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E-READINESS FOR NETWORKED LEARNING IN EAST AFRICAN UNIVERSITIES

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DECLARATION

DECLARATION BY THE CANDIDATE

This Research project is my original work and has not been presented for a degree in any other University. No part of this research project may be reproduced without the prior written permission of the author and/or University of Nairobi.

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This research project has been submitted for examination with my approval as a University Supervisor.

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ABSTRACT

Academic growth in universities depends increasingly on information and communications technologies (ICT's) and the abilities of all stakeholders to collect, process, and use digital information in teaching, learning, support, research and development initiatives. This research study proposed an assessment of e-readiness framework to evaluate the E.A universities readiness for networked learning based on six categories of indicators: Network access, People and organization online, locally relevant content, ICT in everyday life, ICT in the workplace and workforce-ICT human capital using secondary data collected from 53 E.A universities by KENET. To analyse the data, descriptive statistics of mean and standard deviation were used to delineate variable characteristics. The data was presented using tables and charts. Correlation analysis was used to establish relationships between variables and multiple regression analysis was used to estimate the predictive effects of independent variables on networked learning. The key findings as related to the study objectives and hypothesis revealed a strong correlation between network access and networked learning, so is ICT in everyday life, ICT in the workplace, people and organization online, locally relevant content. The results also revealed that there was no correlation between ICT human capacity in the EA universities and networked learning. The conclusion from the study was that in East African universities should align their policies, structures and strategies to boost networked learning for academic excellence. The study therefore recommends future studies should aim at a more in depth understanding of networked learning emerging strategic capabilities, communities in East African context and in Kenyan context in particular in contribution to vision 2030.

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ACRONYMS AND ABBREVIATIONS

E-	Electronic-
ICT	Information and Communication Technology
IT	Information Technology
IS	Information Services
KENET	Kenya Education Network
LAN	Local Area Network
Mbps	Megabit per second
NRI	Networked readiness index
HEI	Higher education institutions
PDA	Personal Digital Assistant
PC	Personal Computer
SPSS	Statistical Package for Social Scientists
UNDP	United Nations Development Program
UPS	Uninterrupted Power Supply
USAID	United States Agency for International Development
WAN	Wide Area Network
ITOCA	Information Training & Outreach Centre for Africa
CID:	Centre for International Development
CIDCM:	Centre for International Development and Conflict Management
CSPP:	Computer Systems Policy Project
NEPAD	New Partnership for African Development
WITSA	World Information Technology & Service Alliance

CHAPTER ONE

INTRODUCTION

1.1 Introduction

This chapter describes the basis of the research project and gives an overview of the aims of the study; description of the background, statement of the problem, the research objectives and hypothesis as well as the scope of the study is presented in this chapter.

1.1.1 Background of the study

The effective adoption of ICTs in higher education Institutions requires appropriate technology, adequate resources and staff development. Goodyear et al. (2005) there has been a substantial increase, over the last five years or so, in the use of electronic mail, the World Wide Web and computer conferencing as aids to teaching and learning in higher education in developed and developing countries and in East Africa universities in particular. A particular genre of such technologically assisted education has come to be called 'networked learning' (steeples and Jones, 2002)

Foster et al., (2006) According to the theory of action, networked learning communities are fundamentally about learning - learning for students, as well as learning for teachers, learning for leaders and learning for schools in which this research study refers to academics. This is what distinguishes networked learning communities from other networks. Networks can exist for many reasons; in networked learning communities in universities the emphasis is on academics.

The organization in this research study begins with the end in mind to show that the intent of engaging in networked learning and communities is to enhance student learning and success-academic performance and changing academic performance outcomes depends on changes in practices and structures in Higher education Institutions (NCSL, 2002).

Little (2005) Similar to the Internet, a networked learning environment is really a network of networks—as simple as a lecturer and her class or as complex as a global web of instructors collaborating to develop a brand new curriculum. The power of the networked learning environment today is that it creates unlimited possibilities for students and faculty, far beyond the limitation of books, bricks and mortar. Networked learning environments connect

courses, teachers, learners and researchers to all these other evolving areas or nodes of the network.

Siemens (2011) Networks have underpinned human learning in well before the proliferation of technology evident in society today. Network learning (NL) is today more evident because it finds its existence in explicit network structures: mobile phone networks, the internet, and the web. Each generation likely views itself as the guardian of new intellectual insight and scientific advances, overlooking the enormous progress brought forward by previous generations. When discussing network learning, we find ourselves on a small pinnacle of a large mountain. The network structures now prominent in technology were previously served by social interactions, written scrolls, religious writings, and the communication structures of generals, kings, and emperors. (Steeples and Jones, 2004).

The terms e-learning, web based learning and online learning now have wide currency in education. Whereas the term networked learning is used to mean a distinctive version of these approaches. Networked learning is defined as: learning in which ICT is used to promote connections: between one learner and other learners; between learners and tutors; between a learning community and its learning resources (Goodyear, Banks, Hodgson & McConnell, 2004).

Higher Education institutions in East Africa (EA) continue to face challenges in developing sustainable ICTs that meet the mainly academic needs of their clientele. In order to address these challenges the institutions need build capacity both in technology and human capital so as to have the relevant ICT and information skills to deliver high quality services and the institution's high level of e-Readiness can foster an environment that supports successful implementation of ICT programmes (Chan and Welebir 2003).

The ever increasing demand for specialized higher courses offered by different universities vouches for the popularity of networked learning. Furthermore, it affords unmatched interactivity amongst learners, tutors and online resources. This promotes social interaction and generates new opportunities for them to work together. Networked learning makes learning relationships more democratic, and there is more flexibility to the learner in terms of time and place. Because anyone can access the resources from anywhere in the world, it

promotes higher education even in under-developed or developing countries. Thus a person in a remote location, where there are no facilities for quality education, can avail the resources provided by a university in a large city (Allen 2003).

The use of Information and communication Technologies (ICT) in Higher Education (HE) Institutions has the potential to enhance the quality of teaching and Learning, the research productivity of the faculty and students, and the management and the effectiveness of Institutions. In addition, the use of ICT in HE institutions develops the future workforce that can effectively participate in the increasingly networked world and the emerging knowledge economy (Kashorda and Waema, 2009).

E-Readiness survey in this study measures the capacity of Higher Education Institutions (HEI) to participate in the use of ICTs to enhance the quality of teaching and formal learning, research and innovation and the general management and effectiveness of the faculties as the key focus in this research refers to as academics. An annual assessment is suggested and required for the advancement of institutional e-Readiness (Kashorda and Waema, 2009)

1.1.2 Overview of East African universities

Notting the stiff competition by many students for the limited spots in the few East African universities; and for the poor students who miss out on the government sponsored admissions, ICT based learning technologies can open windows of opportunities and an e-ready university to offer networked learning in particular can create opportunities for many traditional as well as non-traditional students. Benefits of networked learning can increase enrolment and expand access to university education as well as cut movement and residential costs of students (in many cases) who seek the sought after quality degree programs as well as global learning opportunities can be available in the very competitive disciplines as well to those limited to entry due to financial difficulties in East Africa developing economies.

The governments in the all the East African countries (Burundi, Kenya, Rwanda, Tanzania and Uganda) has over the years improved the regulatory environment to ensure growth of the ICT sectors. Graduates from these universities are expected to take leadership positions in

government, business, and society and will therefore play a critical role in transforming East Africa into an information society. As a result, universities in East Africa are expected to continue to increase their enrolment and this requires the use of ICT-based learning technologies in the HEIs for example in open and distance learning (ODL). Thus, the capacity has to be developed within the university community first by ensuring the e-readiness of existing and new universities (Kashorda and Waema, 2009).

1.2 Statement of the Problem

Wiske (2011) in Unleashing the Power of Networked Learning asks; 'how do we unleash the power of networked learning? What is the nature of that power and what levers must we wiggle to generate effective learning through online technologies?

According to GeoSinc, (2006) a selected e-readiness assessment methodology should be dynamic, interactive, and scalable and provide threshold points that are important benchmarks for improved service in the ICT field. The emphasis is not on technological advancements, though these need to be mentioned, but rather on how the technology was responsibly utilised for intended purpose which this research study rightly emphasizes to be academic excellence. In other words, the emphasis is whether ICTs in HEI in EA are readily being possessed and utilised for the intended purpose of-academic excellence.

Lemke (2002) a report by the Milken Exchange found Virginia technology falling short of its goals for education technology; While the state had committed significant resources to technology * translating into more computers in the classrooms * access to the equipment and networking there was no improved academic performance throughout the school system. This forced the state to halt all funding for learning technology in fiscal year in order to assess the status of technology availability and use. Lemke (2002) explains a bold decision had to be taken to say "Wait! Before going any further, taking a look at whether or not the technology works; taking time to ensure that the expensive tools acquired are used effectively to improve student learning."

Kelly, (1998) notes the promise of the internet and computing technologies promise rarely has been fulfilled, and often, when it is, by mimicking traditional instructor-led processes of education.

Despite the considerable theoretical promise of networks, and their increasing prevalence and popularity as an institutional form, **there is little systematic research about the way that networks work in educational contexts or about what to emphasise to foster successful and productive networked learning in education** (Hwang et al. 2004) and more so in an EA context. This research study is concerned with providing an e-readiness assessment framework for networked learning based on perception of faculty, staff and students in 53 EA universities.

1.3 Objectives of the study

The main objective of the research study is based on studying and comparing related and existing e-readiness tools and frameworks predominately the adapted CID tool by KENET for higher education institutions; develop a framework to analyse the effect of e-readiness perception indicators on networked learning in East African universities.

The specific objectives of the research study are to

1. To determine the influence of Network Access on Networked learning
2. To establish the effect of Network Society indicators on networked learning
3. To establish the effect of ICT human capacity on networked learning

1.4 Hypothesis

Ho_1: Network access has no significant effect on networked learning

Ho_2: People and organization online has no significant effect on networked learning

Ho_3: There is no correlation between locally relevant content and networked learning

Ho_4: ICT in everyday life has no significant correlation on networked learning

Ho_5: ICT in the workplace has no significant correlation on networked learning

Ho_6: There is no significant relationship between ICT human capital and networked learning

1.5 Purpose is study

Sinclair and Boon (2011) Academics have varying responses to engagement with networked learning. For some it may seem a giant step into the spotlight onto the virtual stage; for others, it provides an opportunity to step out of the spotlight and indeed out of classrooms altogether.

In this research work, we make a case for keeping relationships in view as teaching moves inexorably online. The need to pay attention to the implications of what is projected on our screens and by whom and there remains an essential, if challenging, relationship between academics and their students that we must strive to engage and foster.

In this research the purpose is to develop an e-readiness framework to study and measure the readiness of E.A universities for networked learning based on students, faculty and staff perceptions. Then using the framework; the study applies statistical analysis to evaluate and tests hypothesis and finally the researcher makes recommendations.

1.6 Scope of the study

53 universities in the five East African countries of Kenya, Uganda, Tanzania, Rwanda and Burundi, with a particular focus on use of ICT for Academic purpose-how closely is the network focus linked to teaching and formal university learning.

1.7 Justification of the study

As communication and collaboration technologies become more pervasive, they will fade into the background and the focus will be on the work. Just as we don't "see" or think about the electricity that is powering the lights in our classrooms and offices, powering our copy machines, etc. the computers, mobile devices that we run our communication and collaboration platforms on will disappear into the background and we will be free to focus on "what" and not the "how" of these technologies (salmon, 2005).

Universities need to consider cost-effective and efficient methods of operation if they are to survive. While technology alone might not be the answer to all of the university's problems, according to Daniel (1996), it certainly can play a key role. The benefits of utilising

technology, particularly for developing online collaborative activities are well documented (Redfern & Naughton, 2002). Relationships can also be fostered within the context of an online environment. Technology is a powerful medium particularly for part time work based students who find erratic attendance requirements and study difficult (O'Donoghue & Singh, 2001).

1.8 Significance of the study

Goodyear, et al., (2005) Networked learning is an area which has great practical and theoretical importance. It is a rapidly growing area of educational practice, particularly in higher education. This research study brings together EA universities perspective and contribution in this vast research field, and uses it to signpost some directions for future work. This work represents a major contribution to the collective sense of recent progress in research on networked learning and e-readiness frameworks. In addition, the research study serves to highlight some of the most important theoretical gaps in our understanding of students, staff and faculty perspectives on networked learning, patterns of interaction and online discourse.

The range of topics addressed in attests to the vitality of this important field of work. More significant yet is the complex understanding of the field of networked learning and e-readiness in EA universities that the work combines to create. In combination, the research study helps to explain some of the key relationships between E-readiness framework variables and the affordances of text-based communications technologies and processes for informed and intelligent educational change.

The researcher hopes that the findings will be of interest to institutions and universities in EA working with Networked-learning readiness so as to bridge the digital divide in the HEI's. Although most e-readiness assessment studies are performed at the country level, for different countries, it has been emphasized that the e-readiness of organizations like HEIs, in a country, is an integral part of the overall e-readiness of that country ((O'Donoghue & Singh, 2001; Davies, 1998).

CHAPTER TWO
LITERATURE REVIEW

2.1 Introduction

This chapter presents a review of the related literature on the subject under study presented by various researchers, scholars, analysts and authors. It provides concept definitions, concept perspectives, current practices, past studies and conceptual framework. The literature relevance is in key areas related to the topic of study. Some of the key ones include; educational technology use (networked learning) and the notion of institutional e-readiness' in EA universities.

2.2 Networked learning

Siemens (2011), inveterate provokers-of-thought in digitally-mediated education, help in making sense of the transformative impact of technology in teaching and learning over the last decade. The voices calling for reform do so from many perspectives, with some suggesting 'new learners' require different learning models, others suggesting reform is needed due to globalization and increased competition, and still others suggesting technology is the salvation for the shortfalls evident in the education system today.

Networked learning can be practiced in both informal and formal educational settings. In formal settings the learning achieved through networked communication is formally facilitated, assessed and/or recognized by an educational organization. In an informal setting, individuals maintain a learning network for their own interests, for learning on-the-job, or for research purposes (salmon, 2001).

It has been suggested that networked learning offers educational institutions more functional efficiency, However, it is also argued that networked learning is too often considered within the presumption of institutionalized or educationalised learning, thereby omitting awareness of the benefits that networked learning has to informal or situated learning (Goodyear, 2005).

Recent developments in network learning occur against the backdrop of social learning theory, advanced by the aid of technology. Literature on learning and networks has progressed over the last decade, as indicated by university centres such as Helsinki's Centre for Research on Networked Learning and Knowledge Building (2006), research projects at Open University of the Netherlands (2006) and Lancaster University (2004), and dissertations (de Laat, 2006) researching the suitability of networks as a structural underpinning for education. However, the term network has become somewhat convoluted, making discussion of networked learning difficult. Baumeister (2005) echoes this reality:

Within a university setting there is a lot that can be networked: e.g. within a single course, within a faculty, within a research group and between academics, institutions or corporations outside. Taking all this together it will become evident that the term is layered with meaning and that is why in use it is seldom free from ambiguity (Fox, 2007; Conole and Siemens 2005).

Conole and Siemens, (2005) notes the above concern is, in part, a consequence of educators/researchers using the term broadly, without clearly demarcating underlying concepts or the various meanings the term has acquired in its diverse use to describe physical infrastructure, social connections, While networks in these domains meet general network definitions – as two or more connected nodes - discussion of *learning networks* in particular is often imprecise, failing to distinguish between how the term itself has developed over the last several decades.

One of the first references of network models for education can be found in Illich's (1970) description of learning webs. Illich suggested learning webs so "we can provide the learner with new links to the world instead of continuing to funnel all educational programs through the teacher". Illich's view outpaced technology by several decades. More recently, networked views of education have grown in prominence with the development of the internet.

Networked-learning in this research study refers to the use of ICT's and Internet technologies in particular to provide formal education (education for academic purpose) with advantages such as low costs and high flexibility, including accessibility anytime and anywhere

(Rosenberg, 2001). Dron (2005) states the Internet has long been touted as an answer to the needs of learners, providing a wealth of resources and the means to communicate in many ways with many people.

Consideration of the issues associated with the infrastructural aspects, pedagogic considerations and the need to associate the usefulness of technology to enhance the learning experience. This technological path will potentially enhance the learning process, not replace the lecturer or tutor. For lecturers and students, the implications of eLearning are extensive. Increasingly universities and associated disciplines must provide quality and flexibility to meet the diverse needs of students – this will inevitably involve tailoring courses to suit differing educational needs and aspirations. Lecturers will be forced to fundamentally change their approach to teaching to accommodate the shift in student learning styles (Dursun and Effie, 2011).

Kashorda and Waema, (2009) recommended a detailed academic area-specific e-readiness surveys to be conducted; this is because anecdotal evidence suggests that many universities have apparent digital-divides of different academic departments in large universities.
The associated implication of increased workload requires proactive and effective management. Alongside this, ICT enabled Learning threatens the fundamental structure of the university itself, as research forecasts that institutions cannot retain their traditional structure, in facilities and delivery via formal lectures and class based activity.

It is clear that universities must change to accommodate demand and in response to new competition from global, giant corporate and virtual universities, however the problems associated with the change must be fully under-stood and taken into account prior to the transition taking place. Whilst the benefits are highly prophesised, the many implications of implementing an these ICT programmes require careful consideration. Getting it 'right' the first time will ensure long term success in a highly competitive market (O'Donoghue & Singh, 2001)

ICT has also created new opportunities for universities and in particular at the faculty level however there is a great difference between the numbers of people that has access to ICT's in the universities; some faculties HEI have greater access to ICT compared to others in the

same universities. Higher education is essential for closing the gap between the industrial and the third world (Daniel, 2005b) and this applies to all disciplines and areas of specialization hence the need to take advantages of the technological benefits, transforming and hopefully improving the academic discipline/ faculty and this can trickle down to departments. ICT enabled learning in higher education is used to reach a broader segment of the population and to meet the needs of non-traditional students (EIU, 2003).

