has established the Commission for University Education (CUE) as the successor to the Commission for Higher Education. This is the government agency mandated to regulate university education in Kenya. The commission has effectively placed both public and private universities under the management of CUE in the provision of quality and relevant university education in the country. This has made great strides in ensuring the maintenance of standards, quality and relevance in all aspects of university education, training and research. The commission continues to mainstream quality assurance practices in university education by encouraging continuous improvement in the quality of universities and programmes.

University of Nairobi was the first university in the country to be given a charter, its history as an educational institution goes back to the colonial period, but it did not become independent until 1970. So much was expected from the University of Nairobi because it was the only higher educational institution in Kenya mandated to provide students with special skills. Foreign companies relied on University of Nairobi to provide them with people able to work and produce. The functions of the university as stated in the University of Nairobi Act, 1970, indicates: “The University of Nairobi is to provide facilities of university education; assist in the preservation, transmission and increase of knowledge; conduct examinations and grant degrees and diplomas and co-operate with the government in the planned development.” The University of Nairobi, a world class institution, has consistently kept soaring very high in ranking among all other universities in Eastern and Central Africa (Webometrics, 2014). Integration of information literacy in the curriculum of University of Nairobi has been made mandatory. The university is required to provide the requisite funding, information, human and other resources for its effective implementation.

1.3 Statement of the Research Problem

The significance of upholding the element of ICT in the information literacy in institutions of higher education and learning is indispensable, due to the dynamics in the information environment, technology revolution, media landscape, labour market requirements, Millennium Development Goals and Government Vision 2030. It is important to investigate on the possible enhancement of ICT literacy and effectiveness of the same with regard to resources and facilities, course assignments and reading materials, and the quality of instructors in these institutions. Information literacy, in this regard, is a critical underlying factor encompassing the ability to understand and use information effectively in daily living. Literacy levels greatly

enhance the means by which people access information and participate in society. Information literacy being an intellectual framework for understanding, finding, evaluating, and using information, elevates it to be a survival skill in the information age. All these and others among the efficacies of information literacy are accomplished substantially by fluency with information technology. Access to ICT meets significant challenges that stem from income restrictions. This calls for initiatives to reduce the costs of ICT, which includes low cost technologies and shared access through “telecentres”. Even though individuals might be capable of accessing internet, many are faced with barriers to entry such as lack of means to infrastructure and inability to comprehend the information that internet provides. Some individuals have the ability to connect, but they are not technologically literate enough to adopt the ICTs and internet technologies provided to them. This leads to a focus on capabilities and skills, as well as awareness to move from mere access to effective usage of ICT. The internet has emerged as much more than luxury to become a necessity for vast swaths of the population in the economically developed world (Warf, 2010:112).

To be disconnected is to be both economically and socially absent from the information and knowledge revolution (Graham 2011). The need to heighten information literacy for growth and development is critical; many services now require internet access and a sustainable centre for instruction, and other technology services so as to provide information to the members of societies. Emphasis is given on how growing literature focuses on how technological literacy and digital skills are gained through combination of access to ICTs and training (Wilkinson, 2010:32). This can play a great role through commitments of the governments as well as regional collaborative efforts and partnerships (UN Chronicle, 2011:1). This will alleviate the technological, economic and social attributes of digital divide by putting in place concerns of

purpose, mindset, governance, leadership and vision in such institutions. The ICT era brings with it an educational economy that is increasingly dependent on digital-based information. Consequently academic excellence in learning institutions and its students are dependent on the successful mastery and utilization of ICT.

Studies indicate that digital divide is analysed at one of two levels: either the inter-institutional or the intra-institutional digital divide. The first is between institutions of higher learning and the second is the domestic digital divide within those institutions. At the inter-institutional level, studies have shown that a clear divide exists in the access to, skill in, and use of ICT between well equipped and deficiently equipped academic institutions attended by students prior to being admitted to universities (ITU, 2011). Some of the key factors that explain the inequity in ICT access and use in higher learning institutions are GDP per capita, telecommunications infrastructure, economic disparity, regulatory and evolution of socio characteristics of universities over time. Some specific groups of students within the institution who are disadvantaged include students from low cost pre-university schools, students with low literacy levels or limited digital education, students from isolated or rural areas, and those with some kinds of disabilities that inhibits them from full utility of digital information resources. The study of digital divide should consider what he called “the outcome divide” in addition to the access and capability divides, which clearly indicates that digital divide in universities is a multidimensional construct and should be studied in the context of economic, social, political, demographic, and cultural aspects as well as ICT infrastructure (Wei, 2011).

1.4 Purpose of the Study

The purpose of this study was to examine the role of information literacy in bridging the digital divide in institutions of higher education and learning in Kenya with particular reference to the University of Nairobi; and suggest appropriate solutions to reduce the technological imbalance.

1.4.1 Objectives of the Study

Objectives of the study included to:

1. Examine the indicators of information literacy in bridging the digital divide in institutions of higher education and learning in Kenya.
2. Assess information literacy initiatives being undertaken in bridging the digital divide in the institutions of higher education and learning.
3. Examine how broadband subscription can be applied to support learning and research in institutions and universities.
4. Find out factors that influence ownership, use and non-use of digital devices in institutions of higher education and learning.

1.5 Research Questions

The study was guided by the following questions:

1. What are the indicators of information literacy in bridging the digital divide in institutions of higher education and learning?
2. How practical are the initiatives being undertaken in bridging the digital divide in institutions of higher education and learning?
3. To what extent is the application of broadband subscription in support of learning and research in universities?
4. Which factors influence ownership, use and non-use of digital information devices in institutions of higher learning?

5. What are the challenges encountered in bridging the digital divide in institutions of higher education and learning?

1.6 Assumptions of the Study

Internet access, mobile phones and cloud computing are some of the digital information devices that provide access to information, knowledge and communication in institutions of higher learning. Inequality among students in the institutions of higher learning is one of the digital divide pillars that cause variations on how some students are not able to use the internet, or other digital technologies, at the same rate as other students in the same institutions.

1.7 Scope of the Study

The study was critical analysis of the impact of digital divide among students of University of Nairobi, whose views represented institutions of higher educational learning in Kenya. This was a cross sectional descriptive survey that looked into the role of information literacy in bridging the digital divide in among these particular students in this institution. The survey was done on master's students pursuing various courses in the two faculties, that of Agriculture and that of Veterinary Science, both in the UoN's College of Agriculture and Veterinary Sciences (CAVS). All the 283 master's students in these two faculties were picked.

1.8 Limitations of the Study

This study focused only on the University of Nairobi's information science students, because of their considerable knowledge in this area of study needed for this research. Another limitation is the predetermined method for recruiting survey respondents. This may lead to recruitment of unique sample of non-users of digital devices. Further research should draw on a more representative sample. This research method that was used in this study only appears best suited to the research problem so as to avoid getting caught up in philosophical debates about what

could be the best approach (Njoroge, 2013). Assessing the validity of the approach can be complex, hence similar studies should be replicated in future research.

1.9 Significance of the Study

Access to computers and the internet and the ability to effectively use these technologies are becoming increasingly important for full utilization in Kenyan's academic and social life's potentials. The value of this input will subsequently be projected in all work places where these ICT professional graduates will be needed to utilize such noble potentials in the present economy. This demand is in response to the pronounced inadequacies in both coverage and skills of ICT component among graduates of institutions of higher education and learning. Learning and teaching in the institutions of higher education is more affordable with the use of digital devices and technology solutions. This makes it more favorable to students who come from poor families, and also their likelihood to gain a lot in their participation in online learning is in itself an aid to bridging the digital divide. Technically, university students with limited access, and those who have less developed technology skills, will be enhanced in those missing skills by on-hand use and practice with digital devices. Subsequently, students develop proficiency significantly in the academic areas involving file management, word processing, media production and presentation tools and troubleshooting. Web literacy is another key to successful learning. Working online gives students an exposure and a rich cultivation of skills in web navigation, searching, information evaluation and collaboration. Again building the digital divide in universities will help students from poor backgrounds to escape from their social economic status, by being introduced to resources for creating and accessing economic systems. Self-confidence is the key ingredient that inspires a student who is new to technology to pursue further and deeper learning. This is developed in the student from a humble family, who may

have had little opportunity to develop it in using technology, this may be the most significant step in using online education to bridge the digital divide.

Technology, used creatively, can also make a big difference in the way lecturers teach and students learn. Lecturers should be using the internet to keep up with the latest developments in their field, exchange lesson plans with their colleagues, and communicate more frequently with parents. Students should be able to log on to library resources and download documents and engage in more active "learning by doing." Students should also be able to create powerful internet-based learning resources that can be used by other students. The fact that learning institutions consist of students from all over the country of Kenya is an effective strategy of having a real representation of the scenario of digital divide in all institutions of higher learning.

Despite failures and unsuccessful projects that vanished, many reports from Kenya concerning the role of information literacy in bridging digital divide in universities indicate success and commitment to the needs of those scholars whose skills of utilizing digital devices is still wanting. Regardless of evidence of the widening of digital divides, projects in Kenya give promise that ICT, courtesy of information literacy can be used to help close these cracks. Effectiveness of information literacy will provide hope for other applications of ICTs in Kenyan life. Despite doubts about the impact of the successful Kenyan information technology industry on average Kenyans, experience show that, with a will, its successes can benefit not only the general population but the inhabitants of remote localities of the country. In the end, despite the many differences between one county and another, most of the problems of one county will be revealed to be the problems of another county as well, while the findings and solutions of one county provides lessons for other counties.

1.10 Operational Terms and Concepts

Digital Divide

Economic and social inequality according to categories of persons in a given population in relation to access and use of knowledge of information and communication technologies.

Digital Information Systems

Electronic systems that integrate software and hardware to enable information communication and collaborative work.

Global Digital Divide

Social issue referring to the differing amount of information between those who have access to the internet (especially broadband access) and those who do not have access.

Information and Communication Technologies

Unified communications and integration of telecommunication systems (telephone lines and wireless signals), computers as well as necessary enterprise software, middleware, storage, and audio-visual systems used to create, acquire process, store, utilize and broadcast information.

Information Literacy

Ability to know when there is a need for information, be able to identify, locate, evaluate, and effectively use that information for the issue or problem at hand.

Information Society

Information creation, distribution, use, integration and manipulation is a significant economic, political, and cultural activity for gaining competitive advantage internationally, through use of information technology in creative and productive way.

Knowledge Society

System that generates, processes, shares and makes available to all members of the society the literacy skills that are used to improve the human condition.

Web 2.0

Description of World Wide Web sites that use technology to interact and collaborate with each other in social media dialogue as creators of user-generated content in the virtual information community.

