UNIVERSITY OF NAIROBI

ASSESSMENT OF THE EFFECT OF ELEARNING ON STUDENTS' LEARNING PROCESS IN UNIVERSITY OF NAIROBI

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This research project is submitted to the School of Computing and Informatics – The University of Nairobi in partial fulfilment of the requirements for the award of the degree of Master of Science in Information Technology Management (MSc. ITM)

DECLARATION

Student Declaration

I Hosea Kipkemboi Chumba, whose student registration number is P54/79222/2015, hereby declare that this MSc. Project entitled Assessment of the effect of eLearning on students' learning process at The university of Nairobi to the best of my knowledge and belief, it is my original work and has not been submitted for examination in this university or other universities for an award of any other degree. Use of other authors work has been acknowledged at the point of their use and a list of references included at the last pages.

Signature:…… Date:……

Name: HOSEA KIPKEMBOI CHUMBA

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Supervisor's Declaration

This research has been submitted for review with my approval as a university supervisor.

Signature:……. Date:……

Name: DR. ROBERT O. OBOKO

SCHOOL OF COMPUTING & INFORMATICS

UNIVERSITY OF NAIROBI

DEDICATION

to

Kipkoech Kibor Victor Kemboi, Kipkalya Kipkorir Liam Kemboi,
Who are yet to know what and why daddy is always reading and away
most of, if not all, the time.
Hope you grow up to understand the content of this project and much more.

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My sincere appreciation goes to Dr. Robert O. Oboko for his guidance during the entire period of this research. Without his valuable contributions, this research work would never have been realized as it is.

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ABSTRACT

Problem

E-Learning is the use of ICTs in the delivery of content in the education sector. Higher education systems around the world are being forced to introduce and use this innovative technology in teaching and learning. This has greatly exposed students to other extensive and important sources of information. In order for the Institutions of Higher Learning (IHL) to remain competitive, they have to invest and integrate ICTs in teaching and learning. In the last decade both public and private universities in Kenya especially The African Virtual University (AVU) have adopted eLearning as an alternate approach of teaching and learning. Despite these, few research studies have been done to assess the effect of eLearning on Students' Learning Process (SLP) in Institutions of Higher Learning (IHL) and the challenges associated with it. Therefore, the aim of this research study was to examine the effect of eLearning on Students' Learning Process (SLP) at The University of Nairobi.

Methodology

This is a mixed research constituting both qualitative and quantitative deductive research. A population of 530 comprising of ten members of staff and 520 first year students from the College of Health Sciences (Dental School, School of Pharmacy, School of Medicine and the Department of eLearning) at The University of Nairobi Chiromo Campus were selected for the study. Probability and non-probability sampling was used for the study. The researcher used purposive sampling followed by stratified simple random sampling to select respondents from the University of Nairobi's Claroline Learning Management System - CLMS. A sample size of 100 respondents comprising of 10 Bachelor of Dental Surgery students, 22 Bachelor of Pharmacy students, 66 students from Bachelor of Medicine and Surgery and 2 respondents from members of eLearning department was selected in line with Yamane's (1967) formula. Questionnaires and interviews were used to collect data.

Findings

The research findings revealed that independent variables eLearning benefits, eLearning challenges, eLearning incentives and eLearning integration contribute to students' learning process. Each of these factors influences the students' learning process either positively or negatively. The research further revealed that the introduction of favourable and supportive eLearning environment enhances eLearning benefits which positively influence Students' Learning Process while the introduction of unfavourable eLearning environment increases eLearning challenges which negatively affect SLP. The findings may be useful to The University of Nairobi and other IHL within and beyond the region in setting eLearning technologies as well as providing favourable conditions for the implementation of the eLearning process.

Keywords:

E-Learning, Innovation, Students' Learning Process (SLP), Institutions of Higher Learning (IHL), Learning Management Systems (LMS)

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LIST OF ACRONYMS AND ABREVIATIONS

SLP – Students' Learning Process

UoN – University of Nairobi

LMS – Learning Management Systems

CLMS – Claroline Learning Management System

IHL – Institutions of Higher Learning

ICTs – Information Communication Technologies

LDC – Less Developed Countries

CIPP Evaluation Model – Context, Input, Process and Product Evaluation Model

EE – ELearning Environment

ANOVA - Analysis of Variance

1.0 CHAPTER ONE: INTRODUCTION

1.1 Background to the study

ELearning means the utilization of ICTs in the delivery of content in the education sector. Institutions of Higher Learning (IHL) around the world are forced to introduce and use this innovative technology in teaching and learning. This has permitted students to an extensive and comprehensive other sources of information (Kalembera & Majawa 2015). In order for Institutions of Higher Learning (IHL) to remain competitive, they have to invest and integrate ICTs in teaching and learning. Introduction of these technologies is important for building a workforce that embraces technology in order to meet society's continuous need for rapid lifelong learning. This can be delivered in a more effective and efficient manner (Nycz, 2007).