Networked Learning at its best; While, in educational practice, there is still a strong (and much needed) focus on the role of the teacher; researchers are pointing out a changing teacher–student relationship. The teacher increasingly becomes a 'guide on the side', which implies that students are stimulated to take active control over their own and collaborative learning processes. This allows them to fulfil their particular learning intentions and needs and coordinate their learning by agreeing on rules and deadlines. It allows students to actively schedule their activities and assign roles within the group, instead of just exploring the content in order to finish their learning task (Vonderwell, 2003).

Having a clear purpose is critical to the success of learning communities. In a general sense, successful educational change is driven by a pervasive commitment to improving education for all that includes raising the bar and closing the gap of student achievement, treating people with respect, improving the environment for learning, and changing the context for learning at all levels. In addition, this purpose must be *focussed* in ways that are concrete and useful, compelling, challenging, and shared.

A compelling learning focus is based on evidence that it can have significant impact on teaching practices and student learning. Determining a focus involves more than choosing a "good" idea or someone's pet initiative. Networked learning communities need to choose the "right" focus given HEI particulars of need for global academic excellence.

The learning focus is just the beginning to set the parameters that give students, staff and faculty direction for their learning and their work. Educators need to become knowledgeable about the core components of their chosen initiative so that they can integrate them into the

everyday practice and ensure that they respect the intents of the initiative rather than inadvertently eliminate or erode them (Oliver, 2002).

2.3 The concept of E-readiness

Kirkman, Osorio & Sachs (2002) define e-readiness as the degree to which a community is prepared, and has the potential, to participate in the Networked World. Machado, (2007) with a purpose to reveal a primary model of e-readiness for the specific context of higher education, e-readiness is defined as "the ability of HEIs and the capacity of institutional stakeholders to generate learning opportunities by facilitating computer-based technologies."

E-readiness can be defined as the degree to which a community is prepared to participate in the Networked World (McConnell, 2000).

In a comparison of e-readiness assessment models and tools, Bridges.org (2001a) showed that while there is overlap between them –Most consider physical infrastructure, levels of ICT use, human capacity and training, policy environment, and the local ICT economy – each has its own definition of e-readiness and something unique about its measurement criteria.

This diversity of individual standards of e-readiness means that there is no objective way of measuring e-readiness and therefore no one 'correct' tool. Bridges.org identified a need for a more comprehensive model than was available, one that offers a holistic view of the need for ICT and the constraints that hamper ICT access and use. The organisation realised that the actual nuts and bolts of computers and network cables are only one small part of access measurement: peoples' understanding of the potential of ICTs and laws that may limit the growth of the ICT-sector are just some of the other important issues to consider.

The concept of real access to ICT, made up of twelve interrelated factors, was thus proposed (Bridges.org 2002a). The factors are physical access; appropriate technology; affordability; capacity and training; relevant content; integration into daily routines; socio-cultural factors; trust in technology; legal and regulatory framework; sustainability and the local economic environment; macro-economic environment and public support and political will. Because

the twelve factors touch on technical, social and economic issues, their interdependence is complex.

2.3.1 The Digital Divide

In the field of ICT, Digital Divide is the gap between those who can access and use ICT to gain the associated benefits, and those who do not have access to technology or cannot use it for one reason or another (Bridges.org 2002b). These digital divides exist between countries (the 'international divide') and between groups within countries (the 'domestic divide'). The divide between technology 'haves' and 'have not's is painfully wide. For example, only 1.1% of Africa's population has internet access, compared with 66.1% in North America (Internet World Stats 2004). Because the 'haves' are better equipped to use ICTs and adopt new technologies, the gap between them and the 'have-nots' grows exponentially as new technologies appear, further compounding the problem (Bridges.org 2001b).

Information and communication technologies (ICT) concern any device or application (e.g. the Internet, television, radio and computers) for communicating, creating, storing, disseminating and managing information electronically.

The Over the last few years Information and Communication Technology (ICT) has come to play a major role for organisations including Higher Education Institutions (HEI) working for poverty reduction. It is therefore of great importance that also the poor countries will receive the benefits of ICT and avoid falling even further behind in the global development. Great efforts needs to be made to bridge the digital divide, both within and between countries as well as in organizations, since the ICT is becoming more and more important in the social and economic development (SIDA, 2003). One way for ICT to support developing countries is by improving the education and networked-learning is a way to improve education hence close this gap (Rosenberg, 2001).

Okoronkwo and Agu (2010) With ICTs increasingly becoming a key factor in driving education, production and development, a knowledge-based economy is not negotiable and is one in which the generation, adoption and exploitation of ICT knowledge play a key role in the creation of wealth especially in underdeveloped economies. This is because ICT is a

viable platform for generating wealth and an enabler of change; it releases people's creative potential and knowledge. Economists Intelligence Unit (2005) stated the greatest benefit of ICT is its ability to help individuals and enterprises conduct processes more efficiently anywhere in the world.

SADC/WEF (2002), say that ICT is a key weapon in the war against world poverty. When properly used, it offers huge potential to empower people in developing countries to overcome development obstacles and achieve economic viability and dependence. World leaders in government, business, organizations, institutions of Higher learning and civil society are considering how best to harness the power of ICT for development and empowerment through the conduct of e-readiness assessments. Current thinking often frames the discussion in terms of e-readiness, or how ready a country, institutions and others are to reap the benefits offered by ICT generally in terms of policy, infrastructure and ground-level initiatives (Okoronkwo and Agu, 2010; Williamson 2005)

2.3.2 Why E-readiness at HEI

At the heart of our vision of higher education is the free-standing institution, which offers teaching to the highest level in an environment of scholarship and independent enquiry. But, collectively and individually, these institutions are becoming ever more central to the economic wellbeing of the nation, localities and individuals. There is a growing bond of interdependence, in which each is looking for much from the other. That interdependence needs to be more clearly recognised by all participants we think in terms of a compact between higher education and society which reflects their strong bond of mutual independence (NCIHE, 1997)

The progress and changes in the field of information and communication technology together with the diffusion of the technological advances have resulted in the digital revolution and the emergence of the information age. This has had significant impact on cross-border relationships and expanded the global frontier in hitherto unimagined ways. The arrival of broadband technologies, access to the computer and the Internet together with changes in the

collection, storage and retrieval of information, have broken down geographic, social and economic barriers and transformed economies and social relationships (Peters, 2005).

EA countries as developing economies have no choice but to participate in the global economy; indeed it is already incorporated by its historical economic and political relationships with the international community. The issue is its level of readiness; as this will determine its new mode of incorporation into the global community and its ability to secure the economic, social and political benefits that the networked world offers. These include economic growth, employment generation, social equity, administrative efficiency, and strengthened participatory and functional political democracy (Dada, 2006).

It is increasingly clear that for a university to put ICT to effective use; it must be e-ready in terms of infrastructure and the accessibility of ICT to the population at large and in discussing e-readiness it may be necessary to recognise its two parts; the IT capabilities and the attitude towards digitization. When exploring the IT capabilities we acknowledge that the IT infrastructure consists of many sub elements (Danfoss and Aalborg, 2005; Okoronkwo and Agu, 2010)

A number of e-readiness assessment tools have been developed over the years. Each tool measures how ready a society or economy is to benefit from ICT. Bridges (2001) the range of tools has varying definitions for e-readiness and different methods for measurement. For instance, the computer Systems Policy Project (1998) defined an e-ready community as one that has high-speed internet access in a competitive market; with constant access and application of ICTs in schools, government offices, businesses, and all different aspects of societies and communities. Whereas, CID (2000) define an e-ready society as one that has the necessary physical infrastructure, integrated ICTs throughout businesses, communities (local content, many organizations online, ICTs used in everyday life, ICTs taught in schools) and the government; strong telecommunications competition; independent regulation with a commitment to universal access.

2.3.3 Comparison of e-readiness assessment models, tools and frameworks

The e-readiness tools and models can be divided into 2 main categories: those that focus on basic infrastructure or a nation's readiness for business or economic growth and those that focus on the ability of the overall society to benefit from ICT.

2.3.4 E-Readiness Indices of Countries

A starting point in the selection of the right assessment methodology is the "Comparison of E-Readiness Assessment Models" by Bridges.org (www.bridges.org), a non-profit organization dedicated to research, testing, and promotion of best practices for sustainable use of information and communication technology, offering open access to their studies and conclusions.

2.3.5 E-readiness Assessment Tools Comparison

The bridges.org Comparison of E-Readiness Assessment Models describes the various tools that are available and what they measure, including the tools' underlying goals and assumptions which shape their outcomes. Their aim being to foster informed decisions about approaches to e-readiness assessment, as many consider their ICT policies and undertake development initiatives.

Bridges verdict and suggestions on the question of what assessment tool is the best for e-readiness? Their answer is simply 'The right tool depends on the user's goal' further expresses that e-readiness assessments are, in fact, very diverse in their goals, strategies and results. The right tool depends on the user's goal. The user should choose a tool that measures what they are looking for, and does it against a standard that fits their own view of an e-ready society.

Listing a few of the e-readiness assessment tools and models, among these were those developed and used by McConnell International's Risk E-business, Asia Pacific Economic Cooperation Electronic Steering Group (APEC), World Information Technology & Service Alliance (WITSA), Economic Intelligence Unit, Computer Systems Policy Project (CSPP), and Centre for Internal Development and Conflict Management (CIDCM), Mosaic's Global Diffusion of the Internet Project and CID's E-Readiness Assessment.

Having extensively expounded and compared the different e-readiness assessment tools available, Bridges provides a suggestion to look at the digital divide reports; specifically to the group of digital divide reports that focus on education, local and relevant content, and effective use of technology throughout society, for the goal of assessing the effects of the technology on the lives of real people, and considerations on how widely the technology is really being used.

According to Bridges, the process of assessing and improving e-readiness comprises four steps: (1) Choosing an appropriate assessment tool based on a clear understanding of national goals for ICT integration. (2) Conducting the e-readiness assessment. (3) Developing a detailed action plan that will move the country toward its objectives. (4) Implementing the plan.

2.3.6 Readiness for the Networked World: A Guide for Developing Countries by CID

Information Technologies Group, Center for International Development at Harvard University (2000), development a guide for communities in the developing countries. Readiness is defined as the degree to which a community is prepared to participate in the Networked World, which could be measured by assessing a community's relative advancement in the areas that are most critical for ICT adoption and the most important applications of ICT. "The guide...systematically organizes the assessment of numerous factors that determine the Networked Readiness of a community in the developing world." This assessment is meant to serve as a basis for further analysis and planning.

This guide measures 19 different categories, covering the **(1)** Network access (6 access indicators- Information Infrastructure, Internet Availability, Internet Affordability, network speed and quality, hardware and software, service and support) **(2)** Networked Learning (3 Internet usage in education Indicators- use of ICTs in schools, Enhancing education with ICTS, Developing the ICT workforce) **(3)** Network Society (4 Indicators – People and organization online, locally relevant content, ICT in everyday life, ICTs in the workplace) **(4)** Networked economy (4 Indicators – ICT employment opportunities, b2C electronic commerce, B2B electronic commerce, E-government) **(5)** ICT policy (2 indicators- Telecommunication regulation, ICT Trade policy)

CID, (2000) the framework is quite broad with five categories consisting of several factors each. Each factor can be in one of the four stages of advancement. Strengths: 1. A broad definition of categories allows to easily apply the framework to any community Weaknesses: 1. The definitions of stages of advancement can be applicable to developing countries only, as most of the developed countries already are in the fourth stage by each factor (Tarvid, 2008).

2.3.7 Framework for e-Readiness assessment model (STOPE)

Bakry (2004) develops a framework for e-Readiness assessment model (STOPE) consisting of five categories as follows (Al-Osaimi et al 2006, Bakry 2004 and Bakry et al 2005): ⏲ Strategy (ICT leadership and ICT future development plans); ⏲ Technology (ICT basic infrastructure, ICT e-Services infrastructure, ICT provisioning and ICT support); ⏲ Organisation (ICT regulations: government, ICT cooperation and ICT management); ⏲ People (ICT awareness, ICT education and training, ICT qualifications and jobs and management of ICT skilled); and ⏲ Environment (knowledge, resources and economy, organisation and general infrastructure).

2.3.8 Assessing country's e-Readiness

Peters (2005), summarises the criteria used in assessing country's e-Readiness as follows:
- Legal and regulatory environment for ICT use; - Appropriateness of ICT; - Affordability of ICT in the local context; - ICT capacity and training; - Availability of locally relevant content and services; - Use of ICT in business; - Integration of ICT into peoples' lives; - Physical access to ICT; - Socio-cultural factors that affect ICT use; - Security and peoples' trust in ICT; - Macroeconomic environment affecting ICT use; and - Government's role in driving e-Readiness.

2.4 E-readiness assessment models, tools and frameworks For Higher education institutions (E-Readiness Indices of HEIs)

This represents the e-readiness frameworks adopted and developed for assessing higher education institutions in both developed and developing economies.

2.4.1 Colle Building ICT4D capacity in and by African universities.

The paper challenges the perception that "universities are irrelevant" and describes a comprehensive ICT development initiative that includes teaching, research and outreach. The Paper introduces a report released at the World Summit on the Information Society in 2003 identified a significant role for information and communication technologies (ICT) in strategies for African development (Okapaku 2003).

The report notes that the New Partnership for African Development (NEPAD) includes a strong focus on the dual strategies of ICT Development (ICTD) and ICT for Development (ICT4D). Arguably, universities in developing nations are potentially important players in both of these NEPAD strategies, and that the e-Readiness of African universities is a vital issue in African development. The e-Readiness of African universities is clearly relevant to the global creation and distribution of knowledge which, in turn, is a core challenge in the world's thrust toward the Millennium Development Goals (World Bank 2004a).

Applying the NEPAD terms to universities in the following way: **ICT Development** in the university context refers to building media and digital facilities to support university internal functions, along with an academic and research programs that prepare students to function effectively in an information society, in both the public and the private sectors; **ICT for Development** refers to the university applying ICT in programs outside its walls in the service of communities and the nation.

Central to creating a digital resources and academic infrastructure is the question of universities' relevance to the world around them, and especially to the challenge of being an active player, anchoring a broad-based poverty alleviation strategy" in an increasingly knowledge-based economy (Nwuke, 2003).

Going beyond the rather general indictment of academia the paper looked at five dimensions of e-Readiness in the university context ICT facilities and network access; Personnel available to support the design and production of digital materials such as CDs, web pages, and distance learning (training) packages; Academic programs including field experience opportunities that prepare students for applying ICT to communication and development;

University policies that encourage faculty participation in community outreach programs;
A faculty ICT postures, for example, a positive disposition toward the use and efficacy of ICT in education, teaching and learning (colle, 2005)

2.4.2 E-Readiness Assessment of 7 Higher Education Institutions in Ghana

Addom, (2004) the project investigates and assesses the current state and usage of ICT in some Ghanaian universities and to evaluate the potential effectiveness of these technologies for teaching, research, and outreach. In evaluating the framework he suggests a strength that the general framework that can be applied to any HEI and weaknesses that the variables are too simplistic and are not useful in more developed countries or in a more detailed assessment of e-readiness.

This report used a framework developed by Colle (2005) and consists of five categories to be measured by variables. **1.** Human Resources (Existence of IT Support personnel) **2.** ICT Facilities (a. Computers, b. Networks c. Media production facilities) **3.** Academic Programmes (a. Programmes that invite students to study and apply ICT, b. Research & internship opportunities that thrust students and faculty members into the ICT-for-development environment **4.** Outreach Policies (a. Support for "university without walls") **5.** Faculty Posture (a. Faculty's proficiency in ICT, b. Faculty's innovativeness and aggressiveness in application of ICT to learning and outreach (Addom, 2008; Colle, 2004; Tarvid, 2008).

2.4.3 Carlos Machado Developing an e-Readiness Model for Higher Education

Machado (2007) tested his conceptual framework of e-readiness of an HEI on a focus group, which derived key stakeholders interested in development of e-readiness and their functions as mapped to the conceptual framework. The purpose was to reveal a primary model of e-readiness for the specific context of higher education, where e-readiness is defined as "the ability of HEIs and the capacity of institutional stakeholders to generate (e-) learning opportunities by facilitating computer-based technologies."

In a quite general framework that can be applied to any HEI Machado, (2007) identified and mapped functions relative to e-readiness **1.** Ability of HEI Stakeholders (a. HEI current

policy, b. HEI future strategy), 2. Capacity of Learning Stakeholders (a. Knowledge, b. Teaching & learning styles, c. Instructional methodology, d. Techno-cultural acceptance), 3. Facility by Learning Stakeholders (a. Infrastructure, b. Network services) 4. Key Stakeholders (as defined by the focus group) a. Administration level (Ability, Facility (motivation, training, performance appraisal, provision of facility, access) b. Instructor level capacity (way of thinking, resistance, acceptance, understanding new methods, skills) c. Student level Capacity (behaviour, resistance-acceptance, understanding new methods, computer skills, language skills) (Machado, 2007).

2.4.4 Adaptation of the CID Tool for Assessment of HEI in Kenya

The survey assesses the preparedness of the Higher Education Institutions in Kenya to use Information and communication Technologies (ICT) for teaching, Learning, Research and Management. Indirectly, it was also an assessment of the Capacity or readiness of the Institutions in Kenya to use electronic learning (E-Learning) to improve quality of education and ultimately, increase access to higher education in Kenya (Kashorda and Waema, 2009).

The results of the survey recommended that a detailed academic area specific e-readiness surveys should be carried out. This was due to the apparent "digital-divides" of different academic departments in large institutions. An annual e-readiness survey of HE institutions should be carried out to continually identify critical issues and Implications and it was identified that on average the Universities were almost at the same level noting that the overall institutional challenges are similar.

Kashorda and Waema (2009) study used a modified diagnostic e-readiness assessment framework containing a set of 17 ICT indicators grouped under the following five categories:

(i) Network Access (four indicators – Information infrastructure, Internet availability, Internet affordability, Network speed and quality)

(ii) Networked Campus (two indicators – Network environment, E-campus)

(iii) Networked Learning (four indicators – Enhancing education with ICTs, Developing the ICT workforce, ICT Research and innovation, ICTs in libraries)

(iv) Networked Society (four indicators – People and organizations online, Locally relevant content, ICTs in everyday life, ICTs in the workplace)

(v) Institutional ICT Policy and Strategy (three indicators – ICT strategy, ICT financing, ICT human capacity)

The framework was derived from an e-readiness assessment tool originally developed by the Center for International Development at Harvard University. The new e-readiness framework contains two new categories of indicators (networked campus and institutional ICT policy and strategy); seven new indicators; and over 60 new sub-indicators specific to higher education institutions. However, the new framework is similar to the CID readiness assessment in that it is diagnostic and stages each of the indicators on a scale of 1 to 4, where 1 represents unprepared and 4 the highest degree of readiness.