1.11 Chapter Summary

This chapter discussed the background to the study, statement of the problem, aim and objectives of the study and research questions. In addition, the importance of the study, scope, limitations as well as the conceptual framework has also been outlined. Against this background, this study intends to assess the role of information literacy in bridging the digital divide, and pointing out incidental efforts towards the required solutions for narrowing – if not completely eradicating – this information gap.

CHAPTER TWO

LITERATURE REVIEW

2.1 Introduction

This chapter reviewed literature based on the objectives of the study. This review drew from material that had already been published, both in hard copy and electronically, that are relevant for this research project. The review looked into those studies which had been conducted in the past, their mode of such conduction, and the conclusions in the problem area.

2.2 Knowledge Economy

Information literacy has greatly aided the convergence of computers and technology (internet), thereby revolutionizing modern society in enhancing electronic access to information (Chukwusa, 2014:2). In many respects the centrality of information literacy is paramount in capacity building measures to redress the digital divide. The concepts of the digital divide and information literacy is regarded as highly compatible in their application for effective access to technology networks in their bid to respond to a call for a heightened emphasis on education (Dunn, 2013). Like other fields of human endeavor, there is no aspect of educational activities that digital processing is not applicable. Digital literacy and technology is of particular importance when information is to be gathered, store, retrieved and evaluated. The importance of information literacy in fostering ICT in institutions of higher education and learning is so vital due to the need to satisfy a great demand for professionals equipped with its skills, competencies and comprehensive coverage (Dangani & Mohammed, 2009:15).

Students' and teachers' digital literacy needs are getting more complex to do with education, not to mention personal fulfillment. What remains is how the institutions of higher learning can ensure the continuous derivation of the benefits from new opportunities of ICT afforded information literacy. In order to bridge the gap that exists between traditional and modern

methods of information storage, retrieval and provision in the digital age, the use of ICT in commercial and economic operations must be seriously emphasized. Developing countries face opportunity cost by delaying greater access to and use of IT, which together make up ICT, in this rapidly evolving electronic environment (Ofua & Emiri, 2011:14-22). Ideally, information literacy in ICT is expected to have a major impact on the management, structure, and work activities in Kenya. The infrastructure by which individuals, households, businesses, and communities connect to the internet address the physical mediums that people use to connect to the internet such as desktop computers, laptops, basic mobile phones or smart phones, iPods or other MP3 players, xboxes or playstations, electronic books readers, and tablets like iPads, courtesy of information literacy (Zickuher, 2011).

As first step to bridging the gap, Kenyan institutions must accept the fact that information literacy enhances ICTs to be enablers of innovation in the managerial and operational processes. This is to say that the use of the technologies of modern computer-based information systems is a major force that has the capabilities of transforming the traditional methods of operations in every aspect of life. Information literacy in Nigerian libraries is a combination of computers, storage media and telecommunications (Nkanu & Okon, 2010). In other words, computers provide the processing, storage and retrieval capabilities of information in the library, while telecommunication provides the capabilities for the transfer and communication of data (information) from one workstation to another in the library. With such integrations of the systems, a lot of fruitful co-ordinations among various operations can be enhanced as “everything gets connected to everything”.

Owing to the initiative of information literacy in institutions of higher education and learning, the gap between those with access and without access to information technology is actually narrowing, as the knowledge continues to expand the horizon through which such merits of technology is harvested (Sautter & Morgan, 2010:554-575). Many institutions and government sectors are now converting the contents of information resources into electronic databases thus, increasing their dependence on technology. Technology has provided opportunity for the know-how of combining computer and communication technologies in the performance of great varieties of tasks. Information literacy is a necessity for this achievement because people in many disadvantaged groups are often excluded from making use of ICT's due to low levels of computer and technology skills and also, very importantly, literacy skills (Ofua & Emiri, 2011).

Birmingham libraries are using new funding recently secured from the Wolfson Foundation to invest in digital technology to support children's literacy, including tablets, e-readers, smart phones, and projectors across five local libraries beyond the city centre (Elford, 2014:2). Due to the recent attention to this issue, both with the government and the public, Kenya government initiative to enhance digital technology is doing a lot in combating the digital divide. One of the ways through which this is being done is by piloting the One Laptop Per Child (OLPC) program, aimed at digitizing the on-coming generation by providing inexpensively produced "XO" laptops to children residing in poor and isolated regions. Each laptop belongs to individual child and provides the gateway to digital learning and internet access. The XO laptops are specifically designed to withstand more abuse than higher-end machines, and contain features in context to the unique conditions that remote villages present. In this perception a useful set of contexts come in where action learning, community based research, education action research, appreciative inquiry, and action science get to be particularly relevant (Dick, 2010:39).

2.3 Information Literacy and its Role in Bridging the Digital Divide

Influential initiative of information literacy in bridging the digital divide among students in institutions of higher educational learning, and narrowing the intra-institutional divide brings about academic ICT usage that translates into changing learning patterns and eventually transformed educational systems (Sedimo, Bwalya & Plessis, 2011). Access to computers and the internet and the ability to effectively use this technology are becoming increasingly important for full realization of the importance of ICT component in information literacy in such institutions. Creative use of this technology makes big difference in the way teachers teach and students learn, thereby helping institutions initiate faster learning of their students, as well as enabling those students to achieve greater retention of what they learn with more ease. In many disciplines of education ICT is used to accelerate learning and enhance the capacity of students substantially and faster. In some lecture rooms, teachers are using the internet to keep up with the latest developments in teaching, exchange of lesson plans with colleagues, and communicating more frequently. This enables the achievement of both co-operative and collaborative learning techniques, reflection and classroom community (Richardson, 2010). Information literacy curbs digital divide by vastly increasing the resourceful user-generated content (UGC), which is enabled by Web 2.0 (Miller, 2010 & King, 2011). Web 2.0 site allows both students and lecturers to interact and collaborate with each other in virtual learning environment as creators of user-generated content in a virtual community through blogs, wikis, folksonomies, video sharing sites, hosted services, web applications, and mashups. Geographers have been richly benefiting from the opportunity to exploit georeferenced UGC, which is termed volunteered geographic information (Elwood, Goodchild, & Sui, 2012).

Institutions of higher learning are in the site the largest and fastest creation technology wealth ever recorded. By offering various computer and ICT related courses, such institutions are expressing a strong belief that technology will guide higher education into greater heights in academia. However, many universities unlike others lack sufficient computer access due to inadequate technological knowledge and equipment, alongside lower teaching qualities and insufficient resources. This has caused digital divide to continue to grow at an alarming rate irrespective of the increased growth of universities with access to computer and internet connections. On one hand, some group of students in a given university seem to be well ahead of the others owing to their financially privileged background, making them keep adopting newer technologies faster and connecting even more than. Such a group passed through expensive pre-university schools that are equipped with computers and related ICT facilities. On the other hand, the other group of students in the same university but who came from financially underprivileged background experience lower rates for internet and computer usage, making them to lag far behind. This causes the gap of digital divide in institutions of higher learning to keep widening along already strained economic lines.

Institutions of higher education in Kenya are undergoing a fast ICT revolution that has education, library and social implications in the country. A big gap already exists between one another in terms of access and contents of ICTs, known as the inter-institutional digital divide. The disparity is between the technology rich and the technology poor institutions owing to their age of existence and genealogical positions. One of the instances of this differences of this is the position of the institution that recently attained autonomy after being a constituent college of a mother institution. This kind of institution won't match with the mother institution in terms of ICT equipment, skills and expertise. This is very conspicuous in the institutions' academic

libraries and other areas that need development. The library, being the centre of ICT use, must be displaying an increasing efficiency of services and quick collating and disseminating of vital information to library users in those universities.

2.4 Initiatives for Bridging the Digital Divide

Kenya's Education Network Trust (KENET), a research and education network, takes the greatest initiative in promoting the use of ICT in teaching, learning and research in higher education institutions in Kenya (Tilvawala, 2009:5). It spearheads the commitment of Kenyan government to explore internet pricing reforms as well as linking Kenyan universities to the internet. The other is the above-mentioned Kenya government initiative to enhance digital technology by piloting the one laptop per child (OLPC) program, aimed at digitizing the on-coming generation by providing inexpensively produced "XO" laptops to children residing in poor and isolated regions. This will meet out the major cause of digital divide in institutions of higher education and learning, which is the unfair variations in ICT skills among students based on the opportunities availed in pre-university schools. It will be accomplished by the provision of gateway proficiency in digital skills so as to avoid learners from failing to measure up to the level of the others when they ultimately get to universities.

Despite the many initiatives being implemented across institutions of higher learning in Kenya to address obstacles to bridging the digital divide, there is a call to prioritize on helping people acquire the skills necessary to properly utilize information technologies. Through computer cluster and teaching programs, universities can turn students and staff on to the elevated recognition of technology. This calls for a critical examination of the institution's technical literacy, identifying the areas of greatest need and implementing a program to aid the institution's progress. This should go further in enhancing the spread of benefits of technological change

throughout the institution. Access to computers and the internet should be open and unrestricted so as to level out the opportunity to all the various academicians in their different levels, status and capacities. The current educational society is defined by access to information, hence without access to technology leaves one in the digital dark ages. There has to be an initiative to thoroughly orient and drill those students from disadvantaged pre-university institutions to match their advantaged counterparts from equipped pre-university schools, in order to seal this gap.

Just like the Philadelphia Martin Luther King day of service focused on the digital divide, there has to be a day designated for recognition of initiatives for bridging the digital divide in universities, similar to any other public holidays such as AIDS day and labour day (Clark, 2011). In the University of Nairobi, there is Open Access Week in October, which coincides with the Global Open Access Week in October from 19th to 25th. This is an annual scholarly communication event focusing on open access and related topics. It takes place globally during the last full week of October in a multitude of locations both on- and offline. Open access (OA) means unrestricted online access to research literature on the public internet, intended for peer-reviewed academic journals, and a growing number of theses, book chapters, and monographs. This permits any users to read, download, copy, distribute, print, search, or link to the full texts of these articles, crawl them for indexing, pass them as data to software, or use them for any other lawful purpose, without financial, legal, or technical barriers other than those inseparable from gaining access to the internet itself.

The presence of widespread illiteracy among overlooked populations is a major factor that results in the digital divide in universities. National long term investment is required for effective connectivity by installation of enduring infrastructure such as transmission facilities

and public power supply. There should be resources input and support from sources, including government, the private sector, United Nations, financial institutions, World Bank and other global organizations and initiatives such as the UNICT Task force and G8 Digital Opportunity Task Force (Igun, 2013).