The technology can be packaged into Learning Management Systems (LMS) such as Moodle, Blackboard, and WebCT. These LMS are available and can be customized to suite different models that any university may require. ELearning may exist in a number of forms. For example, Hrastinski (2008) identifies asynchronous eLearning as one where the instructors use the Internet to provide lectures, tests, and assignments accessible at any time and is enabled by platforms such as e-mail and discussion boards. On the other hand Romiszowski (2004) describes synchronous eLearning to include the use of technologies such as video conferencing which call for students to be present and actively participate during the students' learning process. They are those classes that require students and instructors to be online at a specific time for learning to occur. Lectures, discussions, and presentations occur at a definite time where all these parties are present. Students can be involved in eLearning from geographically scattered areas, as happens in distance learning, or from the same place, such as using online platforms to work on assignments. In the case of this research, asynchronous mode of eLearning was adopted.

"Use of different ICTs has become inevitable for students' learning. By using modern ICTs, students can retrieve information they need within a short time. They can access and disseminate electronic information such as e-books, e-journals and can advance their learning by using innovative ICTs in the form of wireless networks, Internet search engines, databases, websites and web 2.0 technologies", (Khan, 2011). Furthermore, the concept of eLearning will not substitute the usual classroom set and environment but rather facilitate the entire process by taking the advantage of new informational content and innovative tools used to deliver learning (Omwenga, 2003). ICTs in education on their own are not determinants of how teaching should be conducted; they are rather tools to support teaching (Mbambo-Thata 2009). This is also in tandem with Adedokun & Hashim (2008) they explain that teachers believe that ICT can only be useful when jointly used with other instructional materials. This indicates that students' learning process is not only enhanced by this technology, but an interconnected system is required in place to facilitate effective and efficient teaching and learning. Some of the reasons behind eLearning are the increasing number of students and the matching increase in their needs as students. "Students increasingly require educational programmes tailored to their own situations, rather than a traditional mode of delivery. These demands have forced universities to adjust their programmes and mode of deliveries in order to meet these increasingly diverse cohorts", (Omwenga, 2003).

"Adoption and use of ICT and eLearning in education can promote collaborative, active and lifelong learning, increase students' incentive, offer ubiquitous access to information and other informational resources, facilitate understanding and help students think and communicate efficiently", (Khan, Hasan & Clement 2012). This has led to benefits such as reduction in costs, improved accessibility and flexibility and this enables learning to take place from anywhere anytime (Uys, 2003). Other benefits of eLearning include "enhanced access to information, enhanced interaction between learners and teachers, and delivery of lessons from different geographical locations, prompt access to content, combination of both synchronous and asynchronous learning, supports of student centered eLearning paradigm where students can learn at their own speed, increases access to learning and training opportunity. ELearning lowers costs associated with learning and offers the combination of education with work and family life. ELearning solutions are highly scalable as well as facilitating central management of student records", (Unwin, 2008).

Tarus (2011) explains that the implementation of eLearning is still at the early stages to a greater percentage in most Kenyan public universities. The reasons behind this state are challenges associated to technological, organizational and pedagogical. Tarus, Gichoya, & Muumbo (2015) further established challenges facing eLearning implementation to include inadequate ICT and eLearning infrastructure, inadequate finances, lack of affordable and adequate Internet bandwidth, poor policies and laws that creates an eLearning enabling environment, inadequate eLearning technical skills especially on e-content development by the teaching staff and lack of concern and commitment among the teaching staff to use eLearning. Omwenga, Waema and Wagacha (2004) identify challenges facing eLearning implementation as poor infrastructure in terms of internet concentration (which is only available in urban areas), poor ICT infrastructure, professional incompetence and resistance to change. These teachers view ICT as a component that will render them jobless.

ELearning initiatives have introduced in some Kenyan public universities in line with the government's strategy requiring universities to introduce the use of eLearning as an alternate delivery system. The University of Nairobi (UoN) for instance implemented eLearning in 2004 using Wedusoft platform. Kenyatta University (KU) on the other hand launched eLearning in 2005 and is Moodle platform. JKUAT implemented eLearning in 2006 and is currently using Moodle platform. Moi University (MU) started in 2007 with MUSOMI as their eLearning platform. Other public universities are also still implementing this technology. Private universities such as Mount Kenya University (MKU) and Strathmore University have eLearning running programmes. Furthermore, African Virtual University (AVU) since its inception in 1997 has trained more than 43,000 students using eLearning (Virtual 2012).

Implementation, adoption and use of eLearning and its technology requires large investments in faculty resources such as time, money, and space that need to be acceptable to the universities leadership and governance (Ruiz, Mintzer, and Leipzig, 2006). However, "instead of comparing the effectiveness of varying technologies, efforts should be geared towards determining the optimal combinations of all that would best produce excellent learning outcomes for a particular audience. The factors researchers must consider while evaluating ICT impact should be geared towards eLearning environment, the status of ICT integration in the learning environment, the students' and teachers' disposition towards technology, access to technology and training facilities", (Greenberg, 2004; Adedokun-Shittu and Shittu, 2011).