The survey therefore identified a set of 15 strategic ICT sub-indicators for higher education institutions that could be monitored by the institutions on an annual basis, and that are critical for determining the degree of readiness for ICT.

2.5 E-readiness for Networked Learning at HEI

Information and Communication Technologies (ICTs) and internetworks in particular, are used for learning, for communication and handling information, which in turn helps increase productivity and efficiency. A university that is well prepared for offering effective environment for use of ICTs in learning is able to get a competitive advantage, or at least not fall behind in the race (Blackall, 2006). The concept of e-readiness in relation to networked-learning serves as a roadmap as to how Information and Communication Technology (ICTs) should be implemented in Higher Education Institutions and in a country at large (Koper, 2009).

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should be implemented in Higher Education Institutions and in a country at large (Koper, 2009).

White (2007) nowadays, when the largest and most famous universities and colleges have adopted online education it is evident that networked learning brings many benefits in the area of higher education. It encompasses a variety of technologies and ways of using them, thereby creating more opportunities for a wider group. It complements conventional teaching and can provide various resources that may not be available in a traditional classroom environment.

Networked learning has widened the reach of education by nullifying the relevance of cultural barriers and geographical boundaries in search of academic excellence. Networked-learning is something that has become more and more common, especially in higher education. It offers the potential to reach students and individuals that would otherwise find it difficult to read courses at a university. The reasons for offering online education often relate to these four categories: it expands access, alleviate capacity constraints, capitalizes on emerging market opportunities and serves as a catalyst for institutional transformation (Volery and Lord, 2002).

Kashorda and Waema (2009) Whilst the Information Technology and Internet infrastructure have improved significantly over the last decade in East Africa, several other challenges continue to affect access to knowledge and information over the Internet by students, faculty and staff in EA universities. Expensive Internet bandwidth, limited access to computers and inadequate user skills are key barriers limiting the access and use of required information at the HE institutions particularly those located in remote areas far from the capital cities (Information Training & Outreach Centre for Africa (ITOCA), 2011).

Education has become a commodity in which people seek to invest for their own personal gain, to ensure equality of opportunity and as a route to a better life (Davies, 1998). As a result, providers of Higher Education (HE) are finding themselves competing more than ever for students, funding, research, and recognition within the wider society. Whilst competition has always been an issue for universities and in academic faculties, historically the focus was

national rather than international. During the last decade and through the development of virtual education i.e. distance methods of delivery and new communication methods, HE has become globalised; providers are able to export themselves and as a result competition has been extended beyond national boundaries (Okoronkwo and Agu, 2010)

HE Institutions and in particular universities are actively seeking new markets and the ability to utilise technological progress to structure themselves to deliver programs anywhere in the world. However, for those who are complacent, the threat of being left behind is significant. According to the United Nations Development Program (UNDP) (2006) "e-readiness assessments are meant to guide development efforts by providing benchmarks for comparison and gauging progress. They help diagnosing ICT problems, advocating required ICT changes, and developing sound ICT plans (Sergey, 2004).

The higher education sector needs to: take full advantage of the advances in communications and information technology, which will radically alter the shape and delivery of formal education throughout the world (NCIHE, 2003). Addom, (2004) the project investigates and assesses the current state and usage of ICT in some Ghanaian universities and to evaluate the potential effectiveness of these technologies for teaching, research, and outreach. Kashorda and Waema (2009) suggest there is still need to collect detailed data for different academic departments and their programs, example the fraction of courses that have online components.

According to faculty posture indicator Machado (2007) E-readiness of a faculty contributes to e-readiness of HEI which in turn contributes to the overall e-readiness of that country. The number of studies aimed to find out how to implement use of ICTS in learning in Higher Education Institutions (HEI) is increasing. The interest has been influenced by various barriers and drivers.

The majority of barriers are related to the challenging issue concerning the integration of computing and networks learning systems into the current practice in universities. Hence, it is deemed relevant to understand whether different stakeholders (Staff, faculty, students) in

universities tend to embrace or ostracize these systems for their respective work (Dursun and Effie, 2011).

2.6 Conceptual framework for e-readiness for networked learning in EA universities

Conole & Oliver (2002) a framework is a structure and vocabulary that supports the explication of concepts and issues. In discussing the range of resources that can be used to support decision making, they identify: tools, good practice, models, frameworks and templates/wizards.

They go on to argue that there is a spectrum from templates/wizards through to frameworks: aids to decision-making range from highly restrictive 'templates' or 'wizards', which provide high levels of support and step-by-step guidance but little possibility of user-adaptation, through to 'theoretical frameworks', which provide a context and scope for the work but leave the user to devise their own strategy for implementation.

Looking at how prepared EA universities are to offer ICT enabled learning, Kaleidoscope (2003-2011) discusses about the Conditions for productive Networked Learning Environments Networked learning, then, focuses on the connections between people (learners, tutors, and professors) and information (or learning resources), using Information Communication Technologies (ICT) as a way of communicating and supporting one another's learning. It is a way of organising learning processes within formal education and the work place, using networks (such as the internet and social software) for the purposes of communication and collaboration. Our research study, examines the e-readiness indicators that promote productive learning predominately academic purpose learning.

We are developing a common framework for researching networked learning, based on the perceptions of students, faculty and staff members in 53 East Africa universities. As such, we have identified a number of key issues—including learning infrastructure, ICT in everyday life, ICT in the workplace, ICT human capital, people and organization online—that will have implications for the future of networked learning.

Kashorda and Waema (2009) survey modified the CID tool as discussed in section 2.3.6, by introducing new categories of indicators, indicators, and sub-indicators appropriate for higher education institutions. The new sub-indicators were especially useful in interpreting the data and therefore staging each of the readiness 17 indicators, noting that the sub-indicators were derived specifically for the higher education community and are not specified by CID tool.

The resulting set of 17 relevant indicators was grouped into five categories as follows:

(i) Network Access (four indicators – information infrastructure, Internet availability, Internet affordability, network speed and quality)

(ii) Networked Campus (two indicators – network environment, e-campus)

(iii) Networked Learning (four indicators – enhancing education with ICTs, developing the ICT workforce, ICT research and innovation, ICTs in libraries)

(iv) Networked Society (four indicators – people and organizations online, locally relevant content, ICTs in everyday life, ICTs in the workplace)

(v) Institutional ICT Policy and Strategy (three indicators – ICT strategy, ICT financing, ICT human capacity).

In order to stage each of the 17 indicators, developed and describe a new staging framework for each indicator.

Based on rich theoretical underpinnings, the author modifies the adaptation of CID tool by Kashorda and Waema (2009) further to derive an e-readiness assessment framework for the 53 HEI in East Africa for academic purpose (enhancing education with ICTs) from three possible categories of independent variables:

a) Network Access- (Internet availability, network speed and quality)

b) Networked Society
   i. people and organizations online
   ii. Locally relevant content
   iii. ICTs in everyday life
   iv. ICTs in the workplace

c) ICT human Capital.

The components of the framework are easily measurable and interpretable, which is an obvious advantage which allows a university to assess how much it is possible to improve on them.

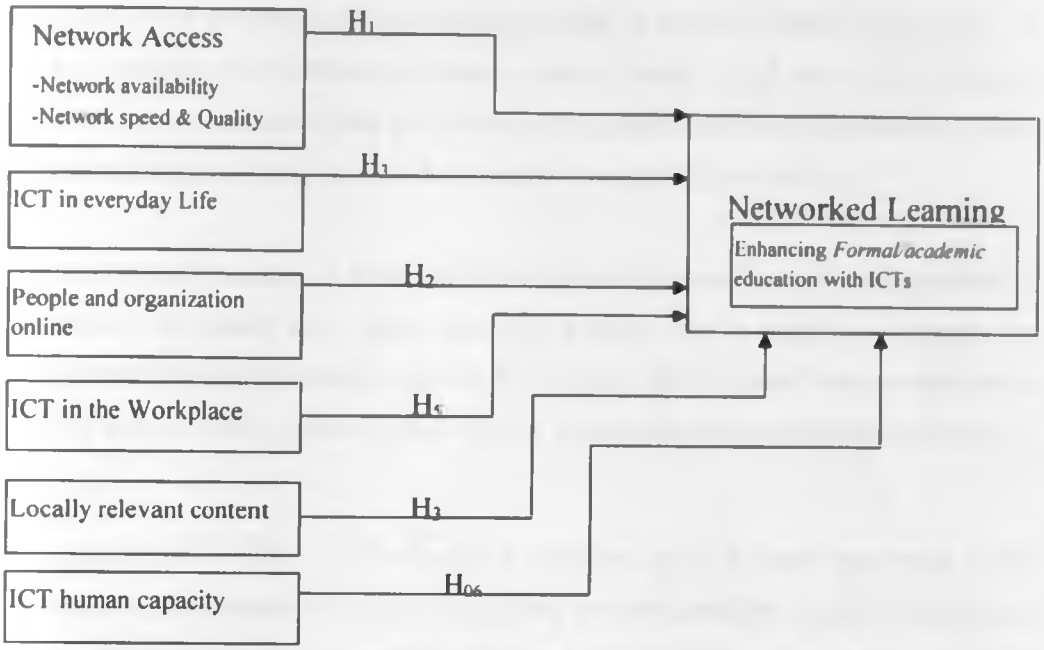
The author can be able to state that the foundation of the framework is best practices and standards, as reviewed in the various e-readiness indices.

Table 2.6-1: adapted e-readiness indicators from Kashorda and Waema, (2009)

Indicator	**Key sub indicators**
Network Access	Network availability
	Network Speed and Quality
Networked Society	ICT in everyday Life
	People and organization online
	ICT in the Workplace
	Locally relevant content
ICT human capacity	ICT Leadership and Skilled work force

2.7 Resulting Conceptual Framework

Figure 1: Conceptual Framework



Source; author (2011)

2.8 Statistical tools, model Formulation and estimation

Conole and Oliver (2002) define models as 'representations, usually of systems. These are frequently visual representations, although formal models are more likely to be syntactic (or derived from an underlying syntactic representation), often being defined mathematically. Models may be tools, in that they can be used to carry out analyses or may permit certain assumptions to be expressed. Equally, however, they may be the object (i.e. purpose) of an activity, in that it may be necessary to construct a model of a system in order to develop an explicit understanding of how it works.'

2.8.1 Regression analysis

Regression analysis is a statistical tool for the investigation of relationships between variables. To explore such issues, the researcher assembles data on the underlying variables of interest and employs regression to estimate the quantitative effect of the causal variables upon the variable that they influence. The researcher also typically assesses the "statistical

significance" of the estimated relationships, that is, the degree of confidence that the true relationship is close to the estimated relationship (Kothari, 2008).

A good theory is the end result of a winnowing process. In statistics, **linear regression** is an approach to modeling the relationship between a scalar variable y and one or more variables denoted X. In linear regression, data are modeled using linear functions, and unknown model parameters are estimated from the data. Such models are called *linear models*.

In this research study we seek to determine; Given a variable y and a number of variables X_1, ..., X_p that may be related to y, linear regression analysis can be applied to quantify the strength of the relationship between y and the X_j, to assess which X_j may have no relationship with y at all, and to identify which subsets of the X_j contain redundant information about y.

Given a data set $\{y_i, x_{i1}, \cdots, x_{ip}\}_{i=1}^{n}$ of n statistical units, a linear regression model assumes that the relationship between the dependent variable y_i and the p-vector of regressors x_i is linear. This relationship is modeled through a so-called "disturbance term" ε_i — an unobserved random variable that adds noise to the linear relationship between the dependent variable and regressors. Thus the model takes the form

$$y_i = \beta_1 x_{i1} + \cdots + \beta_p x_{ip} + \varepsilon_i = x_i'\beta + \varepsilon_i, \qquad i = 1, \ldots, n,$$

Where

y_i Is the *dependent variable*

x_i are *predictor variables*, or *independent variables*

β is a p-dimensional *parameter vector. effects*, or *regression coefficients*.

ε_i is called the *error term*, *disturbance term*, or *noise*.

If the estimator is unbiased, we would find that on average we recovered the true value of each parameter. An estimator is termed *consistent* if it takes advantage of additional data to generate more accurate estimates. More precisely, a consistent estimator yields estimates that converge on the true value of the underlying parameter as the sample size gets larger and larger.

Thus, the probability distribution of the estimate for any parameter has lower variance as the sample size increases, and in the limit (infinite sample size) the estimate will equal the true value. Then, lower variance in the probability distribution of the estimator is clearly desirable—it reduces the probability of an estimate that differs greatly from the true value of the underlying parameter. In comparing different unbiased estimators, the one with the lowest variance is termed *efficient* or *best.*

Regression analysis includes any techniques for modeling and analyzing several variables, when the focus is on the relationship between a dependent variable and one or more independent variables. More specifically, regression analysis helps one understand how the typical value of the dependent variable changes when any one of the independent variables is varied, while the other independent variables are held fixed (Aldrich, 2005).

Aldrich (2005) continues to explain most commonly, regression analysis estimates the conditional expectation of the dependent variable given the independent variables — that is, the average value of the dependent variable when the independent variables are held fixed. Linear regression attempts to model the relationship between two variables by fitting a linear equation to observed data. Some statistical literature use different terminology for response and explanatory variables. A response variable is often called a dependent variable, and an explanatory variable is sometimes called an independent variable, or a predictor, or regress or.

2.8.2 Correlation

Correlation refers to the situation where we have two random variables X and Y, and wish to measure the strength of the linear association between the two: the association is strong if knowing the value of one variable can give us a (reasonably) precise idea of the value of the other variable; the association is weak if we can only get a very rough estimate (Kothari, 2008).

Kutner, Nachtsheim, and Neter (2004) Note that there is an important difference between this situation and the linear regression situation: here, both X and Y are random, whereas in

regression we always regard the explanatory variable x as a *non-random* variable Furthermore, in linear regression we look for a *straight-line relationship* between Y and x; here we are interested in the *strength* of the linear association between X and Y.

The most common measure of strength of a linear association between two variables X and Y is the **Pearson correlation coefficient** (or **correlation coefficient**, or simply **correlation**), usually denoted by ρ (rho). It is given by

$$\rho = \frac{\text{cov}(X, Y)}{\sqrt{\text{var}(X)\ \text{var}(Y)}},$$

where var (X) and var (Y) are the population variances of X and Y, respectively, and

$$\text{cov}(X, Y) = \mathbf{E}[(X - \mathbf{E}X)(Y - \mathbf{E}Y)]$$

is the **covariance** between X and Y. In particular, cov (X, Y) describes the average amount by which X and Y vary with each other, or *co-vary*.

The correlation coefficient ρ can take any value between -1 and 1, inclusive. If ρ is positive, the association is positive, and if ρ is negative, the association is negative. Further, the larger the magnitude $|\rho|$ of ρ is, the stronger is the association. In particular, values of -1 and 1 indicate that the relationship between X and Y is perfectly linear (either positive, if $\rho = 1$, or negative, if $\rho = -1$). That is, all values of ***(X, Y)*** lie on the same line $y = \alpha x$, for some α. Conversely, $\rho = 0$ indicates that there is no linear relationship.

An estimate of P is given by the sample correlation r, that is,

$$r = \frac{s_{xy}/(n-1)}{s_{(x)}s_{(y)}},$$

Goodness of Model fit

Sykes (2001) explains another common statistic associated with regression analysis is the R^2. This has a simple definition—it is equal to one minus the ratio of the sum of squared *estimated* errors (the deviation of the actual value of the dependent variable from the

regression line) to the sum of squared deviations about the mean of the dependent variable. Intuitively, the sum of squared deviations about its mean is a measure of the total variation of the dependent variable. The sum of squared deviations about the regression line is a measure of the extent to which the regression fails to explain the dependent variable (a measure of the noise).

Hence, the R2 statistic is a measure of the extent to which the total variation of the dependent variable *is* explained by the regression. It is not difficult to show that the R2 statistic necessarily takes on a value between zero and one. To be sure, a large unexplained variation in the dependent variable will increase the standard error of the coefficients in the model (which are a function of the estimated variance of the noise term), and hence regressions with low values of R2 will often (but by no means always) yield parameter estimates with small t-statistics for any null hypothesis. Because this consequence of a low R2 will be reflected in the t statistics, however, it does not afford any reason to be concerned about a low R2 per se. a low value of R2 *may* indicate that important and systematic factors have been omitted from the regression model (sykes, 2001; Kothari, 2008).

2.8.3 Model Formulation and estimation

Networked Learning (Y) can be expressed as a function of e-readiness indicators (X) in the following equation:

$$Y= \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \beta_4 X_4 + + \beta_4 X_5 + \beta_4 X_6 + \varepsilon_0$$

Where,

Y= Networked Learning

β= Regression coefficient, where β_0 is the intercept

X_1= Network Access

X_2=People and organization online

X_3=Locally Relevant content

X_4=ICT in everyday life

X_5=ICT in the workplace

X_6=ICT human capacity

ε_0= Extraneous variables not estimated by the equation.

2.8.4 Measuring Network access

The network access is derived by measuring two indicators –network and internet availability, network speed and quality including technical support. Emphasize is on usage and quality of the network infrastructure as perceived by users. Access and connectivity are essential to the very existence of networks, and if they are deficient there is little point in moving onto other focus areas (GeoSINC, 2002). Network and Internet availability is derived by measuring access to internet services on campus. Network Usage, speed & Quality is another part of network Infrastructure component, as perceived by students. Questions on network usage and perceived quality are incorporated into the perceptions questionnaire. This was done for the reason that each HEI has its specific network access.