2.5 Challenges in Bridging the Digital Divide

Institutions of higher educational learning are faced with a great challenge of inability and lack of access to digital infrastructure and facilities to enrich students and enhance global sharing of academic and research materials via the wave. This is made worse due to the fact that such caliber of institutions are shouldered with the responsibility of providing adequate resources and information to meet the bibliographic requirements of lecturers, researchers, and students. In many of these institutions of higher learning, academic libraries have not quite reached the status of providing access to digital resources and information owing to some challenges which militate against access provision (Kniru, 2010: 42-44). The other challenge is the incompetence of providers of these ICT facilities in universities. Many of the information technology patrons prefer digital resources and services in the digital work environment to paper based, yet the technologically handicapped librarians in the same institutions have a very hard time to provide the services needed (Gbaje & Ukachi, 2011: 65-69). Owing to this, librarians and management of university libraries fail to be ICT compliant to optimize the integration and use of ICT infrastructures to offer the needed services in the digital age.

There is also a deficit in the users' own inability to acquire basic knowledge of IT, which inhibits them from operating computer, internet access and facilities which reveals their inadequacy to use and operate in the digital environment due to the radical changes in the nature of information production, selection, dissemination and consumption (Okoli, 2010: 109-110). The other

challenge is characterized by the indifferent attitude of staff, which is the major limitation to effective management of digital information materials as well as lack of skilled and qualified staff (Amaechi, 2010). Digital literacy training in learning institutions is to be underscored and be taken a step further by calling upon libraries in the institutions to employ the small staff of full-time teachers who have made computer training a key component of the institutions (Enis, 2012). These teachers will become the information custodians who will enable the institution to offer a variety of classes or courses to help students learn to use computers or specific software packages. It is also challenging because those classes might not address all of the students' education needs, and they are likely to conflict with the schedules of many students. If there remains no active interaction with digital information resources by information custodians in institutions of higher learning, such custodians will distance themselves from participating and enjoying the benefit of ICT, hence their job of providing materials for library users becomes a challenging one.

2.6 Empirical and Intellectual Studies

A new multi-dimensional approach to information literacy is one way of beginning to tackle the wider, more long standing and pervasive social and economic divides that now increasingly reflect themselves in disparities of access to information (Dunn, 2010). The study focuses on deepening theoretical perspectives and sharing alternative understandings of literacy and the digital divide. In conclusion, a solid foundation of technology-assisted basic education is a key prerequisite to advanced and effective use of ICTs. Many students in institutions of higher educational learning do not meet the digital requirement standards, and lack the critical thinking skills required to effectively navigate technology and the internet (Liu, 2013). The author ascertained that many students in such institutions lacked confidence in ability to use basic

software and electronic resources, and found that by encouraging digital literacy skill development in the home, students in the institutions of higher learning will best be prepared to take on what happens in the classroom and eventually, the workplace. This encourages home broadband adoption by promoting digital literacy trainings on its various websites and at government offices. Together, these recommendations prepares youths and families to cultivate the digital competencies required to succeed in today's classrooms and workplaces.

Report on masters study undertaken to investigate the impact of the digital divide on information literacy training of extended curriculum programme (ECP) students at the Durban University of Technology (DUT) (Naidoo & Raju, 2012) revealed that the digital divide does impact on IL training in ways such as slowing down the progress of IL lessons, basic computer skills to be taught in the IL classroom, and that digitally disadvantaged students find it difficult to follow online lessons while advantaged students already have the expertise to access online information. The study found that computer literacy training is very ineffective when it is done before IL training, and also there is lack of various creative teaching and learning methods which should be incorporated into IL education so as to accommodate both digitally advantaged and digitally disadvantaged students in the IL classroom.

Similar study sought to determine the level of incidence of the variable of university students' incomes on the uses and intensity of use of the internet tools and resources (Torres, Loja, & Huelva, 2011). The study identified three profiles with different levels of use and intensity of use of the internet tools and resources, and statistically the incidence of income in the creation of those profiles was proved. Theoretical conceptual framework was presented to foster creativity for innovative ambient learning applications, which can be used to bridge the digital gap between

universities in developed and developing countries (Mwendia, Wagacha, & Oboko, 2015). Ambient learning allows flexible content access by considering learner's current situation and learning context. A study was carried out on IL in Kenya with the purpose of ascertaining the barriers to efficient utilization of ICT in developing countries (Tilvawala, Myers & Andrade, 2009). The study found that low level of information literacy is the major barrier owing to inability to manipulate and use information effectively.

2.7 Knowledge Gaps

This research varies with that of Dunn, because this one is determined by the need to have information literacy spearhead the fight against digital divide, while Dunn's objectives are determined by the need to see which approaches of information literacy can better tackle social and economic divides, which inhibits information access in institutions of higher learning. Unlike this research, Dunn's does not link information literacy directly to its role in bridging the digital divide, but to the manifestations of digital divide, which are social and economic aspects. Dunn's research is also concerned with obtaining alternative understandings of information literacy as regards social and economic divides, which affect information access. The study goes beyond Liu's case study by not only ascertaining deficiencies of students in institutions of higher learning with regard to digital requirements standards and lack of related skills, but by remedying such deficiencies through enhancement of information literacy.

The study goes beyond investigation of the impact of the digital divide on information literacy, as did Naidoo and Raju. This one does much on how information literacy can be enhanced to remedy digital divide. Naidoo and Raju were also concentrating on addressing the problem of the impact of having both digitally advantaged and digitally disadvantaged students in the same information literacy classroom, expecting them to reach learning outcomes without frustrating

students from either group. This research is focused on bridging this digital divide, after having established the consequences of the two groups (advantaged and disadvantaged digitally) from preceding researches. The findings of both of these researches concur on the need of literacy training to precede the utilities of digital information resources in such institutions of higher educational learning. Torres, Loja and Huelva's research focus so much on the income aspect of the users of electronic resources in institutions of higher learning. This study only features slightly the income aspect with regard to the financial capability of these students in affording to learn in institutions that were digitally equipped, before enrolling in universities.

From the above, this study intended to examine the role of information literacy in bridging the digital divide in institutions of higher education and learning in Kenya, and suggested appropriate solutions to reduce the technological imbalance.

2.8 Conceptual Framework

Figure 1 on pg. 32 therefore helped to visualize the relationship between key concepts and variables that were relevant to the study. The diagram illustrated that within the particular context, given challenge occurred.

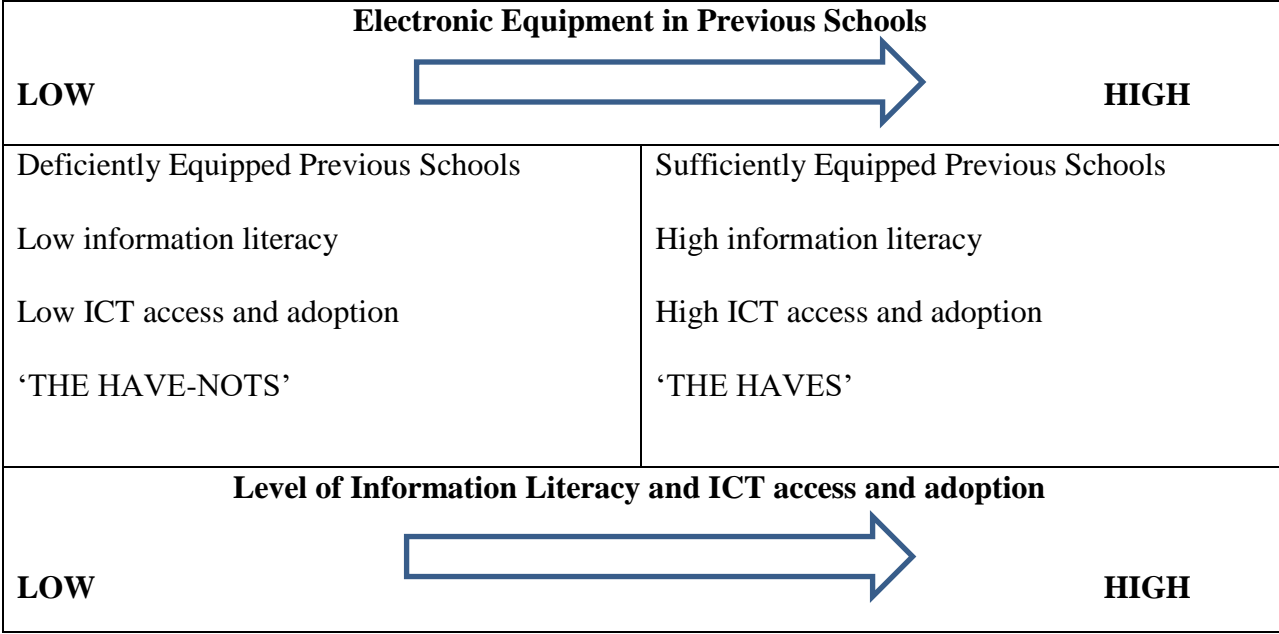


Figure 1: Conceptual Framework

The above conceptual framework strived to explain relationship between variables namely, independent and dependent variables, and the expected outcome from this process. This clearly showed how these variables were interlinked and controlled to produce the expected research outcome.

The independent variables such as the status of electronic equipment in the previous schools of university students before joining universities may have directly affected the expected outcome, which was the student’s level of information literacy and ICT access and adoption. The intervening (mediating) variable was not indicated here but its effect clearly featured out from the background of the whole concept. It alluded the relation, and provided a causal link between the mentioned two variables. The alluded case of an intervening variable held that university students’ motivation, morale and eagerness to learn and master digital information resources, more or less guaranteed the enhancement in information literacy and greater ICT access and

adoption, even though their previous schools were deficiently equipped with electronic equipment.

2.9 Chapter Summary

This chapter discussed essential issues that form the background of the study. Chapter also included the conceptual framework of the study. This chapter reviewed literature based on the objectives of the study. Issues central to the discussion included significance and contribution of information literacy in bridging the digital divide in institutions of higher educational learning in Kenya, practical initiatives being undertaken in bridging the digital divide, application of broadband subscription to support learning and research in institutions of higher educational learning, and ownership, use and non-use of digital devices in institutions of higher education.

CHAPTER THREE

RESEARCH METHODOLOGY

3.1 Introduction

This chapter focused on the procedures that were used to carry out the study. Issues herein included empirical and theoretical work, scientific considerations, research design, location, target population, sample and sampling procedures, data collection instruments, data analysis and critique for assessing the quality of the research. Ethical issues were also discussed accordingly. This qualitative research study examined the students' concerns over media and digital literacy, the digital divide, and digital relationships.

3.2 Research Design

This study involved quantitative principles with aspects of qualitative analysis. The suitability of this study design was based on the measurement of its phenomenon across the sample representation of the targeted population in determining the linkages between variables. The use of this data also allowed large cross-sectional studies to take shorter time and to be made at little expense.

Data analysis involved both qualitative and quantitative aspects. Qualitative data included open ended items where respondents were given the opportunity to express and describe views on a wide range of issues under investigation, which were analyzed along common themes established and those that emerged from the data collected. Due to this mixed method approach both criteria relevant to quantitative and qualitative research were evaluated. These mixed methods provided opportunities for the integration of a variety of theoretical perspectives so as to enhance and enrich the meaning of a singular perspective. This was because in some cases quantitative approach or the qualitative approach by itself was inadequate to develop multiple perspectives and complete understanding about the research problem or question. This approach

therefore led to reliable and valid findings of the research. Qualitative analysis looked into evaluation of trustworthiness, credibility, and data dependability in a bid to minimize biases. This validated the ethnographic observation, study of new questions and initiatives, complex phenomena, hard-to-measure constructs and interactions, everyday settings, and experimental settings.

3.3 Area of the Study

This study was a survey of the University of Nairobi that constituted of 6 colleges. These 6 colleges were: Colleges of Agriculture and Veterinary Sciences (CAVS), Architecture and Engineering, Biological and Physical Sciences, Education and External Studies, Humanities and Social Sciences, and Health Sciences. University of Nairobi is the leading public institution of higher learning in Kenya.

3.4 Target Population

The target population for the study consisted of all master's students in the entire 6 colleges of the University of Nairobi. The sample size was all masters students in UoN's College of Agriculture and Veterinary Sciences (CAVS). This represents 16.67 % of the target population, which is consistent with the minimum requirement of 10% that should be considered as the generally accepted method of selecting samples in a cross sectional survey (Sternley & Gregory, 2001). CAVS has two faculties, i.e. Faculty of Veterinary Medicine and Faculty of Agriculture. The following table 3.1 is a summary illustration of the number of master's students in each department of the two faculties.

3.5 Sample and Sampling Techniques

3.5.1 Sample Size

The sample selected was representative of the whole population with salient characteristics, determined by the optimum number necessary to enable valid inference to be made about the population. In this regard, the sample size was all masters students in UoN's College of Agriculture and Veterinary Sciences (CAVS). The appropriate intellectual and academic attribute of the sample size commensurate the postgraduate students who had more adequate knowledge of the subject area of this research. CAVS has two faculties, i.e. Faculty of Veterinary Medicine and Faculty of Agriculture. Table 1 on pg. 37 illustrates the departmental master's student distribution.

Table 1: CAVS Masters Students' Departmental Population

FACULTY OF VETERINARY MEDICINE	
DEPARTMENTS	SAMPLE SIZE
Veterinary Pathology, Microbiology and Parasitology (VPMP)	6
Public Health, Pharmacology and Toxicology (PHPT)	58
Clinical Studies (CS)	19
Animal Production (AP)	31
Veterinary Anatomy and Physiology (VAP)	1
Sub Total	115
FACULTY OF AGRICULTURE	
DEPARTMENTS	SAMPLE SIZE
Agricultural Economy (AE)	47
Plant Science and Crop Protection (PSCP)	61
Food Science, Nutrition and Technology (FSNT)	48
Land Resource Management and Agricultural Technology (LARMAT)	12
Sub Total	168
TOTAL	283

The sample sizes in the two faculties is the actual student population in the each faculty. This aided a lot in enhancing the actuality of the findings based on the involvement of the total student population in the two faculties.

3.5.2 Sampling Techniques

The sampling method that the study adopted was that of stratified and purposeful. The study adopted this method because of its credibility to this study, owing to the fact that enough information was already known to the respondents by virtue of their scholarship levels, which influenced them to the actual manifestation of the phenomenon of digital divide. The appropriate intellectual and academic attribute of the sample size commensurate the postgraduate students who had more adequate knowledge of the subject area of this research. This study's sample size was ideal enough to limit the margin of error for the sake of enhancing reliability and accuracy of the data. The restriction of selection to the postgraduate students was also a strategy to strike a much smaller standard deviation by limiting the differences in the views of individual respondents.

3.6 Data Collection Methods

In this study, the questionnaires were administered to the master's students. Students were assured of strict confidentiality. This study looked into the students' use of technological tools, the purpose for use, personal use of technology, online relationships, digital connectivity to one another, understanding of digital literacy, feelings toward traditional communication mode, and opinions on building online relationships, and challenges faced in this current digital age.

3.6.1 Questionnaire

The main tool for data collection for this study was the questionnaire. This contained questions and other types of items designed to solicit information appropriate for analysis and was completed personally by each student respondent. The questions enabled respondents to provide the information being sought. The administration of these questionnaires was practical and real, hence dependable response from the respondents. The questionnaires allowed for comprehensive information to be collected cost-effectively from a large number of people in a short period of

time, of which the results were quickly and easily quantified. Questionnaires were analyzed more 'scientifically' and objectively than it would have been with other forms of research. The questionnaires contained both quantitative and qualitative questions, in a bid to get as much information as possible from the respondents. Quantitative questions were in numerical form such as statistics and percentages of which the questions were specific and narrow, and collected a sample of numerical data from respondents. Qualitative questions, on the other hand, asked broad questions that aided the collection of word data from respondents and participants.

3.6.2 Document Review / Desk Review Guide

Considerable amount of research on information literacy and its role in bridging the digital divide in institutions of higher education and learning has been published. This is in regard to differences in the participants' socioeconomic levels owing to opportunities to access ICTs, use of the internet for a wide variety of activities, and natural individual orientation to digital information devices based on aversions, preferences and tastes. This clearly suggests that the digital divide encompasses two major divides: access divide; and use divide, and that the causes of both divides arise from social and economic disparities. This conceptualization has been widely accepted and used by international institutions such as the OECD and the United Nations (2012:13).

3.7 Research Instruments

A number of research instruments were used to measure and collect data based on available diverse variables, thereby enhancing the desired evaluation of subjects. The two major types of these instruments were literature review and the questionnaire. The required validity and reliability of these instruments were ensured.

3.7.1 Pilot Study

Pilot study collected data by issuing questionnaires at random to students in the city campus of Moi University. This was irrespective of the pre-determined category of students' programme of study. This aided the furnishing of the questionnaire for the main research by making the right determination for the needed time, and ironing some minor areas that seemed to be grossly misunderstood by respondents. Moi University was appropriate owing to the position that this institution held in the webometric ranking.

3.7.2 Validity

The expert advice was sought from renowned and popular researchers as well as consultation with peer researchers who were likely to be having more knowledge of various aspects of the research. This was achieved by reading broadly on the similar publications related to this area of study, as well as interacting with senior colleagues whose research work passed approval test by supervisors. This brought in a wealth of different techniques that enhanced the desired quality that promoted the validity of content of this research.

3.7.3 Reliability

Due to the mixed method approach both criteria relevant to quantitative and qualitative research are evaluated. Theoretical frameworks drawn upon by this study is that of social and behavioural, so that most of the phases of the study can be informed. Mixed methods studies here enable the viewing of the research problems from multiple perspectives so as to enhance and enrich the meaning of a singular perspective. In some cases, quantitative approach or the qualitative approach, by itself, is inadequate to develop multiple perspectives and a complete understanding about a research problem or question. This approach therefore leads to reliable and valid findings of the research. Qualitative analysis of this research looks into evaluation of trustworthiness, credibility, and data dependability in a bid to minimize biases. Precisely,

qualitative analysis here will scrutinize behaviour and thoughts of students regarding their use of digital information devices, and the reasons behind such behaviours. This will investigate on the students in institutions of higher learning think and behave the way they do regarding such devices, and not just what devices, where, and when they are used by whoever using them.

3.8 Data Collection Procedures

The distribution of questionnaires will be effected within limited time possible in the earliest convenience of the study. This will be in anticipation of giving the respondents sufficient time possible in which to respond amidst other academic endeavours.

3.9 Data Analysis

Once the questionnaires are collected from the respondents, data will be organized by identifying and correcting errors in the data, coding the data and storing it in the appropriate form. Data analysis will involve both qualitative and quantitative aspects. Qualitative data will include open ended items where respondents are given an opportunity to express and describe their views on a wide range of the issues under investigation, which will be analyzed along common themes established and those that emerge from the data collected. The results of data analysis shall be reported in summary from using frequency tables, bar graphs and pie charts.

3.10 Ethical Considerations

Official permission will be sought from the University of Nairobi, for authority to carry out the study. There will be vigilant adherence to recommended ethical guidelines necessary to clarify the conditions under which this research is acceptable. In these guidelines, there are principles that are intended to be applied to research with human respondents. This will serve as sufficient restriction from the likelihood of any kind of misconduct in conducting the research and handling the respondents. The principle of voluntary participation will strictly be adhered to and the

respondents will not be coerced into participating in the research. Following is the elementary detail on how to undertake the observation to these ethical considerations.

In a nutshell, summary of some ethical principals in this research include a diligent strive for honesty in all communications by avoiding fabrication, falsification, or misrepresentation of data. Objectivity of this research will be upheld by avoiding bias in experimental design, data analysis, data interpretation, peer review, personnel decisions, grant writing, expert testimony, and other aspects of research. Integrity is observed by keeping promises and agreements, acting with sincerity, and striving for consistency of thought and action. Great care will be taken to avoid careless errors and negligence by carefully and critically examining the research work and the work of other peers. This is achieved by keeping good records of research activities, such as data collection, research design, and correspondence with agencies or journals. Openness will be exhibited in sharing of data, results, ideas, tools and resources. Openness to criticism and new ideas will be enhanced. Respect for intellectual property is upheld by honoring patents, copyrights, and other forms of intellectual property. Confidentiality, responsible publication, responsible mentoring and respect for colleagues in this research will be adhered to. The study will administer social responsibility and avoid discrimination against colleagues or students on the basis of sex, race, ethnicity, or other factors that are not related to their scientific competence and integrity. Professional competence and expertise of this research will be maintained and improved through lifelong literacy enhancement and learning. Knowledge and obedience to relevant laws and institutional and governmental policies will characterize the legal acumen of this study. Human subjects' protection will be observed by minimizing harms and risks; respecting human dignity, privacy, and autonomy; taking special precautions with vulnerable populations; and striving to distribute the benefits and burdens of research fairly.

3.11 Chapter Summary

This chapter has provided sufficient illustration in all areas in relation to research methodology, which includes design, area of study, target population, sample size, sampling techniques, data collection methods, questionnaires, document review, research instruments, pilot study, validity, reliability, ethical considerations, data collection procedures and data analysis.