A single sub-component of network access, on which students' opinions are not asked, is security. This is done for several reasons. Firstly, users are normally not informed on security mechanisms used in the company. Secondly, they do not have choice whether to use the security implemented or not. Therefore, the author believes their opinions on this subcomponent are irrelevant. To sum up, technology needs to be accessible, reliable, fast and easy to use. Quality measures for access should therefore take into account all these key factors.

2.8.5 Measuring Networked society

Four indicators are applied in the framework – Access to ICT facilities in everyday life, people and organization online, ICT in the Workplace, locally relevant content.

The researcher would like to measure the Information component the same way as the network Infrastructure component, i.e., by measuring capacity and usage & quality. The researcher proposes to measure Information Services (IS) as means by which users get access to the Information component—for instance, the HEI website or academic journal databases (if access to them is provided). In other words, by measuring IS, one indirectly assesses the Information component (Tarvid, 2008).

GeoSINC, (2002) notes that Training, Education and public awareness are one of the main barriers to network development in many developing countries; the internet is, after all, based

on the written word, and mainly in English (although this situation is changing rapidly. This Indicator measures the intensity of use of on-line resources and what they need the ICT facilities like the Internet for. The sub Indicator measures availability of websites with local content. It could be academic, news or entertainment. It also measures the degree to which users are attracted to the locally relevant websites.

2.8.6 Measuring ICT Human Capital:

Human resources is the component not measured relatively widely in the indices. However, it is quite important, consider Brynjolfsson and Hitt (2003), for instance. They claim that investment in human capital is complementary to investment in ICT, whereas computers and networks (in this case, infrastructure) are only a "general purpose technology." Another proof of the need to invest in human capital comes from Hempell (2003): "Firms that invest strongly in both training and ICT perform significantly better than competitors that pursue rather isolated investment strategies." The author measures the Skilled Workforce component by its quality, which is measured using the variable groups: ICT leadership, ICT Skilled Workforce (Experience and Service quality).

Experience is measured in years of working in any organisation (not only in the HEI under consideration) in IT department. As experience is commonly treated–more important than education, it has a greater weight in the quality assessment-The performance of the HEI in providing high-quality service (O'Donoghue, 2006)

2.8.7 Enhancing Education with ICTs-Academia-networked learning

This indicator measures the integration of ICT in curricula and the readiness of faculty to offer e-learning courses and use ICT in the classrooms and in the offices, In particular use of ICT in research, teaching or learning. The key in this indicator is use of ICTs in formal education (Use of ICT in the academia) wherever the ICT resources are located be it in the classrooms, in the offices, at home or Mobile phones on the go (infoDev, 2001).

Warner et al (1998) proposed for networked-learning to progress; students preferences for ICT enabled form of delivery as opposed to face-to-face classroom instruction, or the provision of print-based pre-packaged resource materials; (b) student confidence in using

electronic communication for learning and, in particular, competence and confidence in the use of Internet and computer-mediated communication; and (c) ability to engage in autonomous formal learning. This indicator measures access and usage of ICT on- and off-campus and data obtained from staff (academic and non-academic staff) measures readiness and usage of ICTs example e-mail, Sms, formal e-learning platforms, Productivity tools e.t.c (Chan, 2003)

CHAPTER THREE
RESEARCH METHODLOGY

3.1 Introduction

In this section, the researcher first introduces the research design and presents the assessment framework and then provides a detailed review of the dependent and Independent variables that were used.

3.2 The e-Readiness Framework

There are many models and tools used to assess e-Readiness. Each assessment tool or model has a different underlying goal and definition of e-Readiness. Of course, no tool will fit every user's needs (Bridges, 2005). The researcher chose carefully and with a clear understanding of the kind of results that the assessment tool is likely to lead as guided by the research objectives

To achieve the research objectives an explanatory research designs was employed; to develop an e-readiness conceptual framework that was used to assess the effect of independent variables on networked learning. Then Secondary data was collected from KENET for all 53 universities in East Africa for the period 2008-2009. Data were analysed using descriptive and inferential test statistics. Specifically, frequency counts, percentage proportions, means and standard deviations were used to assess data characteristics. Cronbach alpha was used to measure reliability while Pearson product moment correlation analysis was used to establish associations between construct variables and test hypothesis. General linear regression was used to test hypotheses relating to networked learning model estimation.

Numerous quantitative statistical techniques if, when used in conjunction with careful conceptual work, can increase the insights drawn and can add confidence to significance of reported findings (Montgomery, 1979). In this study we are therefore concerned with two basic problems regarding the hypothesized relationships; Firstly, Confirming or disapproving the hypothesized relationships, and secondly, if the hypothesis is specific that mathematical form of the relationship between the predictor and criterion variables is determinable,

estimating the parameters and the strength of the relationship by multivariate analysis. Under such circumstances Lehman, et al. (1997) recommends use of explanatory or causal design. As was discussed in the previous section - the Kashorda and Waema (2009) adopted the CID e-readiness framework to suit the EA HEI resulting into 17 indicators grouped in to 5 categories summarised as follows;

1. Network Access; information infrastructure, Internet availability, Internet affordability, network speed and quality.
2. Networked Campus– network environment, e-campus.
3. Networked Learning– enhancing education with ICTs, developing the ICT workforce, ICT research and innovation, ICTs in libraries.
4. Networked Society (four indicators – people and organizations online, locally relevant content, ICTs in everyday life, ICTs in the workplace.
5. Institutional ICT Policy and Strategy– ICT strategy, ICT financing, ICT human capacity.

Madon (2004) found that any evaluation criteria should come from the field reflect felt needs and priorities of the users rather than predefined objective criteria; in this case the perception of E.A universities students, staff and faculty as previously sampled by Kashorda and Waema (2009) guided the development of the framework and the resulting framework for e-readiness of Networked learning as the dependent variable contains a set of 6 key independent indicator variables as follows into:

(i) Network access (Network availability and Quality and speed)
(ii) People and organization online
(iii)Locally relevant content
(iv)ICT in everyday life
(v) ICT in the workplace
(vi)ICT Human capacity

3.2.1 E-readiness for networked learning variable constructs

Table 3.2-1 : Networked learning variable constructs

Variable (DV)	Description	Measurement Constructs	
Networked Learning	Enhancing education with ICT	-Average per day of SMS send for academic nature of these messages -Need for academic Information- -Need for academic research information -of students and faculty using e-mail/Internet for academic -of students who consider Internet most important for academic work -of faculty using Internet for academic work (research, teaching or learning) -opportunities for web-related training	

Table 3.2-2: Network access variable constructs

Indicator	Key sub indicators	Relevant questions	
Network Access	Network and Internet availability	- Off-Campus access to institutional E-mail - availability of on campus e-mail	
	Network Quality and Speed	- Successful to attempts to access off-Campus to institutional E-mail -of campus network and/or E-mail failures -of students who think network speed better than cyber cafe -Internet speeds from your institution frustrate or slow down work? -of how long it takes to restore a campus network failure? -frequency of failure of the computer you use in the lab or offices -When there is a failure, how long does it take to fix the fault -the most common type of computer failure -call or e-mail the help desk in your institution when you encounter problems -campus computer network stable? -how often do you experience power failure and you are unable to use your computer?	

Table 3.2-3: ICT in Everyday life variable constructs

Networked society	ICT in everyday life	-have a mobile phone -send SMS messages -On average, how many SMS messages do you send or receive per day -nature of these messages -mobile phone for Internet access -of students with campus access to computers -Never used a computer -of faculty with campus access to computers -of students whose main access to computers/internet is cyber cafe -of students with home access to computers -of faculty with home access to PC -of students and faculty using computers for e-mail/Internet -of students and faculty using PC for word processing/data analysis	

Table 3.2-4: People and organization online constructs

Networked Society	People and organization online	-of respondent who have never used the Internet -of respondents who consider Internet most important for e-mail -of respondents who consider Internet most important for various uses -of faculty using Internet daily -of students using Internet daily -respondents regular use of the emails -In provision of e-mail services to the respondents by the institution -in of purpose of your having an email address in order of importance -of students who think institutional website interactive -of students who do know about their institutional website -of students with e-mail accounts -any local Web portals (e.g., Newspapers) that you regularly visit -use or participate in most frequently -media have been used to promote your Institution's Web site	

Table 3.2-5: ICT in the workplace constructs

Networked society	ICT in the Workplace	-transact your official business most by Mobile -ever use a mobile for your work -use dial-up mobile-based internet services -transact your official business most by web -transact your official business most by person -transact your official business most by e-mail -transact your official business most by fixed telephone/fax -telephone extension in your office or campus -frequency of access the internet for email or web-sites from your office -have an official business card complete with an email and web-site addresses -of faculty using Internet for academic work (research, teaching or learning) -access to a personal computer in your office -of faculty using e-mail often for internal communications -of faculty who access Internet from office -of faculty staying on-line for more than 1 hour -faculty subscribe to any mailing list (local or international -local web-sites do you visit regularly when in your office -use computers at work (% of private work use of internet, work related, word processing)	

Table 3.2-6: Locally relevant content measurement constructs

Networked Society Locally relevant content	-use your institution's in-house Web-based training application on the Intranet -other local or international Web-based training websites? -any local Web portals (e.g., Newspapers) that you regularly visit -seen your Institution's Web site advertised in other media -local Web sites (.ke or local organizations) do you visit regularly -subscribe to any local mailing lists? -of students visiting 1-2 local websites -of students and faculty looking for academic information from Internet -students looking for news/entertainment -of students and faculty visiting Web portals with Kenyan information -what language(s) are the websites that you visit %type of information do you seek through these local websites -campus Web site content also available in other languages other than English -Staff local web-sites do you visit regularly when in your office -frequently is your most useful local website updated -type of information do you seek through these local websites -web-sites that you visit carry different types of information relevant to different groups within the community % to whom is the web-site information most relevant % regularly is the content of your Institution's Web site updated

Table 3.2-7: ICT human capacity variable constructs

ICT human capacity building	ICT Leadership	-think the IT department is important in your organization -Head of IT department in your institution a senior officer -head of IT department in your institution provide effective leadership of the IT function -ICT professionals in your institution motivated -the head of your institution (e.g., VC or Principal) consider the head of ICT department in your institution important
	Skilled workforce	-Are the ICT professional in your institution qualified and experienced -Are the ICT professional in your institution qualified and in experienced -Are the ICT professional in your institution inexperienced -organization retain experienced and qualified IT professionals - institution have enough IT professionals to support you in your workplace

3.2.2 Data collection and Data analysis (Secondary Data sources)

The primary data collection method was a survey questionnaire, made up of mostly quantitative but also some qualitative questions. The primary original survey was to carry out a diagnostic assessment of the overall e-readiness of 53 E.A universities, which are members of Kenya Education Network.

The research instrument was based on the Kashorda and Waema (2009) adaptation of CID tool for questionnaire. It was slightly modified to make it more focussed on research objectives and includes six categories of indicators. The secondary data sources are collected, organized, cleaned and analysed to satisfy the requirements of the e-readiness evaluation and assessment. The construct validity deals with about the establishment of correct operational measures for the concepts being studied (Yin 1994, Rowley, 2002). The study analyses data from 53 universities in the East African Region to determine their readiness for networked learning.

Data editing and reconciliation is undertaken before any data analysis is done. This is to avoid using incoherent data by which to a large extent can lead to reaching or making wrong conclusions and drawing wrong inferences. Using SPSS analytical tools for data analysis, the data is summarized by use of descriptive statistics. This entails using proportions, frequency distributions, means and standard deviations. Correlation coefficients are also computed to determine relationships among variables and test hypothesis. Simple linear regression, multiple regressions are employed.

The sample sizes for perceptions questionnaires took into account the student population, different categories of students (undergraduates, post-graduates), faculty and staff. In addition, the sample included students, faculty, and staff from eight broad categories. For each institution, the sample size was determined to be statistically significant. For the large universities, sample sizes also took into account different campuses.

Correlation refers to the situation where we have two random variables X and Y, and wish to measure the strength of the linear association between the two: the association is strong if knowing the value of one variable can give us a (reasonably) precise idea of the value of the other variable; the association is weak if we can only get a very rough estimate (Kothari, 2008).

Regression analysis is a statistical tool for the investigation of relationships between variables. To explore such issues, the researcher assembles data on the underlying variables of interest and employs regression to estimate the quantitative effect of the causal variables

upon the variable that they influence. The researcher also typically assesses the "statistical significance" of the estimated relationships, that is, the degree of confidence that the true relationship is close to the estimated relationship (Kothari, 2008).

Starting with a comprehensive model that includes all conceivable, testable influences on the phenomena under investigation and then testing the components of the initial comprehensive model, to identify the less comprehensive sub models that adequately account for the phenomena under investigation. Finally from these candidate sub models, single out the simplest sub model, which by the principle of parsimony we take to be the "best" explanation for the phenomena under investigation (Freedman, 2005).

Sampling and Sampling Size determination

Table 0-1: East African universities Sampled

Institution Name	Frequency	Cumulative Percent		Institution Name	Frequency	Cumulative Percent
University of Nairobi	3644	13		Maseno University	633	29
United States International	466	15		Kenya Methodist University	266	30
Moi University	408	16		Daystar University	353	31
Kenya Polytechnic	749	19		African Nazarene	34	31
Kenyatta University	805	22		Catholic University of East Africa	621	33
Jomo Kenyatta University of Science and Technology	918	25		Hubert Kairuki Memorial University	42	65
Strathmore University	356	26		Masinde Muliro University	534	36
Egerton UNIVERSITY	723	42		Mombasa Polytechnic	773	39
Kabarak University	80	42		Mzumbe University	383	66
Makerere University	3437	54		State University of Zanzibar	122	67
Open University of Tanzania	1233	59		Ardhi University	175	67
University of Dar es Salaam	1733	65		Kigali Health Institute	132	80
Baraton University	278	34		Sokoine University of Agriculture	276	69
Dar es Salaam University College of Education	304	71		National University of Rwanda	517	73
Zanzibar University	176	70		University of Dodoma	43	70
Kigali Independent University/Universite Libre du Kigali	1091	77		Muhimbili University of Health and Applied sciences	203	68
School of Finance and Banking	253	78		Higher Institute of Agriculture and Husbandry (ISAE)	190	81
Kigali Institute of Education	386	79		Kigali Institute of Management	36	81
Kigali Institute of Science and Technology	260	80		Kyambogo University	824	84
Gulu University	407	87		Universite du Lac Tanganyika	50	84
Islamic University in Uganda	482	89		Nkamba university	347	86
Busoga University	214	90		Universite du Burundi	210	93
Uganda Christian University	592	92		Institut National de Sante Publique(INSP)	69	93
Universite Lumiere De Bujumbura	16	92		Mbarara University of Science and Technology	168	94
Universite des Grands Lacs	7	92		Mountains of the Moon University	48	94
Ecole normale Superieure	156	92		Uganda Martyrs University	322	95
Umutara University	45	100		Makerere University Business School	1255	100
Total				27845		

Adopted; Kashorda and Waema 2009.

As discussed in 2.8 section; Model formulation and estimation

Networked Learning (Y) can be expressed as a function of e-readiness indicators (X) in the following equation:

$$Y= \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \beta_4 X_4 + + \beta_4 X_5 + \beta_4 X_6 + \varepsilon_0$$

Where,

Y= Networked Learning

β= Regression coefficient, where β_0 is the intercept

X_1= Network Access

X_2=People and organization online

X_3=Locally Relevant content

X_4=ICT in everyday life

X_5=ICT in the workplace

X_6=ICT human capacity

ε_0= Extraneous variables not estimated by the equation.

A detailed staging framework development guides the entire data analysis process, Importation of data to SPSS for analysis and the assessment based on progressive stages related to each indicator with each variable scored. SPSS superior tools of analysis are used extensively to present the results in tables, charts and analytical diagrams. Ms- excel analysis is also incorporated due to its flexibility and user friendliness to add strength and to give the sought after comprehensive in-depth analysis

CHAPTER FOUR:

DATA ANALYSIS AND INTEPRETATION

4.1 Introduction

This chapter presents the results of the analysis of data collected during the study in four sections that follow this introduction section. Section 4.2 gives the summary of the respondents profile, Section 4.3 and Section 4.4 outlines the descriptive statistics for study variables dependent and independent variables while 4.5 presents regression and correlation testing as per the study objectives.

4.2 General information

The general information considered in this study includes; Respondents characteristics and main source of general information in order of importance. The findings are discussed below. Secondary data was collected from all 53 E.A universities sampled. This high representation did not come as a surprise, since it is possible to achieve 100% representation when dealing with secondary data (Kothari, 2008).

4.2.1 Respondents profiles

In order to generate a profile of respondents who participated in this study, information concerning their gender and occupation was as follows; information concerning their occupation which was aggregated into, Professor/Associate, Senior Lecturer / Lecturer/Assistant Professor, Assistant Lecturer/Tutorial fellow/graduate assistant, Administrative Staff, and Students.

Gender

Table 4.2-1: Gender

		Frequency	Valid Per cent
N	Male	15,292	57
	Female	11,627	43
	Total	26,919	100
None		926	
Total		27,845	

Figure 2: Male and Female

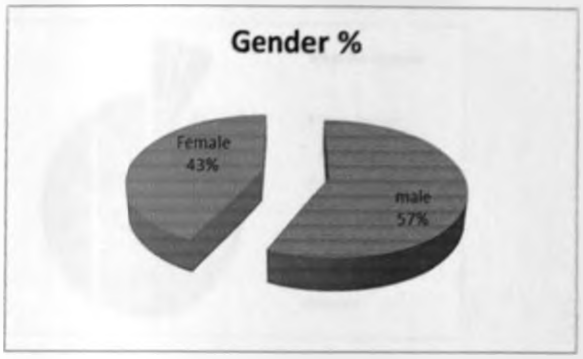


Table 4.2-2: Occupation of the Respondents

	Frequency	Per cent	Cumulative Per cent
Professor/Associate	138	.5	.5
Senior Lecturer / Lecturer/Assistant Professor	585	2.1	2.7
Assistant Lecturer/Tutorial fellow/graduate assistant	530	1.9	4.6
Administrative Staff	1092	3.9	8.6
Student	24, 889	89.4	99.9
Other	36	.1	100.0
Total	27, 270	97.9	
None	575	2.1	
Total	27,845	100.0	

Descriptive results in table 4.2-1 indicate that 24,889 respondents (90%) students while Administrative Staff 1,092 (4%) and 530 (2%) were Assistant Lecturer/Tutorial fellow/graduate assistant also Senior Lecturer / Lecturer/Assistant Professor 585 at (2%) and 138 respondents at (0.5%) were Professor/ Associate.