CHAPTER FOUR

DATA ANALYSIS, INTERPRETATION AND PRESENTATION

4.1 Introduction

This chapter introduces and describes data presentation, analysis, results and discussions based on the objectives and research questions. The chapter presents the data that was found on information literacy and its role in bridging the digital divide in Kenyan institutions of higher education and learning based on the survey of the University of Nairobi. The data that was found became reliable enough in determining the various aspects of the role of information literacy in universities, and the various effects of the same in bridging the evident digital divide that is witnessed in similar institutions in Kenya. The research was conducted on sample size of 283 respondents out of which 146 of them completed and submitted the questionnaires making a response rate of 51.59%. This rate is reliable for statistical reporting because it is above 50% which is the minimum requirement for statistical reporting (Mugenda, 2012). The collection and analysis of quantitative data adopted Likert scale on multiple response questions. Computation of the means and percentages was done by scale of points. Presentation of results was in the form of tables, figures and pie charts in accordance to explanations given in prose. Open ended questions were used to collect qualitative data that was analyzed and presented in prose.

4.2 Response Rate of Respondents

The total population of all the master's students in the 6 colleges of the University of Nairobi was targeted. From the population sampled, the study issued questionnaires to all the 283 students in the College of Agriculture and Veterinary Sciences (CAVS). From the 283 total questionnaires administered, a total of 146 respondents completed and returned the questionnaires. This brought the overall response rate to 51.59%, which was adequate for analysis.

4.3 Background Information of the Respondents

The obscured information concerning the respondents is significant to this study. The study particularized the characteristics of respondents with regard to their level of study and location/institution/campus where they are based in their study. Such characteristics are essential in validating the responses, and this will aid the researcher to have an insight to the level of experience and location of the respondents with regard to their handling of the questionnaires.

4.4 Practical Aspects of Information Literacy in Bridging the Digital Divide in the University

4.4.1 Use of Digital Information Devices

The study found out about respondents degree of inclination towards various digital information devices in the university in their search for academic information, as illustrated in Table 2 below.

Table 2: Practical Aspects in Bridging the Digital Divide

ASPECTS	FREQUENCY	PERCENTAGE (%)
Use of university's computer labs	103	70.55
Use of university's cyber cafe	18	12.33
Use of personal computer in university	14	9.59
Use of personal mobile devices in university	11	7.53

From Table 2 above, it is evident that most students prefer using computer lab as opposed to cyber cafes, personal computers and mobile devices.

4.4.2 Frequency of Use of Digital Information Resources

The study found out the level of initiative which the university is undertaking, by observing the frequency of usage of the institution's digital information resource. This is analyzed in Table 3 below.

Table 3: Frequency of Computer Usage in Different Locations

PLACE	1	2	3	4	5	Total
Library	118 (80.82%)	19 (13.01%)	7 (4.79%)	2 (1.37%)	0 (0.00%)	146
Hostel	0 (0.00%)	3 (2.05%)	9 (6.16%)	22 (15.07%)	112 (76.71%)	146
Lecture Hall	0 (0.00%)	6 (4.11%)	7 (4.79%)	27 (18.49%)	103 (70.55%)	146
Outside university premises	0 (0.00%)	0 (0.00%)	32 (21.92%)	103 (70.55%)	11 (7.53%)	146

Table 3 above clearly indicates that the library is most frequently used compared to other places like hostels, lecture halls and outside university places.

4.4.3 Source of Technical Help

The study also showed the respondents' judgment of the university's initiative in enhancing the use of IT. This is manifested by the respondents' source of technical help regarding their use of digital information resources, as indicated in Table 4 on pg.47.

Table 4: Source of Technical Help

SOURCE	1	2	3	4	5	Total
Books / reference materials	0 (0.00%)	11 (7.53%)	9 (6.16%)	22 (15.07%)	104 (71.23%)	146 (100%)
Fellow students	0 (0.00%)	9 (6.16%)	12 (8.22%)	31 (21.23%)	94 (64.38%)	146 (100%)
Pay someone for technical support	0 (0.00%)	6 (4.11%)	7 (4.79%)	27 (18.49%)	106 (72.60%)	146 (100%)
Computer/internet resources	108 (73.97%)	27 (18.49%)	11 (7.53%)	0 (0.00%)	0 (0.00%)	146 (100%)
Friends or family	0 (0.00%)	12 (8.22%)	8 (5.48%)	25 (17.12%)	101 (69.18%)	146 (100%)
My internet provider	0 (0.00%)	16 (10.96%)	10 (6.85%)	28 (19.18%)	92 (63.01%)	146 (100%)
Library	113 (77.40%)	22 (15.07%)	9 (6.16%)	0 (0.00%)	0 (0.00%)	146 (100%)

The findings from the above table shows the respondents' most preferred source of technical help to be library.

4.5 Information Literacy Initiatives

The study also sought to find out about respondents' view for the need of information literacy course occasioned by the various factors alleged to be responsible for unequal utility of information technology resources in the university. The findings are in Table 5 on pg. 48.

Table 5: Need of Information Literacy Course

FACTORS	5	4	3	2	1
Lack of previous exposure to ICT devices	0 (0.00%)	3 (2.05%)	8 (5.48%)	51 (34.93%)	84 (57.53%)
Difficulties in locating digital information resources	0 (0.00%)	6 (4.11%)	7 (4.79%)	32 (21.92%)	101 (69.18%)
Deficiency of ICT skills with information custodians	0 (0.00%)	5 (3.42%)	11 (7.53%)	38 (26.03%)	92 (63.01%)
Users' own inability to acquire basic knowledge of IT	0 (0.00%)	3 (2.05%)	13 (8.90%)	43 (29.45%)	87 (59.59%)
Changes in the nature of digital information access techniques	0 (0.00%)	2 (1.37%)	14 (9.59%)	51 (34.93%)	79 (54.11%)
Lack of policy regarding utility of digital information devices	0 (0.00%)	1 (0.68%)	6 (4.11%)	56 (38.36%)	83 (56.85%)

From Table 5 above, among the strongest factors alleged to be responsible for unequal utility of information technology resources in the university include difficulties in locating digital information resources, deficiency of ICT skills with information custodians, users' own inability to acquire basic knowledge of IT, lack of previous exposure to ICT devices, lack of policy regarding utility of digital information devices, and the least one being changes in the nature of digital information access techniques.

4.6 Institution's Initiatives to Bridge the Digital Divide

The study also showed respondents' judgment on the institution's initiative and contribution towards bridging the digital divide. Table 6 in pg. 49 show the rating of their preferences.

Table 6: Information Technology Initiative

ASPECTS	1	2	3	4	5
Search for information online	106 (72.60%)	29 (19.86%)	11 (7.53%)	0 (0.00%)	0 (0.00%)
Provides information literacy	114 (78.08%)	25 (17.12%)	7 (4.79%)	0 (0.00%)	0 (0.00%)
Supports use of technology	109 (74.66%)	28 (19.18%)	8 (5.48%)	1 (0.68%)	0 (0.00%)
Provides policy for ownership of digital information devices	99 (67.81%)	24 (16.44%)	16 (10.96%)	3 (2.05%)	4 (2.74%)
Function of outdoor wireless network (WiFi) around the library	108 (73.97%)	31 (21.23%)	3 (2.05%)	3 (2.05%)	1 (0.68%)

From the above table, the respondents' judgment on the institution's initiative and contribution towards bridging the digital divide is mostly based on their observation on how it provides information literacy, how it supports the use of technology, and its enhancement of outdoor wireless network (WiFi) around the library.

4.7 Applications of Broadband Subscription to Support Learning

The study sought to examine how broadband subscription can be applied to support learning and research with regard to the status of the students' pre-university schools. Based on parts 4 and 8 of question 8 in the questionnaire, Table 7 on pg. 50 has the following findings.

Table 7: Broadband Subscription in Pre-University Schools

STATEMENT	1	2	3	4	5
Lack of previous exposure to ICT devices	102 (69.86%)	28 (19.18%)	16 (10.96%)	0 (0.00%)	0 (0.00%)
Inadequate infrastructure	113 (77.40%)	22 (15.07%)	11 (7.53%)	0 (0.00%)	0 (0.00%)

The above table reveals that inadequate infrastructure and limitations in broadband subscriptions in the pre-university schools denied students with the required exposure to ICT devices, which would have enhanced their utility of digital information devices in their subsequent university education.

4.8 Factors that Influence Ownership, Use and Non-use of Digital Devices in University

The study sought to find out factors that influence ownership, use and non-use of digital devices in institutions of higher education and learning. Based on question 4 in the questionnaire, it became evident that most respondents use university computers as the main means of access to information in their studies. This study also tried to investigate students' responses on whether they have/use their own personal computers in their academic endeavors. The following pie chart in pg. 55 reveals the ratio (3:1) of those without to those with personal computers.

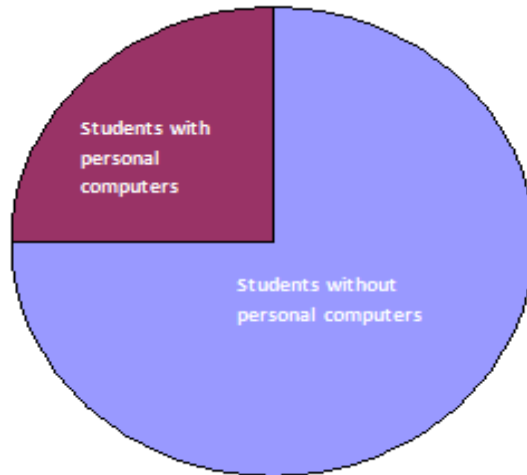


Figure 2: Students With/Without Computers

This study also tried to investigate on the time in which the 11 students who use mobile phones in their academic endeavors do so. The bar graph in Figure 3 below reveals the findings.

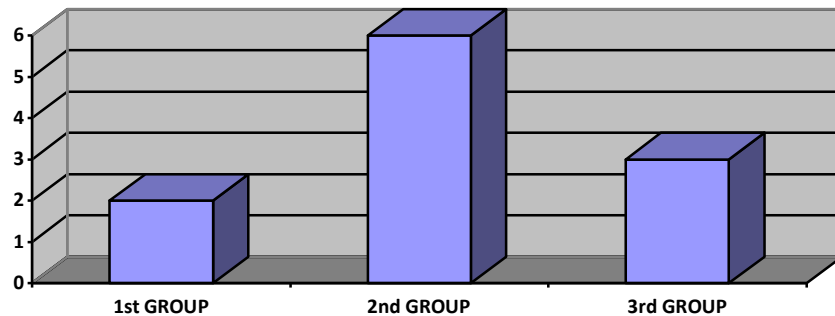


Figure 3: Students' Use of Mobile Devices

In the above bar graph the 1st group bar represents the 2 students who responded to be using the mobile devices in the university in the weekdays during the learning session hours. The 2nd group bar represents the 6 students who responded to be using the devices in the weekdays but in off learning session hours when the library/computer lab is closed, while the 3rd group bar

represents the 3 students who responded to be using the devices in the weekends and public holidays.

4.9 Information literacy, Ownership of Digital Devices, and Users’ Information Technology Abilities

The study also carried out the respondents’ perception on the institution’s significance of information literacy, ownership of digital information devices, and users’ own ability to acquire basic knowledge of information literacy, of which Table 8 below revealed the following findings.

Table 8: Information literacy, Ownership of Digital Devices, and Users’ Information Technology Abilities

ASPECTS	1	2	3	4	5
Institution provides information literacy	114 (78.08%)	25 (17.12%)	7 (4.79%)	0 (0.00%)	0 (0.00%)
University has sufficient digital information devices	115 (78.77%)	26 (17.81%)	5 (3.42%)	0 (0.00%)	0 (0.00%)
users’ own inability to acquire basic knowledge of information technology is frustrating.	117 (80.14%)	20 (13.70%)	9 (6.16%)	0 (0.00%)	0 (0.00%)

The table on pg 56 revealed that most respondents expressed frustrations attributed to users’ own inability to acquire basic knowledge of information technology, and yet the university has sufficient digital information devices besides providing information literacy.

4.10 Internet Search Engines

The study was also concerned with the students’ mannerisms/behavior and preferences in searching and browsing with internet search engines. This is illustrated in the pie chart of figures 4a below and 4b on page 58.

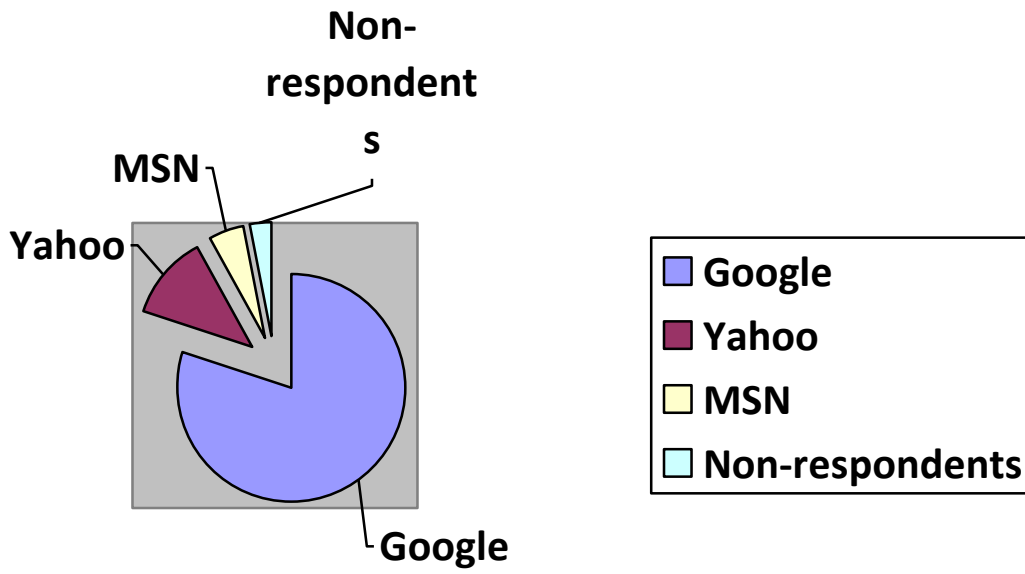


Figure 4a: Use of Internet Search Engines

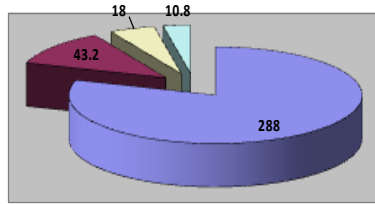


Figure 4b: Use of Internet Search Engines

Among the four search engines, Google ranked top with 117 respondents (80%), followed by yahoo with 18 respondents (12%) score, then MSN with 7 respondents (5%). 4 respondents (3%) did not respond to this question.

CHAPTER FIVE

SUMMARY OF THE FINDINGS, CONCLUSION AND RECOMMENDATIONS

5.1 Introduction

This chapter is organized into various sections that provide summary of the findings of this study. In addition, the section includes conclusion, recommendations and suggestions for further research. The chapter presents the findings of the study based on the objectives and research questions. The study also provides suggestions and recommendations on information literacy and its role in bridging the digital divide in the institutions of higher education and learning in Kenya.

The purpose of this study was to examine the role of information literacy in bridging the digital divide in institutions of higher education and learning in Kenya with particular reference to the University of Nairobi; and suggest appropriate solutions to reduce the technological imbalance.

The objectives of the study include to:

- Examine the practical aspects of information literacy in bridging the digital divide,
- Assess information literacy initiatives being undertaken in bridging the digital divide,
- Examine how broadband subscription can be applied to support learning and research, and,
- Find out factors that influence ownership, use and non-use of digital devices in institutions of higher education and learning in Kenya.

5.2 Summary of the Findings

5.2.1 Factors Hampering Access and Utilization of Electronic Information Devices

This study reveals how access and utilization of information at the university is hampered by several factors. One of these factors is that the university has been facing a transitional period

when digitization of resources was being enhanced technically to satisfy the need for the increased utility of ICTs to access information. The elevated communication infrastructure, with the subsequent expansion of ICT facilities purposed for expansion of information resources and easing location of such information, came in with such dynamic restructuring of the entire system, which has invited challenges of familiarizing with the same by the information custodians. Owing to this transition of the university's ICT, the older generation of students and staff require more guidance in the use of ICT, while the 'millennials' were gradually forming the larger user population. At the moment, the instruction in information literacy provided by university libraries is so superficial and reaches only a part of students and is not coordinate enough. This is indicated by the overwhelming utility of computer labs as noted by most respondents (103 which is 70.55 %) as the main option, as indicated in Table 2 pg. 37.

Poor internet connectivity is another hindrance occasioned by frequency in dwindling internet signals in several sessions in the process of seeking information, as indicated in Table 7 pg. 42, where the inadequate broadband subscription is attributed to students' lack of previous exposure to ICT, as advocated by 69.86% of all respondents, and also the same being attributed to inadequate infrastructure, as advocated by 77.40% of respondents. The other problem is the complex structure of the digital information, which calls for students with higher ICT literacy to maneuver through and interact skillfully. This poses great disadvantages to those students whose previous educational background was devoid of ICT exposure as indicated in Table 7 pg. 42, where 69.86% of respondents supported this reason. The unequal utility of information technology resources in the university is evidently attributed to insufficiency of ICT devices, occasioned by the outnumbering of these devices by the many students enrolling in the university

on each intake. This is also coupled by lack of skills and familiarity in the use of the same, especially among the newly admitted students in the university.

5.2.2 Educational Level and Its Impact

The study targeted postgraduate respondents' owing to their greater acquaintance of ICTs in all the time that they have been in the university. Their undergraduate counterparts could not have been more ideal because for most of them their pre-university schools were devoid of ICTs facilities to acquaint them with the relevant experience needed in this research. Besides, most undergraduate students ended up in this university fresh from secondary schools without having passed through any intermediary training/course, like computer packages. This was significant in determining the responses on which the analysis will be based on. From my own personal observation, their retarded response rate of 51.59% is attributed to greater and heavier responsibilities that they shoulder, due to the fact that most of them are juggling studies with employment and family responsibilities. On the other hand, postgraduate students seem more rigid to blend with dynamism, the fact which might have had some little deduction in their concentration and attention on the questionnaires.

5.2.3 Practical Aspects of Information Literacy in Bridging the Digital Divide in the University

Objective number one sought to examine the indicators of information literacy in bridging the digital divide in institutions of higher education and learning in Kenya. Table 2 pg. 37 clearly indicate that the University of Nairobi is undertaking diligent initiative in instituting information literacy in the curriculum by acknowledging the significance of information literacy, contributing towards information literacy, fostering the use of technology and ownership of digital information devices and fostering the use of technology through substantial budgetary allocation in procurement of sufficient digital information devices. This is evidenced by 70.55% of all

respondents, who declared their most frequent visit/utility of the University of Nairobi's computer lab than other sources of similar information. This is also clearly indicated in Table 8 pg. 44 where 78.08% of respondents are in support of the fact that the institution is doing its best to provide information literacy, and 78.77% being in support of the fact that the university is fully utilizing its adequate digital information devices. The evidence for this is also clearly manifested in the frequency of computer usage in the library (80.82%) compared to other locations by the students in accessing internet, as analyzed in Table 3 pg. 38. The study also showed the respondents' judgment of the university's initiative in enhancing the use of IT. Most respondents' answer to the call for their suggestions for possible solutions to the problem of unequal utility of information technology resources in the university skirted around the university's need for consistent observation and implementation of Open Access Week in the month of October every year. The Open Access Week offers unrestricted online access to research literature on the university internet. Respondents also pronounced the need for thorough orientation on the use of information devices and scheduled electronic resources user induction sessions.

5.2.4 Information Literacy Initiatives

Objective number two sought to assess information literacy initiatives being undertaken in bridging the digital divide. Evidently, most respondents strongly agreed that the only way to curb the malady attributed to frustrated efforts of bridging the digital divide is to make information literacy course mandatory. This will enhance effectiveness of the use of digital information devices in the University by remedying the users' own inability to acquire basic knowledge of IT as manifested in the third part of Table 8 pg. 44. On the same objective, most respondents strongly acknowledged the institution's initiatives and contributions towards bridging the digital divide by endorsing the institution's search for information online (72.60%),

provision of information literacy (78.08%), support of use of technology (74.66%), Provision of policy for ownership of digital information devices (67.81%), and function of outdoor wireless network (WiFi) around the library (73.97%). This is evident from the manifestation given in Table 6 pg. 41.

5.2.5 Applications of Broadband Subscription to Support Learning

Objective number three sought to examine how broadband subscription can be applied to support learning and research. Table 7 pg. 42 illustrates how all students strongly agreed that utility of digital information devices is so challenging to students whose pre-university schools did not have such devices, as advocated by 69.86% of respondents. As per the extensive literature review done on this study, the diffusion of broadband is shaped by the penetration rates of individual locations of a given region, which in turn, depends on affordability of the available broadband services. This is the whole base of the determination of broadband penetration, which in this case presented a great challenge in the achievement of the required take-up targets in those pre-university institutions that students passed through before joining this university. Much is to be done by the responsible ministry to enhance such penetration and diffusion of broadband especially in those regions that are populated with learning institutions. This initiative will equip schools with ICT facilities in a bid to prepare students with adequate ICT skills before joining higher learning institutions.