Figure 3: Occupation of respondents

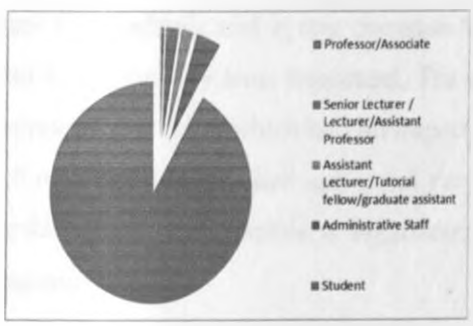
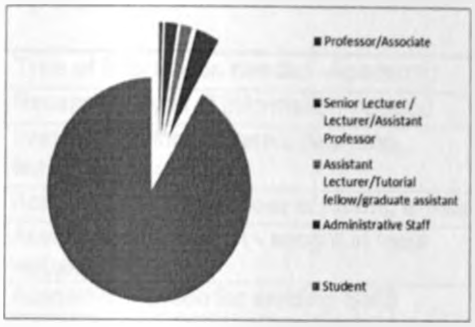


Figure 3: Occupation of respondents



4.3 DESCRIPTIVE RESULTS

This section presents descriptive statistics on study variables. Mean being the most robust statistic for interval and ratio data, was employed to measure central tendency. Range was used to show the spread between the minimum score and the maximum score while standard deviation was employed as the measure of dispersion. Standard deviation was chosen because of its stability (Gall & Walter, 2005).

The analysis began by examining the characteristics of networked learning, individually examining the characteristics of networked learning as per the perception questionnaire. Next, the determinants of networked learning namely; Network access, Networked society (ICT in everyday life, People and organization online, ICT workforce, locally relevant content) and ICT human capacity as one of the indicators of ICT policy and strategy are examined.

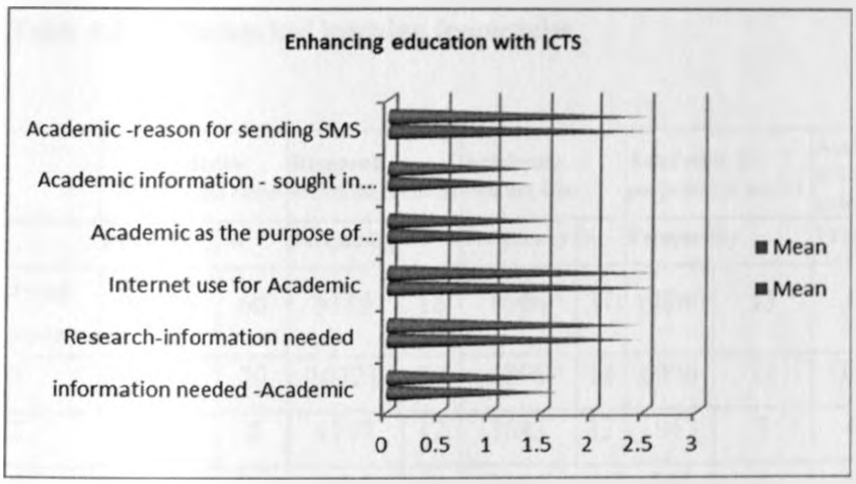
4.3.1 Networked learning measures

The respondents were asked to rate in order of importance the extent to which the ICTs are used for academic and in one occasion for research in a 6 point scale 1 being most important and 5 or 6 the very least important. The scores of most important and important were taken to represent a variable which had an impact to a large extent equivalent to a mean score of 1.0 to 2.0 on a continuous likert scale and very least important a mean score of 5 to 6. A standard deviation of >1.5 implies a significant difference on the impact of the variable among respondents.

Table 4.3-1: Means and SD for networked learning

	Range	Min	Max	Mean	Std. Deviation
Type of information needed -Academic	5	1	6	1.64	1.102
Research- Type of information needed	5	1	6	2.46	1.248
Internet use for Academic (learning, teaching, research)	5	1	6	2.60	1.539
Academic as the purpose of having e-mail	4	1	5	1.60	.939
Academic information - sought in local websites	5	0	5	1.39	1.113
Academic -reason for sending SMS	5	1	6	2.56	1.432

Figure 4: Means for networked learning



As shown on table 4.3-1, Universities in East Africa on average consider academic information as Important a mean of 1.64 indicated by a dispersion of SD 1.102. On average the universities consideration of 2.60 as Internet rarely used for academia-with an SD of 1.5 a score of partly important signifying a relative variation on the use of the internet for academic purposes. Use of e-mail for academia ranged at a mean of 1.60 and SD of 0.9 this being an indication that E-mail is considered important and is used in academia the low SD implies a low variation in responses. Local websites sought for academia mean at 1.4 and with a standard deviation of 1.1. In terms of academic reason for sending SMS, the East African universities registered a mean of 2.56, with a SD of 1.43.

The result shows that on average respondents generally use the ICT facilities at their disposal for academic and/or research purposes, The scores were closely distributed with SD<1.6.

As shown in table 4.3-2, regarding importance of Information needed- Academic information (60%) as Most important, 20% as Important and 2% as Least important. Regarding importance of Information needed- respondents showed research information 18% as Most important, 39% research as Important and 2% research is Least important. With internet use for academia as most important only 31%, with 13% responding that use of internet for academia is rarely important.

Table 4.3-2 : Networked learning frequencies

	Academic information need		**Research** information need		**Academic** Internet Use		**Academic** the purpose for e-mail		**Academic** information sought in local websites		Sms use for **Academic**	
	Frequency	**%**	**Frequency**	**%**	**Frequency**	**%**	**Frequency**		**Frequency**	**%**	**Frequency**	**%**
1-most Important	16586	60	5119	18	8506	31	14860	53	4125	15	6975	25
2	5659	20	10721	39	4896	18	6076	22	14508	52	6002	22
3	1885	7	4757	17	3683	13	1913	7	4915	18	5247	19
4	937	3	2423	9	3154	11	845	3	1862	7	2923	10
5	502	2	1163	4	3551	13	559	2	1065	4	1601	6
6-Least Important	513	2	896	3	611	2	-	-	739	3	1142	4
N	26082	94	25079	90	24401	88	24253	87	27214	98	23890	86
None	1763	6	2766	10	3444	12	3592	13	631	2	3955	14
Total	27845	100	27845	100	27845	100	27845	100	27845	100	27845	100

As it regards to use of e-mail for academic purposes, 53% regarded it as most important with 22% regarding e-mail as important for academia. Searching information from Local websites for academia only 15% of EA universities respondents regarded it as most important with 52% as only important. With use of SMSs the level of importance as it regards to academia was varied with 25% and 22% regarding it as most important and important respectively with the rest of 39% regarding it from rarely important to very least important.

4.3.2 Network access

Network access indicators were analysed in terms of Network availability and Network speed and quality which includes technical support with one of the specific objective of the study being to find out the effect of Network access on Networked Learning.

The respondents were asked to rate network access variable; the summary of findings are as shown in table; 4.3-3: On the network availability indicators the respondents were asked on their perception as it regards; having off-campus access to institutional email (M=1.46, SD=0.499), many responded on the presence of access to institutional e-mails off-campus, and felt that there is no success on first attempts to access institutional e-mails (M=1.52, SD=0.5) aspects of network quality. Network quality issues where asked as it regards to classification of failures (M=1.94, SD=0.638).

When asked about Internet speeds frustrating and slowing down work aspects of network speed the respondents (M=1.29, SD=0.454) and as it regards to how long it take to restore a campus network failure (M=2.90, SD=1.399) the results reveal that the frequency of failure of the computer respondents use in the lab or offices (M=2.90, SD=1.359). However, respondent's opinions were as follows when asked about most common type of computer failure (M=2.11, SD=0.858). Respondents view on campus computer network stability (M=1.54, SD=0.498).

Network access perception on how often respondents experience power failure and are unable to use the computers (M=2.56, SD=1.025). As it regards network support indicators questions on whether they e-mail the help desk in your institution when they encounter problems (M=1.48, SD=0.500) and on whether Internet speeds are better than cyber (M=1.55, SD=0.498) and finally, when respondents were asked the extent to which when there is a failure, how long does it take to fix the fault (M=2.59, SD=1.083).

Table 4.3-3: Means and Standard Deviations for Measures of Network access

	Off-campus access to institutional email	always successful on first attempt	classify failures	internet speeds frustrate work	the long it take to restore a network failure	Frequency of failure of	common type of computer failure	campus computer network stability	Power failure	e-mail the help desk?	Internet speeds better than cyber's	how long it take to fix the fault
N	26,328	21,393	24,463	26,196	25,996	26,229	26,318	26,206	25,677	26,131	26,196	25,854
None	1517	6452	3382	1649	1849	1616	1527	1639	2168	1714	1649	1991
Mean	**1.46**	**1.52**	**1.94**	**1.29**	**2.90**	**2.90**	**2.11**	**1.54**	**2.56**	**1.48**	**1.55**	**2.59**
Median	1.00	2.00	2.00	1.00	3.00	3.00	2.00	2.00	2.00	1.00	2.00	3.00
Std. Deviation	**0.499**	**0.500**	**0.638**	**0.454**	**1.399**	**1.359**	**0.858**	**0.498**	**1.025**	**0.500**	**0.498**	**1.083**

4.3.3 Locally Relevant content

The respondents were asked to rate locally relevant content; the summaries of findings were as shown in table 4.3-4: As it regards to local websites the respondent's visit that contains local topics/information (M=2.17, SD=0.834), How frequently is the universities most useful local website updated (M=1.68, SD=0.738).

In what language(s) are the local websites staff, faculty and students visited (M=1.41, SD=0.824) as well is how dissimilar the web-sites are as it regards to type of information (M=1.98, SD=0.650) with also whether the web-sites often visited carry different types of information relevant to different groups within the community (M=1.23, SD=0.422). However, respondent's opinions on user discussion groups which is key for creating learning networks (M=1.69, SD=0.760).

With receiving or sending e-mail newsletters (M=1.55, SD=0.672) and how often the respondent's experienced List-serves? (M=2.51, SD=0.721) or the availability of opportunities for web-related training (M=1.56, SD=0.497).

Web content, media and language of communication is key for greater collaboration; questions about web-related skills for manipulating and easily using the web that the respondents felt they require but are not available locally (M=1.35, SD=0.476). University web site content availability in other languages other than English (M=1.64, SD=0.480).

Table 4.3-4: means and SD; locally relevant content

	al sites visited	frequency local site update	language(s)	How dissimilar	Content relevance	User Discussion Groups	E-mail Newsletters	List-serves	opportunities -web-related training	skills require - not available	campus site content in other languages	Web site update regular	media used to promote site
N	25817	22034	23838	24354	24528	20030	20862	17360	25552	24452	24438	25527	24857
Mean	**2.17**	**1.68**	**1.41**	**1.98**	**1.23**	**1.69**	**1.55**	**2.51**	**1.56**	**1.35**	**1.64**	**3.38**	**2.75**
Mode	2	1	1	2	1	1	1	3	2	1	2	5	2
Std. Deviation	**.834**	**.738**	**.824**	**.650**	**.422**	**.760**	**.672**	**.721**	**.497**	**.476**	**.480**	**1.544**	**1.411**

On the quality of information; questions were asked on how regularly is the content of the Institution's Web site updated (M=3.38, SD=1.544). Asked about media; an aspect of how information about the institutions in East Africa is marketed and advertised for awareness a creation and expanding student base as well as image, media used to promote your Institution's Web site (M=2.75, SD=1.411).

4.3.4 ICT in everyday life

Table 4.3-5 summarises the descriptive results on ICT in everyday life as follows;

The results reveal that respondents; having a mobile phone (M=0.193 SD=1.04), using the mobile phone for Internet access (M=1.51, SD=0.501), where mainly access to a computer is obtained (M=2.92, SD=1.267) in everyday life. On every days use of computers respondents reveal that email/internet (M=1.05, SD=0.222) mainly followed entertainment (M=1.12, SD=0.328) then by word Processing (M=1.15 SD=0.356) and finally data analysis (M=1.18 SD=0.388) generally respondents felt that.

Table 4.3-5: ICT in everyday Life

	have a mobile	send SMS	use the mobile Internet access	have a computer	Use computer	Word Processing	Data Analysis	Email/Internet	Entertainment
N	26857	26660	26482	26526	26548	14668	12043	18713	14250
None	988	1185	1363	1319	1297	13177	15802	9132	13595
Mean	1.04	1.05	1.51	1.50	1.04	1.15	1.18	1.05	1.12
Std. Deviation	.193	.216	.501	.500	.197	.356	.388	.222	.328

4.3.5 ICTs in the workplace

Use of ICTs in the workplace demonstrates a starting point and readiness for creation of networked communities where everyone participates. ICTs widely used in the workplace demonstrates the potential for efficiency and effectiveness in the delivery of institutional mandate which is in support of institutions vision and mission which mainly borders on academic excellence.

The results reveal that; Respondents with unlimited access to telephone services (M=1.44 SD=0.496), respondents with access to a personal computer in the office (M=1.22, SD=0.414) and the respondents who have internet access from their office computer (M=1.23, SD=0.424).

Noting the 21st century pervasive use of mobile phones; the staff and faculty using a mobile for their work (M=1.23, SD=0.419). Numerous researcher work in East Africa have provided empirical evidence that internet availability and affordability is on the increase; with that in mind respondents who still use dial-up mobile-based internet services (M=1.617, SD=0.487) a great number still lagging behind on this critical necessity for networked learning and clearly this is demonstrated by the lesser number of respondents who use the internet for academic work (M=1.24, SD=0.429).

Table 4.3-6: ICTs in the WorkPlace-Means and std deviation

	Person -person	Fixed tel	SMS	Fax	Email	Memos/ Letters	Web	access - PC office	internet access - office	use a mobile - work	dial-up mobile-internet	official B card with email &web site	subscr ibe - mailin g list	email for internal communic ation	Often access internet - office	Often Access - applicati on	Do not use
N	1372	880	1077	727	823	795	574	2272	2230	2253	2214	2208	2166	2189	2078	1027	264
Mean	1.23	1.55	1.48	1.78	1.51	1.60	1.76	1.22	1.23	1.22	1.61	1.52	1.38	2.03	2.77	1.08	1.51
Mode	1.00	2.00	1.00	2.00	2.00	2.00	2.00	1.00	1.00	1.00	2.00	2.00	1.00	1.00	2.00	1.00	2.00
Std. Deviation	.421	.50	.500	.41	.50	.49	.42	.41	.42	.41	.48	.49	.48	1.00	1.45	.27	.50

When it comes to respondents having a business card complete with an email and web-site addresses (M=1.529, SD=0.499), whereas those who subscribe to any mailing list (M=1.380, SD=0.486), when asked how often they use email for internal communication (M=2.03, SD=1.0), Private access to Internet (M=1.08, SD=0.276), Work-related Internet access (M=1.055, SD=0.229),generally respondents felt that Access to organizational applications and use of Microsoft applications at(M=1.08, SD=0.272), (M=1.07, SD=0.256), respectively. Finally for the ones who do not use ICTs were at (M=1.511, SD=0.5).

4.3.6 ICT employment opportunities

This table summarises the descriptive results on ICT human capacity in HEI in East Africa. ICT leadership; the results reveal that; On respondents who think the IT department is important in their university (M=1.03, SD=0.174), when asked whether head of IT department in the university is a senior officer (M=1.2, SD=0.4), whereas perceptions on whether IT department in the institution provide effective leadership of the IT function (M=1.22, SD=0.41) and views whether the ICT professionals in the university are motivated (M=2.056, SD=0.632),

Table 4.3-7: ICT human capacity

	IT dept is important	Head of IT a senior officer?	IT dept provide effective leadership of the IT	ICT professionals motivated	ICT Prof qualified & experienced	retain experienced & qualified IT professionals	enough IT professionals	Head of institution consider the head of ICT important
N	33	2123	2113	2058	2051	2111	2135	2108
Mean	1.03	1.19	1.21	2.05	2.11	1.24	1.44	1.17
Mode	1.00	1.00	1.00	2.00	2.00	1.00	1.00	1.00
Std. Deviation	.17	.39	.41	.63	.51	.43	.49	.37

ICT skilled workforce; When respondents were asked about whether the ICT professional in the HE institution are qualified and experienced (M=2.11, SD=0.514) whereas the university retaining experienced and qualified IT professionals (M=1.246, SD=0.431). Quality of support and availability of enough IT professionals for support in the workplace (M=1.446,

SD=0.497) and generally respondents felt that head of their institution relatively considers the head of ICT department in the university as important (M=1.175, SD=0.380).

4.4 Estimation of results -Reliability test, Regression and correlation analysis

This section presents relationship results as per the study objectives. As a prelude to results presentation on each study objective, the criterion variable Networked learning was first analyzed and its constituent measures tested for reliability. This was followed by results on each of the five objectives. Analysis of the objectives began by first assessing the reliability of the constructs that builds up to index construction. These indices are correlated to establish underlying relationships after which hypothesis are tested where applicable. This was followed by model estimation and finally interpretation and discussions.

The correlation analysis was used to establish the relationships between variables and multiple regression analysis used to estimate the predictive effects of Network Access, Network Society indicators (ICT in everyday life, ICT in the workplace, People organization online, locally relevant content) and ICT human resources on Networked Learning

Inferential statistics namely Pearson's product moment correlation employed to determine whether there is a relationship between the study variables. Tests of hypothesis 1 to 6 were presented and key findings related to the study objectives discussed below.

P-value was used to analyse the statistical significance of the coefficients of the independent variables-This is the probability of getting a value of the test statistic as extreme as or more extreme than that observed by chance alone. If the null hypothesis is true, the p-value is compared with the actual significance level of the test in this case 0.05 and if it is smaller that is less than 0.05, the result is significant.

4.4.1 Tests and analysis of networked learning Measures

(a) Reliability Tests

Seven items were used to test the students, faculty and staff perspective of networked learning. Composite reliability analysis on the items showed internal consistency result of cronbach $\alpha = 0.717$ on the threshold of $\alpha = 0.70$.

Reliability Statistics

Table 4.4-1 reliability test for Networked learning constructs

Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	N of Items
.712	.717	7

(b) Correlation analysis

Correlation analysis was used to establish relationships between networked learning constructs.

Table 4.4-2: Enhancing education with ICTs

		Academic type of information needed	Research type of information needed	Use of internet for Academic	Academic-purpose for e-mail address	Academic info sought from Local websites	Academic nature of SMSs	use the internet for academic work
Academic type of info	Pearson Correlation	1	.053(**)	.219(**)	.353(**)	.235(**)	.193(**)	.181(**)
	Sig. (2-tailed)		.000	.000	.000	.000	.000	.000
Research	Pearson Correlation	.053(**)	1	.090(**)	.167(**)	.120(**)	.097(**)	.176(**)
	Sig. (2-tailed)	.000		.000	.000	.000	.000	.000
Academic use of interne	Pearson Correlation	.219(**)	.090(**)	1	.205(**)	.135(**)	.040(**)	.152(**)
	Sig. (2-tailed)	.000	.000		.000	.000	.000	.000
Academic-Email	Pearson Correlation	.353(**)	.167(**)	.205(**)	1	.336(**)	.310(**)	.142(**)
	Sig. (2-tailed)	.000	.000	.000		.000	.000	.000
Academic-local	Pearson Correlation	.235(**)	.120(**)	.135(**)	.336(**)	1	.242(**)	.007
	Sig. (2-tailed)	.000	.000	.000	.000		.000	.762
Academic	Pearson Correlation	.193(**)	.097(**)	.040(**)	.310(**)	.242(**)	1	.156(**)
	Sig. (2-tailed)	.000	.000	.000	.000	.000		.000
use the internet for academic work	Pearson Correlation	.181(**)	.176(**)	.152(**)	.142(**)	.007	.156(**)	1
	Sig. (2-tailed)	.000	.000	.000	.000	.762	.000	

** Correlation is significant at the 0.01 level (2-tailed).

The correlation analysis table 4.4-2 shows that almost all the constructs are positively correlated very significant in fact mostly having (P=0.00) and the association is significant at p<0.01. The association between use of the internet for academic work and use of sending SMSs for academic work (r=0.07, p=0.762) is positive but not significant.

4.4.2 Network access and Networked Learning

The first specific objective of this study sought to establish the link between Network access and networked learning. In order to address this objective hypotheses were formulated. As shown in Table 4.4-4 Independent variables had the following P-values, measure of Networked learning.

The network access variable constructs are positively and significantly correlated except for most type of computer failures and whether internet speeds are better than those of cyber café (R=-0.02, P=0.795).

As shown in table 4.4-3; Network access is positively correlated with the measure of Networked learning (r=-0.042, p=0.000) and the association is significant at P<0.05. Since P is less than P<0.05, we reject the null hypothesis and accept the alternative; hence (Ho_1) there is a significant relationship between Network access and Networked Learning.

Table 4.4-3: Correlations; network access and networked learning

		Network Access	Academic (Networked Learning)
Network access	Pearson Correlation	1	-.042(**)
	Sig. (2-tailed)		.000
Networked learning	Pearson Correlation	-.042(**)	1
	Sig. (2-tailed)	.000	

** Correlation is significant at the 0.01 level (2-tailed).

Table 4.4-4: Network access constructs correlations

	row1	Row 2	Row 3	Row 4	Row 5	Row 6	Row 7	Row 8	Row 9	Row 10	Row 11	NL
Off-campus access to email; Pearson C.	1	.118(**)	.120(**)	.010	.157(**)	.014(*)	.149(**)	.058(**)	.089(**)	.113(**)	.016(*)	.056(**)
Sig.		.000	.000	.102	.000	.028	.000	.000	.000	.000	.013	.000
How classify failures Pearson Correlation	.118(**)	1	.255(**)	-.205(**)	.370(**)	-.076(**)	.320(**)	.043(**)	.097(**)	.248(**)	-.038(**)	-.006
Sig.	.000		.000	.000	.000	.000	.000	.000	.000	.000	.000	.440
Internet speeds better than cybers Pearson Correlation	.120(**)	.255(**)	1	-.331(**)	.280(**)	-.075(**)	.231(**)	.002	.237(**)	.372(**)	-.007	-.002
Sig.	.000	.000		.000	.000	.000	.000	.795	.000	.000	.237	.803
Internet speeds slow down work	.010	-.205(**)	-.331(**)	1	-.176(**)	.170(**)	-.148(**)	.015(*)	-.014(*)	-.184(**)	.099(**)	.014(*)
Sig.	.102	.000	.000		.000	.000	.000	.014	.026	.000	.000	.044
How long does it take to restore a network failure	.157(**)	.370(**)	.280(**)	-.176(**)	1	.013(*)	.660(**)	.060(**)	.143(**)	.279(**)	.013(*)	-.046(**)
Sig.	.000	.000	.000	.000		.043	.000	.000	.000	.000	.039	.000
Frequency of failure in the lab or offices	.014(*)	-.076(**)	-.075(**)	.170(**)	.013(*)	1	.016(*)	.004	.017(**)	-.174(**)	.336(**)	-.044(**)
Sig.	.028	.000	.000	.000	.043		.010	.500	.005	.000	.000	.000
does it take to fix the fault	.149(**)	.320(**)	.231(**)	-.148(**)	.660(**)	.016(*)	1	.079(**)	.123(**)	.247(**)	.004	-.039(**)
Sig.	.000	.000	.000	.000	.000	.010		.000	.000	.000	.488	.000
most common type of computer failure	.058(**)	.043(**)	.002	.015(*)	.060(**)	.004	.079(**)	1	.012	.038(**)	.031(**)	.043(**)
Sig.	.000	.000	.795	.014	.000	.500	.000		.051	.000	.000	.000
or e-mail the help desk	.089(**)	.097(**)	.237(**)	-.014(*)	.143(**)	.017(**)	.123(**)	.012	1	.236(**)	.035(**)	.046(**)
Sig.	.000	.000	.000	.026	.000	.005	.000	.051		.000	.000	.000
campus computer network stable	.113(**)	.248(**)	.372(**)	-.184(**)	.279(**)	-.174(**)	.247(**)	.038(**)	.236(**)	1	-.125(**)	-.024(**)
Sig.	.000	.000	.000	.000	.000	.000	.000	.000	.000		.000	.001
experience power failure –pearson corr	.016(*)	-.038(**)	-.007	.099(**)	.013(*)	.336(**)	.004	.031(**)	.035(**)	-.125(**)	1	.027(**)
Sig.	.013	.000	.237	.000	.039	.000	.488	.000	.000	.000		.000
Networked Learning Pearson Correlation	.056(**)	-.006	-.002	.014(*)	-.046(**)	-.044(**)	-.039(**)	.043(**)	.046(**)	-.024(**)	.027(**)	1
Sig.	.000	.440	.803	.044	.000	.000	.000	.000	.000	.001	.000	

** Correlation is significant at the 0.01 level (2-tailed).
* Correlation is significant at the 0.05 level (2-tailed).

Many of the individual constructs had significant relationships amongst themselves except for a few surprises which are discussed further in the next sections.

Network access construct summary table

Table 4.4-5: Networked access constructs-summary

Question/ Construct	Pearson correlation R	Significance(2-tailed) P	Answer correlation to networked learning
Off-campus access to email;	056(**)	.000	Correlated
How classify failures	-.006	.440	Not
Internet speeds better than cybers	-.002	.803	Not
internet speeds slow down work	.014(*)	.044	Present but very weak
How long does it take to restore a network failure	-.046(**)	.000	Correlated
Frequency of failure in the lab or offices	-.044(**)	.000	Correlated
Does it take to fix the fault	-.039(**)	.000	Correlated
most common type of computer failure	.043(**)	.000	Correlated
e-mail the help desk	.046(**)	.000	Correlated
campus computer network stable	-.024(**)	.001	Correlated
experience power failure –	.027(**)	.000	Correlated

** Correlation is significant at the 0.01 level (2-tailed).
* Correlation is significant at the 0.05 level (2-tailed).

Summary of network access indicators and their relationships with networked learning; The table below 4.4-5 illustrates a summary of all network access indicators grouped in to sub indicators of network availability and network speed and quality that includes technical support as per the framework;

4.4.3 Networked Society and Networked Learning

The second objective was having the four variables of ICTs in everyday life, people and organization online, locally relevant content, ICT in the workplace; like in most of the adapted frameworks for e-readiness; all are categorised as sub indicators of networked society though in this research they are hypothesised independently.

4.4.3.1 ICT in everyday life and networked learning

This specific objective was to measure the effect of ICT in everyday life and networked learning; The ICT in everyday life constructs are positively and significantly correlated

except when it comes to having a computer which is not correlated to using it for academic purposeful learning thereby not harnessing the power of using a computer as it applies to this study as shown in table 4.4-5.

Table 4.4-6: Correlations among ICT in everyday life constructs and with networked learning

		Networked Learning (academic composite)	have a mobile phone	send SMS messages	SMS send or receive per day	use the mobile Internet access	have a computer	ever used a computer
Networked Learning	Pearson Correlation	1	.035(**)	.064(**)	.023(**)	-.015(*)	.004	.041(**)
	Sig.		.000	.000	.002	.039	.538	.000
have a mobile phone	Pearson Correlation	.035(**)	1	.563(**)	-.227(**)	.121(**)	.076(**)	.149(**)
		.000		.000	.000	.000	.000	.000
send SMS messages	Pearson Correlation	.064(**)	.563(**)	1	-.301(**)	.116(**)	.076(**)	.135(**)
		.000	.000		.000	.000	.000	.000
SMS messages do send or receive per day	Pearson Correlation	.023(**)	-.227(**)	-.301(**)	1	-.178(**)	-.142(**)	-.047(**)
		.002	.000	.000		.000	.000	.000
use the mobile phone for Internet access	Pearson Correlation	-.015(*)	.121(**)	.116(**)	-.178(**)	1	.251(**)	.075(**)
		.039	.000	.000	.000		.000	.000
have a computer	Pearson Correlation	.004	.076(**)	.076(**)	-.142(**)	.251(**)	1	.078(**)
		.538	.000	.000	.000	.000		.000
ever used a computer	Pearson Correlation	.041(**)	.149(**)	.135(**)	-.047(**)	.075(**)	.078(**)	1
		.000	.000	.000	.000	.000	.000	

** Correlation is significant at the 0.01 level (2-tailed).
* Correlation is significant at the 0.05 level (2-tailed).

With ICTs in everyday life and its relationship with Networked learning ($r=0.015$, $p=0.03$), having $p<0.05$; we therefore reject the null hypothesis and accept the alternative hypothesis and hence (Ho_3) there is a strong relationship between ICTs in everyday life and Networked learning.

Table 4.4-7: ICT in everyday life Correlations with Networked learning

		ICT in everyday life	Networked Learning
ICTs in everyday life	Pearson Correlation	1	.015(*)
	Sig. (2-tailed)		.032
Networked Learning	Pearson Correlation	.015(*)	1
	Sig. (2-tailed)	.032	

* Correlation is significant at the 0.05 level (2-tailed).

4.4.3.2 ICTs in everyday life construct summary table

Table 4.4-8: ICTs in everyday life construct summary

Construct	R	P	Answer
have a mobile phone	.035(**)	.000	Correlated
send SMS messages	.064(**)	.000	Correlated
SMS send or receive per day	.023(**)	.002	Correlated
use the mobile Internet access	-.015(*)	.039	Very Weak correlation
have a computer	.004	.538	No correlation
ever used a computer	.041(**)	.000	Correlated

** Correlation is significant at the 0.01 level (2-tailed).
* Correlation is significant at the 0.05 level (2-tailed).

4.4.3.3 Locally relevant Content and networked learning

In order to establish the strength and significance of the relationship between Locally relevant content and networked learning in East African universities, the results find that locally relevant content ($r=0.028^{**}$, $p=0.007$) the two relationships are significant at $P<0.01$. We therefore reject the null hypothesis and accept the alternative (Ho_4): there is a strong relationship between the locally relevant content and networked learning in E.A universities.

Table 4.4-9: Correlations among the constructs for locally relevant content

	NL R1	R2	R3	R4	R5	R6	R7	R8	R9
Networked Learning	1	.031(**)	-.016(*)	.058(**)	.029(**)	-.013	.036(**)	.049(**)	.003
Sig. (2-tailed)		.000	.039	.000	.000	.081	.000	.000	.727
local websites that contain local topics/information	.031(**)	1	-.022(**)	.058(**)	.038(**)	-.051(**)	-.125(**)	-.038(**)	-.092(**)
	.000		.001	.000	.000	.000	.000	.000	.000
most useful local website updated	-.016(*)	-.022(**)	1	.061(**)	.052(**)	.051(**)	.068(**)	.039(**)	.132(**)
	.039	.001		.000	.000	.000	.000	.000	.000
language(s) are the websites that visit	.058(**)	.058(**)	.061(**)	1	-.004	-.019(**)	-.044(**)	.018(**)	-.019(**)
	.000	.000	.000		.511	.005	.000	.008	.004
How dissimilar are the web-sites	.029(**)	.038(**)	.052(**)	-.004	1	-.049(**)	.066(**)	-.004	.146(**)
	.000	.000	.000	.511		.000	.000	.516	.000
web-sites carry different types of information	-.013	-.051(**)	.051(**)	-.019(**)	-.049(**)	1	.098(**)	.070(**)	.038(**)
	.081	.000	.000	.005	.000		.000	.000	.000
have opportunities for web-related training	.036(**)	-.125(**)	.068(**)	-.044(**)	.066(**)	.098(**)	1	.075(**)	.202(**)
	.000	.000	.000	.000	.000	.000		.000	.000
web-related skills require but not available locally	.049(**)	-.038(**)	.039(**)	.018(**)	-.004	.070(**)	.075(**)	1	.028(**)
	.000	.000	.000	.008	.516	.000	.000		.000
the content of the Web site updated	.003	-.092(**)	.132(**)	-.019(**)	.146(**)	.038(**)	.202(**)	.028(**)	1
	.727	.000	.000	.004	.000	.000	.000	.000	

** Correlation is significant at the 0.01 level (2-tailed).
* Correlation is significant at the 0.05 level (2-tailed).

Summary Table for Locally relevant content constructs

The correlation relationship between individual constructs and networked learning

Table 4.4-10: summary for locally relevant content constructs

CONSTRUCT	R	P	Answer
local websites that contain local topics/information	.031(**)	.000	Correlated
most useful local website updated	-.016(*)	.039	Weak correlation
language(s) are the websites that visit	.058(**)	.000	Correlated
How dissimilar are the web-sites	.029(**)	.000	Correlated
web-sites carry different types of information	-.013	.081	Not correlated
have opportunities for web-related training	.036(**)	.000	Correlated
web-related skills require but not available locally	.049(**)	.000	Correlated
the content of the Web site updated	.003	.727	Not Correlated

** Correlation is significant at the 0.01 level (2-tailed).
* Correlation is significant at the 0.05 level (2-tailed).

4.4.3.4 People and organization online and networked learning

The Measure of people and organization online as an indicator of networked society -It is also significantly correlated with Networked learning thus the measure of people and organization online (r=--0.340, p=0.000) with the association being significant at P<0.01. Thus we reject the null hypothesis and accept the alternative. Thus (Ho_2) there is a significant and strong relationship between people and organization online and Networked Learning.

Table 4.4-11: People and organization online

	Ever used internet services	E-Mail	News /Entertainment	Business Transactions/ Banking	General Search for information	regular use the internet	local Web portals	Campus web site advertised in other media	subscribe to local mailing lists	NL
Ever used internet services	1	.016(*)	-.009	-.037(**)	.018(**)	.061(**)	.174(**)	.071(**)	.120(**)	.020(**)
Sig.		.013	.156	.000	.005	.000	.000	.000	.000	.005
E-Mail	.016(*)	1	.064(**)	-.157(**)	-.341(**)	-.023(**)	-.021(**)	.008	.009	-.142(**)
	.013		.000	.000	.000	.000	.001	.213	.162	.000
News /Entertainment	-.009	.064(**)	1	-.075(**)	-.297(**)	-.038(**)	-.005	-.009	-.020(**)	-.213(**)
	.156	.000		.000	.000	.000	.445	.193	.002	.000
Business Transactions	-.037(**)	-.157(**)	-.075(**)	1	-.181(**)	.026(**)	.015(*)	.057(**)	.091(**)	-.180(**)
Sig.	.000	.000	.000		.000	.000	.031	.000	.000	.000
General Search for information	.018(**)	-.341(**)	-.297(**)	-.181(**)	1	.021(**)	.005	-.008	-.054(**)	.015(*)
Sig.	.005	.000	.000	.000		.001	.456	.224	.000	.038
How regularly use the internet	.061(**)	-.023(**)	-.038(**)	.026(**)	.021(**)	1	.171(**)	.078(**)	.162(**)	-.003
Sig.	.000	.000	.000	.000	.001		.000	.000	.000	.656
local Web portals visit	.174(**)	-.021(**)	-.005	.015(*)	.005	.171(**)	1	.230(**)	.307(**)	-.019(**)
Sig.	.000	.001	.445	.031	.456	.000		.000	.000	.008
Web site advertised in media	.071(**)	.008	-.009	.057(**)	-.008	.078(**)	.230(**)	1	.245(**)	.035(**)
Sig.	.000	.213	.193	.000	.224	.000	.000		.000	.000
subscribe local mailing lists	.120(**)	.009	-.020(**)	.091(**)	-.054(**)	.162(**)	.307(**)	.245(**)	1	-.018(*)
Sig.	.000	.162	.002	.000	.000	.000	.000	.000		.011
NL	.020(**)	-.142(**)	-.213(**)	-.180(**)	.015(*)	-.003	-.019(**)	.035(**)	-.018(*)	1
Sig. (2-tailed)	.005	.000	.000	.000	.038	.656	.008	.000	.011	

* Correlation is significant at the 0.05 level (2-tailed).