5.2.6 Factors that Influence Ownership, Use and Non-use of Digital Devices in University

Objective number four sought to find out factors that influence ownership, use and non-use of digital devices in institutions of higher education and learning. Based on the findings, the only access to information used by most students is the university's computer lab. This fact is made evident by the pie chart illustration in Figure 2 pg. 42 that reveals the lacking of personal computers among most students and yet they still acknowledged their sufficient and adequate

access to the university's electronic information devices and the internet. This is evidently seen in Table 4 pg. 39. It is only when students are in dire need to connect to internet while the computer lab is closed, is when they expediently resort to the use of their smart phones for that purpose, as illustrated in Figure 3 pg. 43. Respondents strongly acknowledge institution's significance of information literacy and institution's contribution towards information literacy and institution's initiative to foster use of technology, and institution's ownership of digital information devices. These are evident factors that influence UoN's ownership and use of digital devices in its custody. Based on most of the respondents' answers in question 9 of the questionnaire, some of the disparities responsible for unequal utility of information technology resources in the university is evidently attributed to outnumbering of the electronic devices by the many students enrolling in the university, coupled by lack of skills and familiarity in the use of the same, especially among the new students in the university who had no previous exposure to ICT as revealed in the study findings in Table 7 pg. 42. The other barrier to the efficient utilization of ICT is the relatively low level of information literacy, which denies the students the ability to manipulate and use information effectively.

5.2.7 Internet Search Engines

Based on the pie chart on Figure 4 pg. 42, Google topped because of having been at it the longest. They dominate by about 80% (288 degrees) of the pie, because one can keyword in the URL, in the title and in the page headers. It also has a lot of back links, and it prefers quality over quantity. It has relevant anchor text, both external and internal. It has enough secondary keywords to justify primary keyword density. It regularly adds fresh content in its sites and that is why it likes busy blogs and back links, especially popular ones. Google seems to prefer informational pages to commercial sites. This is why students prefer it for information searching in their academic endeavors.

In direct contrast to Google, Yahoo tends to prefer commercial pages to informational pages. Unfortunately, this usually means Yahoo's own commercial pages. Yahoo search results are much more liberal than Google's, and "exact matching" is more important than "concept matching" which makes them slightly more susceptible to spamming. This makes Yahoo easier to be unreal, hence this trait leads to poorer search results, less relevancy, and therefore a generally inferior search engine. Yahoo places more importance on the number or quantity of back links than does Google. It is common for Google to report 5 backlinks to a page, while Yahoo! reports 50 or more for the same page. Yahoo gives more credence to meta keywords and description tags than does Google. Good descriptions, keyword tags, on-page content, and relevant and descriptive titles pay dividends with yahoo.

MSN is the youngest of the big three engines and is still trying to figure out what people want. The MSN algorithm differs significantly from the Google and Yahoo algorithms in that MSN only crawls the beginning of pages. The MSNbot is the laziest of all searchbots, seemingly designed to crawl only home pages. For this reason, it is much harder to grab their attention with back links. MSN put less emphasis on link popularity and more on page content because it chooses not to crawl too deeply. Again, this is why new sites can rank well, but it also makes them more susceptible to spam and why they rely more on exact matching than on content matching.

The respondents suggested possible solutions for the problems involving digital literacy. These included the expansion of computer lab facilities in all campuses and establishment of outdoor wireless network (WiFi) to cover a substantial radius of other campus libraries besides the one at the main campus library. This will ease congestion in the computer labs, by having those who can afford laptops to be using the wifi instead. The enhancement of information literacy in the

commencement days of the students' enrollment in the university will combat the deficiency of skills and familiarity in the use of electronic information resources.

5.3 Conclusion

- Based on the results of this study, it can be concluded that institutions of higher education and learning is serious in doing all that they can in their initiative to bridge digital divide in their academic areas of jurisdiction. This effort is challenged by the influx of more and more students being admitted in such institutions. The capacity and quality of ICT equipment is up to date but the quantity of the same is still wanting.
- There are very few secondary schools and pre-university institutions that offer comprehensive information literacy and ICT courses and training. This gives the universities greater burden of combating with such deficiencies regarding the required ICT skills and acquaintance among newly admitted students.
- Qualified information custodians in universities are lacking, hence limiting the excellence of students in ICT skills.
- University libraries are having great limitations in effecting literacy and ICT education because this aspect of library objective was not spectacular during planning and development of such libraries.

5.4 Recommendations

Based on the findings of the research and conclusion, the following recommendations were made:

5.4.1 Training and Repositioning of Information Professionals

Due to the development and impact of information communication technology institutions of higher learning have experienced considerable changes in their information custodies, especially

the libraries. Professional flexibility is critical, especially in this era when the role of academic libraries is rapidly changing. For this reason there is need for information custodians in the university to be well qualified and constantly be scheduled for workshop and conferences to keep updating their skills so as to show relevance in helping students. The library and information professionals should possess adequate ICT skills to manage these information centers. It is needful for them to acquire continuous knowledge and skills on the fast changing Information Communication Technology so as to provide better services to information users. These professionals should then go further by re-defining their role in information provision because conventional skills that they will have acquired in training institutions alone cannot provide solutions to the user requirements and improve information access. It is also necessary to develop conceptual, technical and other skills among information custodians through formal training, hands-on experience or other personal informal learning initiatives that will go a long way to assist users in using access channels such as ICT resources and facilitate on-demand provision of information. The staff should also take opportunities for enrolling in relevant courses and keeping up to date through channels such as e-mail lists, discussion forums and blogs. It is also necessary for them to establishing a close network with colleagues in the same profession and other professions that are relevant to information sciences. There is need for participation in relevant conferences and seminars, together with consultation of a wide variety of literature in information sciences. Librarians must also embrace Web 2.0 tools and other necessary developments that are popular with the modern information seekers.

5.4.2 Information Literacy Programs

There should be regular literacy programs in the university which should collaborate the library, faculty, student affairs, human resource and other departments. It is necessary to identify relevant literacy programs and scheduling them in the main curriculum. Literacy programs are

very important as the university keeps increasing the utility of digital resources. This program should be carefully developed and regularly reviewed by all stakeholders, and should cut across the entire learning programme in the university. ICT literacy goes hand in hand with hands-on experience, and therefore more users are to be exposed to ICT resources in order to promote the utility of them to solve their day to day problems. Open Access week should be consistently observed for its prompt observation in the month of October every year, which offers unrestricted online access to research literature on the university internet. Orientation to new students on the use of digital information devices should be done and keep being refreshed throughout the academic year, other than being carried out only once in the admission week. Electronic resources user induction should be scheduled and incorporated in the teaching curriculum throughout the year. University libraries need to be modernized to enable information transfer and access, so as to establish a network of libraries. In the short run, this initiative will help in resource development, resource sharing and their utilization by having students search the Web or digital library for e-journals, CD-ROM databases, online databases, web-based resources, and a variety of other digital/electronic resources. External sources like World Bank Group Strategies in ICT should focus more on promoting reform, increasing access, supporting ICT human capacity, and supporting ICT applications in universities.

There is need to enhance access and use of the internet and broadband in the pre-university institutions in the rural areas of Kenya so as to advance the preparedness of students in their optimum utility of digital information resources in universities. Equipment of ICT facilities in such institutions found to be one of the greatest factors attributed to bridging the digital divide in universities and other institutions of higher learning. This will help such schools to keep updating their curriculum for digital literacy so as to keep up with the currently accelerating

technological developments. This calls for having classrooms in such schools equipped with computers, educational software, and online library and course materials for students. Information literacy being a lifelong learning experience calls for its implementation to be more effective if the process is made to begin at an early stage in life. For this sake, it becomes a top-priority requirement for the government leadership to ensure stakeholder involvement, robust communication and a smooth transition for the multiplicity of government agencies involved, whose main coordinator is to be the Ministry of ICT through the ICT Authority in collaboration with the Ministry of Education. These agencies are the New Partnership for Africa's Development (NEPAD), Kenya ICT Trust Fund, Computers for Schools Kenya (CFSK) and Rotary Club among others. They mainly provide computers to schools. The government of Kenya on the other hand through the ministry of education has a role to play in curriculum development and policy implementation. Likewise, parents should be encouraged to support their children in acquiring the tools for digital information literacy rather than wholly depending on college or university programmes. These include basic training on computer applications and hands on experience in the case where parents own technological resources such as computers. This way, the primary and high school curriculum will be incorporated with basic computer courses, so that students are able to utilize them in university level without the need to undergo basic training again. This will go a long way in solving the ICT literacy problems experienced at university level.

5.4.3 Adequate ICT Resources

In order to reap maximum benefits from the information resources available internally and externally, the university needs to harness ICT in most areas of its operations. These include the computers which form part of information resources. Users require computers that offer capabilities for retrieving information at high speed, storing information, presenting the

information in the desired formats, safeguarding retrieved information and widely sharing the information among other features. Computers should be seen as equally important as the conventional information resources such as books and journals. They are the medium for downloading the vast information resources available over the internet as well as managing the information efficiently. The internet as a tool for information retrieval may be a solution to some of the problems relating to access. The university has the potential of satisfying student and staff needs through the provision of internet services. As such, yearly budgets should cater for their acquisition and improvement. The university should provide for effective power backup facilities so as to minimize inefficiency and the loss of information as a result of power failure. This malady has been so consequential to the extent of having unnecessary re-scheduling of sessions or interference with the communication infrastructure. Frequent power failure has been wasting time for computer users who had to restart the machines and programs or sites they were using. Some of the ICT resources have also been damaged by power related problems. Power failure interrupts network downloads and to a large extent discourage users from accessing the desired content.

5.4.4 Development of Information and Knowledge Portals

Following increased use of digital resources, it is important to provide an easy way for users to access the resources. Users do not find it convenient to keep a record of the addresses to various resources on their own. The presence of various access tools and services that are underutilized and uncoordinated create a confusing scenario for the end user. A portal that facilitates the convergence of all these tools provides the user with a simple access to all the services as it retains the exclusive features of each tool. It is a more viable solution to the user frustration of relying entirely on familiar search engines such as Google, missing out on a lot of other relevant quality information resources. A team should also be made in charge of the portal and all other

access tools. The team will ensure that the portal is up to date and contains the required content. There is need for a staff member to be allocated with the custody of updating the website.

5.4.5 Access to Online Resources

Access to resources by non-resident students and staff should be given more facilitation in order to curb such deficiencies that are currently facing the institution. These and other emerging options will enable users who access the internet through other service providers (such as mobile phone service providers) to download articles from online databases. Remote access to digital content is becoming increasingly important to postgraduate students who spend less time within campus and perhaps juggle employment with studies.

5.4.6 Multimedia Resource Centre

A library multimedia resource centre is needful for its assistance to users in accessing and utilizing online resources, multimedia support services, playing music or video, educational presentations and e-learning. This multimedia will enable the library to combine several services that are being offered in its different sections, thereby reducing students' mobility and strain in information searching. It will also act as a convenient venue for information literacy sessions.