** Correlation is significant at the 0.01 level (2-tailed).

Table 4.4-12: People & Organization online

		Networked learning	People and org
Networked Learning	Pearson Correlation	1	-.340(**)
	Sig. (2-tailed)		.000
People organization Online	Pearson Correlation	-.340(**)	1
	Sig. (2-tailed)	.000	

** Correlation is significant at the 0.01 level (2-tailed).

Summary table for people and organization online constructs

This was to establish the significance of relationship of each individual constructs and networked learning from a two tailed tests.

Table 4.4-13 : Summary of People & organization online correlation constructs

Variable Construct	R	P Sig.	Answer
Ever used internet services	.020(**)	.005	Correlated
E-Mail	-.142(**)	.000	Correlated
News /Entertainment	-.213(**)	.000	Correlated
Business Transactions	-.180(**)	.000	Correlated
General Search for information	.015(*)	.038	Weak correlation
How regularly use the internet	-.003	.656	Not correlated
local Web portals visit	-.019(**)	.008	Correlated
Web site advertised in media	.035(**)	.000	Correlated
subscribe local mailing lists	-.018(*)	.011	Correlated

* Correlation is significant at the 0.05 level (2-tailed).
** Correlation is significant at the 0.01 level (2-tailed).

4.4.3.5 ICT in the workplace and networked learning

Table 4.4-14: **Correlations for ICT in the workplace constructs**

	Networked learning	use the internet	unlimited tel services	access PC in your office	often use email - internal comm	internet access-office	use a mobile-work	use dial-up mobile-internet	official card with an email web-site	Do you subscribe to any mailing list	Length of stay on-line on office	access internet in office
Networked Learning	1	.219(**)	-.025	.135(**)	.016	.084(**)	.006	.095(**)	.136(**)	.051	-.031	-.054
		.000	.345	.000	.555	.002	.829	.000	.000	.058	.267	.053
Internet for academic work	.219(**)	1	.143(**)	.374(**)	.335(**)	.339(**)	.159(**)	.208(**)	.229(**)	.309(**)	-.326(**)	.017
	.000		.000	.000	.000	.000	.000	.000	.000	.000	.000	.443
Unlimited access to telephone	-.025	.143(**)	1	.175(**)	.108(**)	.194(**)	.152(**)	.163(**)	.192(**)	.210(**)	-.116(**)	-.014
	.345	.000		.000	.000	.000	.000	.000	.000	.000	.000	.537
Access PC in your office	.135(**)	.374(**)	.175(**)	1	.296(**)	.486(**)	.168(**)	.204(**)	.293(**)	.253(**)	-.276(**)	-.087(**)
	.000	.000	.000		.000	.000	.000	.000	.000	.000	.000	.000
Often use email for internal	.016	.335(**)	.108(**)	.296(**)	1	.322(**)	.132(**)	.054(*)	.107(**)	.245(**)	-.357(**)	.077(**)
	.555	.000	.000	.000		.000	.000	.013	.000	.000	.000	.001
Have internet access office	.084(**)	.339(**)	.194(**)	.486(**)	.322(**)	1	.098(**)	.229(**)	.273(**)	.244(**)	-.350(**)	-.056(*)
	.002	.000	.000	.000	.000		.000	.000	.000	.000	.000	.011
Use a mobile for your work	.006	.159(**)	.152(**)	.168(**)	.132(**)	.098(**)	1	.089(**)	.083(**)	.165(**)	-.093(**)	.071(**)
	.829	.000	.000	.000	.000	.000		.000	.000	.000	.000	.001
Use dial-up mobile-based internet	.095(**)	.208(**)	.163(**)	.204(**)	.054(*)	.229(**)	.089(**)	1	.355(**)	.202(**)	-.087(**)	-.094(**)
	.000	.000	.000	.000	.013	.000	.000		.000	.000	.000	.000
Official business card with email and web-add	.136(**)	.229(**)	.192(**)	.293(**)	.107(**)	.273(**)	.083(**)	.355(**)	1	.326(**)	-.130(**)	-.075(**)
	.000	.000	.000	.000	.000	.000	.000	.000		.000	.000	.001
Subscribe to any mailing list	.051	.309(**)	.210(**)	.253(**)	.245(**)	.244(**)	.165(**)	.202(**)	.326(**)	1	-.199(**)	-.016
	.058	.000	.000	.000	.000	.000	.000	.000	.000		.000	.477
Length of stay on-line in office	-.031	-.326(**)	-.116(**)	-.276(**)	-.357(**)	-.350(**)	-.093(**)	-.087(**)	-.130(**)	-.199(**)	1	.107(**)
	.267	.000	.000	.000	.000	.000	.000	.000	.000	.000		.000
Frequently access the internet office	-.054	.017	-.014	-.087(**)	.077(**)	-.056(*)	.071(**)	-.094(**)	-.075(**)	-.016	.107(**)	1
	.053	.443	.537	.000	.001	.011	.001	.000	.001	.477	.000	

** Correlation is significant at the 0.01 level (2-tailed).
* Correlation is significant at the 0.05 level (2-tailed).

ICT in the workplace is strongly correlated with networked learning having ($r=0.130$, $p=0.000$), and as $p<0.05$ we therefore reject the null hypothesis (Ho_5) and accept the

alternative and hence there is a strong positive relationship between ICT in the Workplace and Networked Learning.

Table 4.4-15: ICT in the workplace and networked learning

		Networked Learning	ICT in workplace
Networked Learning	Pearson Correlation	1	.130(**)
	Sig.		.000
ICT in workplace	Pearson Correlation	.130(**)	1
	Sig.	.000	

** Correlation is significant at the 0.01 level (2-tailed).

Summary table for ICT in the workplace correlation constructs

Constructs	R	P	Answer
use the internet in the office	.219(**)	.000	Correlated
unlimited telephone services	-.025	.345	Not Correlated
access PC in your office	.135(**)	.000	Correlated
often use email - internal communication	.016	.555	Not Correlated
internet access-office	.084(**)	.002	Correlated
use a mobile-work	.006	.829	Not Correlated
use dial-up mobile- internet	.095(**)	.000	Correlated
official card with an email web-site	136(**)	.000	Correlated
Do you subscribe to any mailing list	.051	.058	Not Correlated
Length of stay on-line on office	-.031	.267	Not Correlated
access internet in office	-.054	.053	Not Correlated

* Correlation is significant at the 0.05 level (2-tailed).
** Correlation is significant at the 0.01 level (2-tailed).

4.4.4 ICT human capacity and networked learning

Table 4.4-16: ICT human capacity constructs correlated with networked learning

	Networked Learning	IT dept is important in your organization	Head of IT dpt a senior officer	IT dept provide leadership of the IT function	ICT professionals institution motivated	organization retain experienced and qualified IT professionals	Head of your institution consider the head of ICT important
Networked learning	1	.278	.122(**)	.042	-.058(*)	.052	.091(**)
Sig. (2-tailed)		.235	.000	.125	.036	.059	.001
IT dept is important	.278	1	-.099	-.122	-.461(*)	-.080	-.068
Sig.	.235		.598	.522	.010	.669	.712
Head of IT a senior officer Pearson Correlation	.122(**)	-.099	1	.349(**)	-.152(**)	.254(**)	.266(**)
Sig.	.000	.598		.000	.000	.000	.000
IT department leadership of the IT function Pearson Correlation	.042	-.122	.349(**)	1	-.330(**)	.374(**)	.358(**)
Sig.	.125	.522	.000		.000	.000	.000
ICT professionals motivated Pearson Correlation	-.058(*)	-.461(*)	-.152(**)	-.330(**)	1	-.265(**)	-.255(**)
Sig.	.036	.010	.000	.000		.000	.000
retain experienced and qualified IT professionals	.052	-.080	.254(**)	.374(**)	-.265(**)	1	.320(**)
Sig.	.059	.669	.000	.000	.000		.000
Head of your institution head of ICT dept important	.091(**)	-.068	.266(**)	.358(**)	-.255(**)	.320(**)	1
Sig.	.001	.712	.000	.000	.000	.000	

** Correlation is significant at the 0.01 level (2-tailed).
* Correlation is significant at the 0.05 level (2-tailed).

There is also no strong correlation between ICT human resources and networked learning (r=0.137, p=0.599) and since p>0.05 we therefore accept the null hypothesis and reject the alternative and hence; (Ho_6) there is no significant relationship between ICT human capacity and Networked Learning.

Table 4.4-17: ICT human capacity

		Networked Learning	ICT human capacity
Networked learning	Pearson Correlation	1	.137
	Sig. (2-tailed)		.599
ICT human capacity	Pearson Correlation	.137	1
	Sig. (2-tailed)	.599	

Summary table for ICT human capacity constructs

Table 4.4-18: ICT human capacity correlation summary

Construct	R	P	Answer
IT department is important in your organization	.278	.235	Not correlated
Head of IT department a senior officer	.122(**)	.000	Correlated
IT department provide leadership of the IT function	.042	.125	Not Correlated
ICT professionals institution motivated	-.058(*)	.036	Weak Correlated
organization retain experienced and qualified IT professionals	.052	.059	Not Correlated
Head of your institution consider the head of ICT important	.091(**)	.001	Correlated

* Correlation is significant at the 0.05 level (2-tailed).
** Correlation is significant at the 0.01 level (2-tailed).

4.4.5 Correlation of all the study variables

Table 4.4-19: Correlations of the Study Variables

		Networked Learning	Network Access	ICT daily	People & org online	Local	Work place	HR-IT
Networked Learning	Pearson Correlation	1	-.042(**)	.015(*)	-.340(**)	-.055(**)	.130(**)	.137
	Sig. (2-tailed)		.000	.032	.000	.000	.000	.599
Network access	Pearson Correlation	-.042(**)	1	.088(**)	.272(**)	.336(**)	.366(**)	.273
	Sig. (2-tailed)	.000		.000	.000	.000	.000	.259
ICT in everyday life	Pearson Correlation	.015(*)	.088(**)	1	.188(**)	.085(**)	.416(**)	.259
	Sig. (2-tailed)	.032	.000		.000	.000	.000	.211
People& org	Pearson Correlation	-.340(**)	.272(**)	.188(**)	1	.226(**)	.276(**)	-.111
	Sig. (2-tailed)	.000	.000	.000		.000	.000	.672
Locally relevant	Pearson Correlation	-.055(**)	.336(**)	.085(**)	.226(**)	1	.308(**)	-.117
	Sig. (2-tailed)	.000	.000	.000	.000		.000	.747
ICT in workplace	Pearson Correlation	.130(**)	.366(**)	.416(**)	.276(**)	.308(**)	1	.509(*)
	Sig. (2-tailed)	.000	.000	.000	.000	.000		.022
ICT HR	Pearson Correlation	.137	.273	.259	-.111	-.117	.509(*)	1
	Sig. (2-tailed)	.599	.259	.211	.672	.747	.022	

** Correlation is significant at the 0.01 level (2-tailed).
* Correlation is significant at the 0.05 level (2-tailed).

This means that Networked learning perspective is significantly correlated to Network access, ICT in everyday life, locally relevant content, people and organization online and ICT in the Workplace. This may be explained by the fact that for students and faculty to use ICTs it for academic purposes- Learning, Teaching, research availability of Technical infrastructure must be ensured. However, these constructs are a critical measure of e-readiness thus open for much further analysis.

4.4.6 Regression analysis

In the previous sections, the mathematical models were introduced; a linear regression model was applied to determine the relative importance of each of the six e-readiness variables with respect to networked learning. The regression model is as follows

Model Formulation and estimation

The hypothesis is that networked learning in the "real world" is determined in accordance with the equation $Y= \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \beta_4 X_4 + \beta_5 X_5 + \beta_6 X_6 + \varepsilon_0$ true values of α, β, and γ exist, and desired to ascertain what they were. Because of the noise term ε, however, can only estimate these parameters. Just noting that the noise term is a random variable, the *estimates* of α, β, and γ (as distinguished from their true values) will also be random variables, because the estimates generated depend upon the particular value of ε drawn by nature for each individual in the data set.

Networked Learning (Y) can be expressed as a function of e-readiness indicators (X) in the following equation:

$Y= \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \beta_4 X_4 + \beta_5 X_5 + \beta_6 X_6 + \varepsilon_0$

Where, using the values of the coefficients (β) from the regression coefficient table the established multiple linear regression equation takes the form of;

$Y= 14.470 + 0.382 X_1 + 2.146 X_2 + 1.030 X_3 + -1.803 X_4 + -1.931 X_5 + 1.713 X_6$

Where; Constant = 14.470, when the values of the independent variables are zero, networked learning would in this case take the value 14.470.

With Y= Networked Learning

β= Constant = 14.470, when values of the independent variables are zero, networked learning would take the value 14.470.

X_1= 0.382; one unit increases in Network Access results in 0.382 units increase in networked learning.

X_2=2.146; one unit increase in People and organization online results in 2.146 units increase in networked learning

X_3= 1.030; one unit increase in Locally Relevant content results in similar units increase in networked learning

X_4= -1.803; one unit increase in ICT in everyday life results in an increase in networked learning

X_5=-1.931; one unit increase in ICT in the workplace results in similar units increase in networked learning

X_6=1.713; one unit increase in ICT human capacity results in similar units increase in networked learning

ε_0= Extraneous variables not estimated by the equation.

Coefficients (a)

Table 4.4-20: Regression Coefficients table;

Model	Unstandardized Coefficients		Standardized Coefficients	T	Sig
	B	Std. Error	Beta	B	Std. Error
(Constant)	14.470	44.853		.323	.768
Networked Access	.382	3.391	.073	.113	.917
People and Org online	2.146	3.604	.408	.595	.593
Locally content	1.030	2.882	.219	.357	.744
ICT in everyday	-1.803	4.049	-.237	-.445	.686
ICT in workplace	-1.913	3.250	-.311	-.589	.597
ICT human Resources	1.173	5.445	.126	.215	.843

Coefficients (a)
Dependent Variable: Networked Learning

Table 4.4-21: Model Summary

R	R Square	Adjusted R Square	Std. Error of the Estimate	
.585	.342	-.975	10.33576	.342

Predictors: (Constant), ICT Human Capacity, ICT in workplace, ICT in everyday, Network Access, locally relevant content, people and Organization online

The results shown in table 4.4.21; that the regression coefficient, R=0.585, showing there was average relationship between independent variables and the dependent variable. The coefficient of determination R^2=0.342 which showed the predictive power of the model and in this case at 34.2% of variations in networked learning is explained by the independent variables. The adjusted coefficient of determination R^2 shows the predictive power when adjusted for degrees of freedom and sample size. In this case, after it was adjusted at 97.5% of the variations in the perception networked learning by staff, students and faculty of E.A universities is explained by the independent variables. The adjusted coefficient of R^2 shows the predictive power when adjusted for degrees of freedom and sample size.

CHAPTER FIVE:

DISCUSSION OF RESULTS

5.1 Introduction

This section discusses the findings of both literature and empirical study in order to achieve the six objectives translated into six hypotheses.

5.2 Network access as a determinant of Networked Learning

Many studies on e-readiness and generally networked learning have demonstrated that a network availability, quality and technical support influenced ICT enabled education. This study provides additional support for these previous findings implying that network access indicators are generalizable across a broad spectrum of universities in particular East African universities.

Correlation results were largely as predicted with ($r=-0.042$, $p=0.000$) and the association significant at $P<0.01$. Almost all network constructs were significantly correlated with academic purposeful e-learning except for the perception that internet speeds versus those of cyber cafes ($r = -0.002$, $p = 0.803$), all in all network access constructs show significant associations with networked learning.

When it comes to the design and organisation of networked learning, Goodyear et al.(2001) suggest that the institutions in this case the universities has to be able to specify the right online learning activities and infrastructure needs to fit the course needs and have knowledge of the appropriate pedagogies to create and support the online activities. Thus, Network availability, speed and quality require thorough consideration and planning; such as improvements on having off-campus access to institutional email and ensuring adequate technical support to ensure minimal failures.

With Internet speeds that frustrate and slowing down work; power failures and poor response times all these do not set a good precedence to the need for collaboration and communication in networked learning.

5.3 People and Organization online as a determinant of Networked Learning

The measure of people and organization online as an indicator of networked society - It was significantly correlated with Networked learning (r=--0.340, p=0.000) with the association being significant at P<0.01. Thus we rejected the null hypothesis and accepted the alternative. With enhanced people organization online; Relationships are created form the 'connective tissue' of networked learning communities and provide the social capital that allows people to work together over time and exceed what any of them could accomplish alone. In relationships, people create a common language and a sense of shared responsibility, provide channels for communicating and disseminating information to one another about network members' expertise, and develop readiness to trust one another (Hargreaves, 2003).

In sharing of methods, materials, ideas and opinions, people make aspects of their work accessible to others and expose their ideas and intentions to one another. This kind of sharing does not usually extend to commentary on curriculum, learning, and instruction. However this study provides precedence for further empirical studies in this area.

5.4 The effect ICT in everyday life and Networked Learning

Correlation results between ICT in everyday life variables and enhancing education with ICT were all as hypothesized and significant at P<0.01. There was also strong associations between the ICT in everyday life variables themselves and these associations are also significant at P<0.01. Surprisingly having a computer did not correlate with using the computer for academic purpose with (r=0.004 and P=0.538). Overall ICTs in everyday life were significantly correlated with (r=0.015, p=0.03), and having p<0.05.

5.5 Locally relevant Content and Networked Learning

Results of the correlation showed that most of the locally relevant content indicators at P<0.01 except for the web- visited carry different types of information (r= -0.013 and P=0.081) as well as how frequently the most useful local websites were updated(r= -0.016 and P=0.039).

In order to establish the strength and significance of the relationship between Locally relevant content and networked learning in E.A universities, the results found that locally relevant

content (r=0.028**, p=0.007) the two relationships significant at P<0.01. ICT in the workplace and networked learning

ICT in the workplace is strongly correlated with networked learning having (r=0.130, p=0.000), and as p<0.05 we therefore reject the null hypothesis (Ho_5) and accept the alternative and hence there is a strong positive relationship between ICT in the Workplace and Networked Learning.

5.6 ICT human capacity and networked learning

There is also no strong correlation between ICT human resources and networked learning (r=0.137, p=0.599) and since p>0.05 we therefore accept the null hypothesis and reject the alternative and hence; (Ho_6) there is no significant relationship between ICT human capacity and Networked Learning.

Capacity building includes the conditions, opportunities, and experiences for collaboration and mutual learning. Years of school improvement research have shown that improving schools are ones that take charge of change. Senge (1990) describes a learning organisation as one that is continually expanding its capacity to create its future. In networked learning communities this means creating the conditions to support all of the processes described in the previous key features.

Building capacity depends on intentionally fostering opportunities to examine existing beliefs and practices and challenge them against new ideas, new knowledge, new skills, and even new dispositions. When networks are focused on learning, they intentionally seek out and/or create supporting activities, people, and opportunities to push them beyond the status quo.

5.7 Toward an Integrated Framework model of Networked Learning

This study began by examining the existing models, frameworks of e-readiness in countries, Higher education institutions and specifically the adaptation of CID tool for HEI in East Africa, and resulting in to a comprehensive conceptual framework based on perceptions of staff, students and faculty for measuring the effect of various e-readiness indicators for networked learning.

The resulting Framework developed reveal the most of the e-readiness variables are significantly correlated to networked learning. The predominate determinants for networked learning are revealed by this study as Networked access, People and organization online, Locally relevant content , ICT in the workplace and ICT human capacity.

In general, networked teaching, support, learning and research activities design, facilitate and direct the cognitive and social process for the purpose of realising personally meaningful and educationally worthwhile learning outcomes (Anderson et al., 2001). An institution has to be able to show the relevance between the activities and its desired outcomes, and select the appropriate media accordingly.

Regression analysis

The data set contains observations for *Y* and *X's*. The noise component ε is comprised of factors that are unobservable, or at least unobserved. The parameters α and β are also unobservable. The task of regression analysis is to produce an *estimate* of these parameters, based upon the information contained in the data set and, as shall be seen, upon some assumptions about the characteristics of ε.

Multiple regression analysis will select a plane so that the sum of squared errors—the error here being the vertical distance between the actual value of *Y* and the estimated plane—is at a minimum. The intercept of that plane with the Y-axis (where *X1, X2, e.t.c* are zero) implies the constant term α, its slope in the education dimension implies the coefficient β, and its slope in the experience dimension implies the coefficient γ. With *n* explanatory variables, multiple regression analysis estimates the equation of a "hyperplane" in n-space such that the sum of squared errors has been minimized. Its intercept implies the constant term, and its slope in each dimension implies one of the regression coefficients.

The estimated coefficient of 0.382 has standard error of 3.391 and thus a t-statistic of – 0.382/3.391 = 0.113. The associated probability under a two-tailed test is reported as 0.917. This means that if the true value of the coefficient for the Networked access were zero, a

coefficient greater than or equal to 0.382 in absolute value would nevertheless arise 91.7 percent of the time given the degrees of freedom of the t-distribution from which the coefficient estimate is drawn.

A rejection of the null hypothesis on the basis of a parameter estimate equal to 0.382 or greater in absolute value, therefore, will be erroneous nine times out of ten when the null hypothesis is true. By conventional standards, therefore, the significance level here is too low to reject the null hypothesis, and the coefficient of the Networked access variable is not statistically significant. Hence; in having employed a conventional two-tailed significance test, led to erroneously to reject the hypothesis that there is no significant relationship between networked access and networked learning.

CHAPTER SIX

SUMMARY, CONCLUSIONS AND RECOMMENDATIONS

6.1 Introduction

This chapter presents a summation of the findings of the study. Section 5.2 gives a summary of the study and conclusions while 5.3 recommendations.

6.2 Summary of the Key findings and conclusions

The main objective of this research study is based on studying and comparing related and existing e-readiness tools and frameworks predominately the adapted CID tool for higher education institutions in EA; develop a framework based on the perceptions of students, staff and faculty to analyse the effect of e-readiness indicators on networked learning in East African universities.

The specific objectives of the research study are to

(1) To determine the influence of Network Access on Networked learning

(2) To establish the effect of Network society indicators on networked learning

   a. To establish the effect of People and organization online on networked learning
   b. To establish the effect of locally relevant content on networked learning
   c. To establish the effect of ICT in everyday life on networked learning
   d. To establish the effect of ICT in the workplace on networked learning

(3) To establish the effect of ICT human capacity on networked learning

Indeed, consideration as to the impact of communications and information technology (C&IT) is evident throughout the study discussion of different aspects of higher education provision: 'students and learning', 'supporting research and teaching', 'staff in higher education' and the 'Human capital of higher education institutions'.

The learning focus is just the beginning to set the parameters that give staff, faculty and students direction for their learning and their work. Networked learning educators need to become knowledgeable about the core components of their chosen initiative so that they can

integrate them into the everyday practice and ensure that they respect the intents of the initiative rather than inadvertently eliminate or erode them (Timperley, 2004).

The resulting e-readiness framework for measuring Networked learning in East African universities contains a set of 6 key independent variables grouped into:

(i) Network access (Network availability and Quality and speed)

(ii) Networked society

- People and organization online
- Locally relevant content
- ICT in everyday life
- ICT in the workplace

(iii) ICT Human capacity

To achieve these objectives a descriptive and explanatory designs were employed. Secondary data was collected from Kenet for all 53 universities in East Africa for the period 2008-2009. Data were analysed using descriptive and inferential test statistics. Specifically, frequency counts, percentage proportions, means and standard deviations were used to assess data characteristics. Cronbach alpha was used to measure reliability while Pearson product moment correlation analysis was used to establish associations between construct variables and test hypothesis. General linear regression was used to test hypotheses relating to performance model estimation.

P-value was used to analyse the statistical significance of the coefficients of the independent variables-This is the probability of getting a value of the test statistic as extreme as or more extreme than that observed by chance alone. If the null hypothesis is true, the p-value is compared with the actual significance level of the test in this case 0.05 and if it is smaller, the result is significant.

Inferential statistics namely Pearson's product moment correlation is employed to determine whether there is a relationship between the study variables. Tests of hypothesis 1 to 6 are presented and key findings related to the study objectives discussed below.

6.2.1 The effect of Network access on Networked Learning

The network access constructs were well correlated among individual constructs except for off-campus access to institutional e-mail and internet speeds slow down work at ($r=0.010$ and $p=0.102$) in a 2-tailed test $p>0.05$. For responses on whether institutional internet speeds were better than cybercafé ($r=0.02$ and $P=0.795$) did not correlate at all with most common type of computer failures in the institutions and experiences with power failures ($r=-0.007$ and $p=0.237$).

Other constructs that were really a surprise in their lack of correlation where none had a significant relationship include Frequency of failure in the lab or offices ($r=0.004$ and $P=0.5$) with most common type of computer failures whereby this research recommends further studies. How long it takes to fix a fault did not correlate with at ($r=.004$ and $p=.488$) experiences with power failures; Noting the lack of significant relationship between most type of computer failure ($r=0.12$ and $p=0.51$) and whether the respondents call or e-mail helpdesk can be said was not expected to be so.

In relation to networked learning most constructs had a significant relationship- a strong one for that except for classification of failures ($r=-0.006$ and $P=0.440$) and whether internet speed are better than those of cyber cafes at ($r=-0.002$ and $p=0.803$) all other constructs such as how long it takes to restore a network failure, e-mail to helpdesk, experiences with power failure were strongly correlated with networked learning.

In measuring the effect of overall/ composite variable network access on networked learning, the independent variable P values demonstrate a strong and significant correlation; with the measure of Network access ($r=-0.042$, $p=0.000$) and the association is significant at $P<0.01$. Since P is less than $P<0.05$, we rejected the null hypothesis and accepted the alternative; hence (Ho_1) there is a significant relationship between network access and networked learning.

6.2.2 The Effect of Networked Society on networked Learning

Most of the individual constructs of **people and organization online** were strongly and positively correlated with networked learning and these include; whether the respondents Ever used internet services at (r=.020(**) and p=.005) as well as use of E-Mail services at (r=-.142(**) and p=.000) not forgetting use of internet for News /Entertainment(r=-.213(**) and p=.000), Business Transaction, General Search for information had a weak correlation at (r=0.015(*) and p=0.038) however, How regularly use the internet was not correlated with networked learning (r=-0.003 and p=0.656) others correlated with networked learning were local Web portals visit(r=-0.019(**) and p=0.008), as well as whether institutional websites advertised in media (r=0.035(**) and p=0.000) and subscriptions to local mailing lists had a negative correlation (r=-0.018(*) and p=0.011).

The Measure of people and organization online as an indicator of networked society -It is also not significantly correlated with Networked learning thus the measure of people and organization online (r=-0.003, p=0.680) with the association being significant at P<0.05. Thus (Ho_2) there is no significant relationship between people and organization online and Networked Learning. Thus we accept the null hypothesis and reject the alternative.

In order to establish the strength and significance of the relationship between **Locally relevant content** and networked learning in E.A universities, the results find that locally relevant content (r=0.028**, p=0.007) the two relationships are significant at P<0.01. We therefore reject the null hypothesis and accept the alternative (Ho_4): there is a strong relationship between the locally relevant content and networked learning in E.A universities.

Locally relevant content individual constructs were corrected to networked learning except for questions on whether web-sites carry different types of information for different groups in the university community (r=-0.013 and P=0.081) and whether the content of the Web site is updated regularly (r=0.003 and p=0.727). About local websites that contain local topics/information (r=0.031(**) and p=0.000). On how dissimilar are the web-sites visited was as expected strongly correlated with networked learning (r=0.029(**) and p=0.000).

With **ICTs in everyday life** and its relationship with Networked learning (r=0.015, p=0.03), and having p<0.05 we therefore reject the null hypothesis and accept the alternative

hypothesis and hence (Ho_3) there is a strong relationship between ICTs in everyday life and Networked learning.

The individual constructs of ICT in everyday life and their relationship with networked learning; on respondents having a mobile phone (r=0.035(**) and p=0.000), sending SMS messages (r=0.064(**) and p=0.000), whereas use the mobile for Internet access were all correlated to networked learning (r=-0.015(*) and p=0.039)and unexpected have a computer did not correlate to networked learning (r=0.004 and p=0.538) however the construct of whether one ever used a computer was positively and strongly correlated to networked learning (r=0.041(**) and p=0.000).

Contrary to the–expectation, **ICT in the workplace** is strongly correlated with networked learning having (r=0.130, p=0.000), and as $p<0.05$ we therefore reject the null hypothesis (Ho_5) and accept the alternative and hence there is a strong positive relationship between ICT in the Workplace and Networked Learning.

With ICT in the workplace strongly and positively correlated; the individual constructs were not as well correlated. With respondents unlimited availability and use of telephone services at (r=0-.025 and p=0.345); Not correlated with networked learning. On the same spectrum respondents often use email - internal communication (r=0.016 and p=0.555), the use a mobile-phone services for work(r=0.006 and p=0.829) Not correlated as well as subscription to any mailing list (r=0.051 and p=0.058), Length of stay on-line while in the office for e-mail or web services (r=-0.031 and p=0.267) and access of internet in office (r=-0.054 and p=0.053).

The ICT in the workplace constructs positively and strongly having a significant relationship with networked learning were as follows: use the internet in the office (r=0.219(**) and p=0.000), access PC in your office (r=0.135(**) and p=.000), internet access-office (r=0..084(**) and p=0.002) and use dial-up mobile- internet services at (r=0.095(**) and p=0.000) when it comes to having an official business card complete with an email and web-site address(r=0.136(**) and p=0.000)

This means that Networked learning perspective is significantly correlated to ICT in everyday life, locally relevant content and ICT in the workplace indicators as well as people and organization online of Networked Society.

6.2.3 The effect of ICT human capacity on networked Learning

There is also no strong correlation between ICT human resources and networked learning (r=0.137, p=0.599) and since p>0.05 we therefore accept the null hypothesis and reject the alternative and hence; (Ho_6) there is no significant relationship between ICT human capacity and Networked Learning.

Looking at the individual constructs of ICT human capacity: all clearly had a strong input on the lack of significant relationship between ICT employment opportunities in the universities of EA and networked learning. On the question whether IT department is considered as important in the organization (r=0.278 and p=0.235) Not correlated at all, whereas whether IT department provide leadership of the IT function had a poor showing as well (r=0.042 and p=0.125) Not Correlated, questioning whether the organization retain experienced and qualified IT professionals (r=0.052 and p=0.059) no significant relationship and a weak correlation was with the responses on the perceptions whether ICT professionals in the institution are motivated (r=0.058(*) and p=0.036).

The few constructs with a positive showing were perceptions on whether the Head of IT department is a senior officer (r=0.122(**) and p=0.000) and Correlated was whether Head of the institution consider the head of ICT as important (r=0.091(**) and p=0.001). A consideration on the head of ICT by the vice chancellor can give at least some perception of how ICT as a department is viewed in the entire university. For ICT strategies that support networked learning to push through; there must be top executive support to champion the initiatives and projects.

Goodness of Regression Model Fit

Sykes (2001) Hence, the R^2 (0.342) statistic is a measure of the extent to which the total variation of the dependent variable *is* explained by the regression. It is not difficult to show that the R^2 statistic necessarily takes on a value between zero and one. To be sure, a large

unexplained variation in the dependent variable will increase the standard error (10.33576) of the coefficients in the model (which are a function of the estimated variance of the noise term), and hence regressions with low values of R^2 will often yield parameter estimates with small t-statistics(0.26) for any null hypothesis. Because this consequence of a low R^2 will be reflected in the t statistics, however, it does not afford any reason to be concerned about a low R^2, low value of R^2 *may* indicate that important and systematic factors have been omitted from the regression model.

The results showed; that the regression coefficient, R=0.585, showing there was average relationship between independent variables and the dependent variable. The coefficient of determination R^2=0.342 which showed the predictive power of the model and in this case at 34.2% of variations in networked learning is explained by the independent variables. The adjusted coefficient of determination R^2 shows the predictive power when adjusted for degrees of freedom and sample size. In this case, after it was adjusted at 97.5% of the variations in the perception networked learning by staff, students and faculty of E.A universities is explained by the independent variables.

Many researchers are drawn into research into the use of technologies in an educational context from a practical perspective, i.e. what can these technologies offer? What are the issues? This pragmatic stance is coupled with a desire to understand and describe emergent theoretical perspectives. A number of points were made extrapolating key themes emerging from research and practice. I) the focus needs to be on how technologies can enhance the learning experience, and that it is important to remember that good teaching and learning is possible without any technology. 2) The teacher's role is crucial, technology won't make a bad teacher good, 3) there is no one size fits all solution. 4) Failure is useful, we can (and should) learn from it as provided in an overview of the position of theories in the emergent field of learning technologies (Oliver, 2002)

We began with the end in mind: What is it that networked learning is intended to accomplish? In our theoretical and empirical analysis, it became clear that networked learning is based on the conviction that when formal educators, students, non-academic staff work together, with the necessary network infrastructure in place, necessary skills, necessary everyday

environments they will create new knowledge and spread it to others. Once the knowledge is created and shared, the expectation is that it will influence practices – change what educators do in their universities and classrooms and how they do it.

Many networked learning perceptions in educational settings are designed without a deep understanding of the inherent technological, communicative and collaborative conditions of networked learning for academic excellence. Our research provides insights into what works across, correlating different variables and contexts, thereby making significant contributions to the innovative use of ICT for learning.

Ultimately, the changes in practices are intended to have an influence on students to enhance their learning and their long-term success. Having a clear purpose is critical to the success of networked learning communities. In a general sense, successful educational change is driven by a pervasive commitment to improving education for all that includes raising the bar and closing the gap of student achievement, treating people with respect, improving the environment for learning, and changing the context for learning at all levels.

This study finds that the determinants for network learning e-readiness in East African universities are predominantly network access, people and organization online, locally relevant content, ICT in the workplace whereas as though ICT human resources is part of the e-readiness framework according to the perception of students, staff and faculty it does not correlate to networked learning. In the East African context, this study brings out that ICT infrastructure, the attitude of use in people and organizations online as well as ICT in the workplace and having readily local content will push to a greater degree networked learning from the basics of reasons for use to how efficiently and effectively use ICTS and associated collaboration and communication for academic excellence not only East Africa but across the globe.

After identifying and researching on the purpose of networked learning and a number of features have been shown to create the conditions that networked learning and these are necessary technical network infrastructure that is accessible and of good quality, The other

people relationships daily online, workplace organization in the use of ICTs, and ICT human capacity opportunities in the HEIs. As a result of focus on purpose and setting the necessary networked learning environments; educators will be in apposition to participate in focused relationships for collaborative inquiry, they open themselves to new ideas and to challenging their views through interaction with others and with formal knowledge. Leaders, both formal and distributed across roles, can provide vision, accountability and capacity building opportunities for engagement in the activities that move the university academic learning and knowledge creation forward.

6.3 Limitations and Recommendation for further studies

The hypotheses were tested using secondary data; may in some cases result in reasonable weak or strong relationship between and among variables. It is therefore, important to replicate this study in different contexts in East Africa higher education institutions.

Considerations should be made for improvement of variable metrics and e-readiness frameworks so as to incorporate aspects of study constructs that are more relevant to the 21st century situation noting daily improvement, increasing daily availability, increasingly accessibility, increasingly affordability of ICTs today in the developing economies. This should specifically target the metrics used to measure aim, purpose and use of ICTs extensively for both short term and long term value. The sample used in this study was particularly large good for estimation purposes; future studies should aim at a more in depth understanding of smaller institutional samples which can provide a firmer basis for more statistical inferences.

This study was particularly on estimation of purposes; future studies should aim at a more in depth understanding of more networked learning capabilities, communities in East African context. While much has been written about technologies and learners' use of technologies, less research has been devoted to how teachers practise in technology-rich environments; Faculty roles in learning environments- considering how these are dynamic, complex and not fully understood by practitioners and researchers alike.

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