5.4.7 Bandwidth Management

The university require broadband services. Though bandwidth is an expensive resource that calls for economic utility, the institution is suffering from low bandwidth owing to the considerable increase of internet utility. Network infrastructure/bandwidth should be increased from time to time in order to improve the current deficient access to online resources due to anticipated increase in its utility. The bandwidth utility increment is attributed to the increase in student numbers, increase in computers owned by the university, growing volume of resources on the internet, and new services on the internet.

5.4.8 Marketing of Information Services

Marketing of information services is essential for the enhancement of information literacy. Users. Users need to know the resources that satisfy their needs. The users' activities with the ICT devices should be such vibrant in order to elicit the updates. As the channels increase it becomes more likely for the users to become aware. Information service providers should create as many pointers to information as possible. Social networks and Web 2.0 tools are some of the channels that can be used for this purpose. Libraries should provide updates on new items or resources available for the patrons and enable them to have a single library page that syndicates all library content that interests them. The networks will enable the library to reach the "millennials" where they are, rather than wait for them to come to the library. They also encourage feedback and acknowledge patrons as partners in the search for information. Equally important are other methods such as websites, brochures, posters, RSS summaries, newsgroup feeds, email alerts, orientation and personal contacts. Library visits has a direct bearing on the nature and effectiveness of marketing of information services, as it is an opportunity for reaching out to them.

5.4.9 Maintenance and Updating of Resources

There is need for maintaining and updating of information resources after their investment. These include hardware (computers, network), software (antivirus, application programs) and information resources (print resources, websites, portals, database access rights, e-learning content, repository). Such initiative will give the user the opportunity to access information without experiencing distractions from defective hardware, unavailable or inappropriate software or unfamiliar configurations. This brings to bear the fact that users do not have the time, rights and sometimes the skills to fix these problems during their information seeking session.

5.5 Suggestions for Further Research

The following areas are suggested for further study.

5.5.1 Information Literacy Skills

The need for information literacy and learning skills in institutions of higher learning calls upon more research to be done on the creation of effective programs in addressing new information and communication technologies. This will go a long way to link up lecturers, students and management for the purpose of research, teaching and learning issues. A research on how to include information literacy competency curriculum will enable graduates from the university to meet the international information literacy competency standards required by professional life and lifelong learning. This will go a long way to define the central elements of information literacy and assist in the development of the contents of courses in information skills. It will also enhance the comparability of degrees and the transferability of credits from one university to another.

5.5.2 Adaptation To Students' Technology Use

Much should be sought on devising a digital strategy – for example, making websites more mobile-friendly for international enrolment management. There is need to research on how to exploit the opportunities that are currently presented by digital devices such as mobile phones in the area of digital learning. Hybrid information services are to be skillfully tailored to curb the menace of technological transitions, whereby both print and electronic information resources can smoothly complement and substitute each other at some points of utility.

5.5.3 Network Marketing

Much should be sought on how to embrace the power of network marketing. A collective university network exerts the biggest influence on students' decision-making processes. Admissions officers, faculty, current students and alumni comprise a cohesive university

network. Institutions need to form strategic relationships with these stakeholders and use them to interact with prospective students.

5.5.4 Current ICT Facilities

Dynamism of ICTs owing to advancement in technology calls for the need for frequent benchmarking of ICT facilities with the current state of state of the art. The findings of the study may only be relevant for a short period of time at the given moment of study and at the given level of technology, which calls for improvement of information access by its clientele. More research need to be done to find out how new and emerging developments in ICT, dynamic nature of user categories, and the needs and approaches to information provision could be incorporated,. There is need to segment the users so as to determine their information needs and the patterns which these users adopt in seeking the information. Such segmentation may be based on the course enrolled by users, the academic year, gender, work roles and level of study.

5.5.5 Integration of Library Systems

Studies should be carried out on how integrated library systems can be explored and improvement done on it so as to enhance its support for numerous applications and management of resources in a university setting, such as digital repositories, e-resources, local content, mobile devices and e-learning activities.

5.5.6 Involvement of the Ministry

Studies should look into how Ministry of Education Development Plan for Education and Research should amplify the importance of the willingness of libraries to contribute to the development of teaching and study methods. This will ensure excellent information literacy among the graduates of universities and polytechnics.

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APPENDIX I
INTRODUCTION LETTER

Matthews Abijah Nyapela
Department of Library and Information Science
University of Nairobi
P.O. Box 30197–00100
Nairobi.

Dear Respondent,

RE: INTRODUCTION LETTER FOR RESEARCH

I am a student at the University of Nairobi, pursuing a course in Master of Library and Information Science (MLIS) in the Department of Library and Information Science. I am in the process of conducting a research, of which the title is; *Information Literacy and its Role in Bridging the Digital Divide in Kenyan Institutions of Higher Education and Learning: Survey of the University of Nairobi*. The purpose of this study is to collect data and information from master's students of the University of Nairobi.

It is my request that you accept the honor of being selected to participate in this study. The information and opinions that you provide are purely for academic purposes of the study and shall remain strictly confidential.

Thank you in advance for your cooperation.

Yours faithfully,

Matthews Abijah Nyapela
Student Registration Number: C54/70423/2013

APPENDIX II
LETTER FOR DATA COLLECTION

APPENDIX II
LETTER FOR DATA COLLECTION

FACULTY OF ARTS

DEPARTMENT OF LIBRARY AND INFORMATION SCIENCE

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P.O. Box 30197- 00100 GPO
Nairobi, Kenya.
dnjiraine@uonbi.ac.ke

Our Ref: UON/CHSS/DLIS/303

5th August, 2015

Moi University
P. O. Box 3900-30100
Nairobi.

Dear Sir/Madam,

RE: NYAPELA, MATTHEWS ABIJAH REG NO: C54/70423/2013

The above named is a bonafide student at the University of Nairobi undertaking a Master of Library and Information Science (MLIS). He is currently in the process of collecting data as part of the requirements for the course.

His topic is "*Information Literacy and its Role in Bridging the Digital Divide in Kenyan Institutions of Higher Education and Learning: Survey of Moi University*"

Any assistance accorded to him will highly be appreciated.

Regards,



Dr. Dorothy Njiraine
Ag. Chairperson
Department of Library & Information Science (DLIS)

APPENDIX III
QUESTIONNAIRE FOR POSTGRADUATE STUDENTS

INSTRUCTIONS

Please respond by ticking (√) against your preferred response that most closely represents your opinion for each question with options. For questions that require suggestions or comments, please use the provided space.

Background Information

1. Highest educational level: _____
2. College/Institution: _____
3. Programme of study: _____
4. Indicate how you normally access information in the university from the list below.

NO.	ACCESS OF INFORMATION	
1.	Computer labs	
2.	Cyber cafe	
3.	Personal computer	
4.	Mobile devices	
5.	Any other option	

5. Rank the extent to which you use the following search engines and electronic information devices. Use the scale of: Most Frequently=1, Frequently=2, Less Frequently=3, Least Frequently=4, Not Applicable=5.

NO.	SEARCH ENGINES AND ELECTRONIC INFORMATION	5	4	3	2	1
1.	Yahoo					
2.	MSN					
3.	Google					

LOCATION OF ACCESS		5	4	3	2	1
1.	Library					
2.	Hostel					
3.	Lecture hall					
4.	Outside university premises					
SOURCE OF TECHNICAL HELP						
1.	Books / reference materials					
2.	Fellow students					
3.	Pay someone for technical support					
4.	Computer/internet resources					
5.	Friends or family					
6.	My internet provider					
7.	Library					
INTERNET INFORMATION SERVICES						
1.	Use email, texting or video to communicate					
2.	Seek entertainment (games, videos, music)					
3.	Use social media (facebook, twitter, linkedIn)					
4.	Get the news or weather					
5.	Shop, search for products and services					
6.	Research or study topic of interest					
7.	Share opinions, post to blog, review product or service					
8.	Attend online class or training					
9.	Work from home					
10.	Banking online (paying bills, investing)					
11.	Find information on community resources and events					

12.	Using the internet as an information resource					
	INTERNET INFORMATION SERVICES (con't)	5	4	3	2	1
13.	Engage in civic activities (participate in discussion about community and government issues; research information)					
14.	Search for health and medical information					
15.	Communicate with government					
16.	Sell goods and services online, advertise					
17.	Find directions or look up a map					

6. The following statements are in relation to access of information from the internet, digital repositories and related sources. Select the one that applies to you using the scale of: Strongly Agree=1, Somewhat Agree=2, Partially Agree/Disagree=3, Somewhat Disagree=4, Strongly Disagree=5.

NO.	ACCESS TO INFORMATION	5	4	3	2	1
1	Information on internet is easy to find					
2	Internet is well organized					
3	Internet is useful to information resource					
4	Information literacy course is mandatory for effective use of digital information devices					
5	Utility of digital information devices is so challenging to students					

7. Rate the following practices of reducing the digital divide in the university. Use the scale of: Excellent=1, Good=2, Fair=3, Poor=4, Don't Know=5.

NO.	REDUCING THE DIGITAL DIVIDE	5	4	3	2	1
1.	Search for information online					
2.	Provides information literacy					
3.	Supports use of technology					
4.	Provides policy for ownership of digital information devices					

5. Function of outdoor wireless network around the library

8. Indicate the extent to which each of the following is responsible for unequal utility of information technology resources in the university. Use the scale of: Strongly Agree=1, Somewhat Agree=2, Partially Agree/Disagree=3, Somewhat Disagree=4, Strongly Disagree=5.

NO.	STATEMENT	5	4	3	2	1
1.	Transitional period of restructuring digitization of resources					
2.	Lack of hybrid information services for both print and electronic information resources in the course of transition					
3.	Insufficient digital information devices in the university					
4.	Lack of previous exposure to ICT devices					
5.	Difficulties in locating digital information resources					
6.	Deficiency of ICT skills with information custodians					
7.	Users' personal preferences and orientation with digital information devices					
8.	Inadequate infrastructure					
9.	Poor internet connectivity					
10.	Users' own inability to acquire basic knowledge of IT					
11.	Changes in the nature of digital information access techniques					
12.	Lack of policy regarding utility of digital information devices					

9. Suggest possible solutions to the issues in question 8 above.

APPENDIX IV OBSERVATION GUIDE

1. Establish the significance and contribution of information literacy in bridging the digital divide in the university.
2. Assess practical initiatives being undertaken in bridging the digital divide.
3. Examine how broadband subscription can be applied to support learning and research.
4. Find out factors that influence ownership, use and non-use of digital devices.
5. Identify issues of:
 - Utility of available digital information resources
 - Skills of students in using ICTs in learning
 - Scale of equipment of ICT facilities among the postgraduate students.
6. Ascertain ICT facilities among the postgraduate students.

Determine the alternative mode **of** learning besides the use of ICT.