ELearning therefore is an innovation utilized by students during their learning process. Learning processes as those activities aimed at identifying ways of supporting learners and learning in educational and work environments. Learning activities are what students actually do to learn. "It involves the integration of overviews, preliminary reading, listening to discussion, presentation, websites, media or video clip while processes entails lectures, further reading, group discussion, demonstrations, questions and answers, relating to earlier learning experience, interactive websites, audio-visual material, media, research projects. Learning processes can also involve practical projects, discussion of ideas with peers and teachers, project tasks, structured experiences, role play, skills laboratories and writing. It also entail getting both formal and informal feedback which entails criticisms from self, from peers, from teachers, from colleagues, from family and friends and finally reflecting, adjusting and trying again. This can be done through contemplation, writing, reflective journals, discussion", (Hughes 1992).

1.2 Statement of the Problem

Kenyan public and private universities are being compelled by government to introduce eLearning as an alternative delivery system (Kenya Vision 2030, 2007). The University of Nairobi (UoN) for instance implemented eLearning in 2004 using Wedusoft platform. Kenyatta University (KU) on the other hand launched eLearning in 2005 and is Moodle platform. JKUAT implemented eLearning in 2006 and is currently using Moodle platform. Moi University (MU) started in 2007 with MUSOMI as their eLearning platform. Other public universities are also still implementing this technology. Private universities such as Mount Kenya University (MKU) and Strathmore University have eLearning programs. Furthermore, African Virtual University (AVU) since its inception in 1997 has trained more than 43,000 students using eLearning (Virtual 2012). The incentives for Institutions of Higher Learning (IHL) to implement eLearning include technological advancement; needs and demands of the individual learner; need to provide university education in an effective; efficient and cost-effective manner among others. Kirschner et al (2011) noted that eLearning projects are heavily funded by African universities. This is in tandem with Ruiz et al. (2006) who explain that adopting eLearning and its technology requires large investments in institutions resources such as time, money, and space that need to be acceptable to the universities leadership and governance. All these have led to public and private institutions in Kenya to allocate and spend huge sum of money on technology as an indication of development and improvement in education. Despite of all these, few studies have been done in an effort to assess the effect of eLearning on students' learning process in Institutions of Higher Learning (IHL). Such an example is a study by Ruiz et al. (2006) research on The Impact of E-Learning in Medical Education and a study by Adedokun-Shittu et al. (2012) on impact of ICT on students and lecturers. While the use of this technology in education is perceived to bring a lot of benefits, there is also concern of a widespread of unawareness of the specific effect of ICT on education goals and objectives (World Bank, 2003). Similarly, the assessment of ICT impact on teaching and learning (T&L) in Less-Developed Countries (LDC) still exist as a great limitation and most researchers have been evasive on this aspect (Adedokun-Shittu & Shittu, 2011; Unwin & Day, 2005; Trucano, 2012). It is because of this that the researcher decided to conduct a study to assess the effect of eLearning on students' learning process in The University of Nairobi (UoN).

1.3 General research objective

The key objective of this research is to evaluate the effect of eLearning on students' learning process in University of Nairobi.

1.4 Research objectives

i. To determine effect of eLearning benefits on students' learning process in University of Nairobi
ii. To investigate effect of eLearning challenges on students' learning process in University of Nairobi
iii. To establish effect of eLearning incentives on students' learning process in University of Nairobi
iv. To find out effect of eLearning integrations on students' learning process in University of Nairobi
v. To establish the effect of eLearning environment on the relationship between eLearning benefits and SLP
vi. To determine the effect eLearning environment on the relationship between eLearning challenges and SLP
vii. To propose a model for establishing the effect of eLearning on students' learning process

1.6 Research Hypothesis

H_1: eLearning benefits have significant effect on students' learning process.

H_2: eLearning challenges have significant effect on students' learning process.

H_3: eLearning incentives have significant effect on students' learning process.

H_4: eLearning integrations have significant effect students' learning process.

H5: eLearning environment has significant effect on the relationship between eLearning benefits and SLP

H6: eLearning environment has significant effect on the relationship between eLearning challenges and SLP

1.7 Significance of the study

This research provides research study will provide information on eLearning benefits, eLearning challenges, eLearning incentives, eLearning integration, eLearning environment and their effect on SLP. This is important since many Institutions of Higher Learning have introduced eLearning innovation/technology while others are still introducing with a notion of enhancing teaching, learning and research in the most efficient and effective manner. This research was therefore important in explaining whether this innovation effectively facilitate SLP by way of enabling the realization of course objectives and learning outcomes in an educational setup. Furthermore, with this understanding of the effect of eLearning on SLP, leaders in educational institutions, lecturers, eLearning system developers and the government get to understand the effect of what they do.

1.8 Operational definition of the variables

1.8.1 ELearning

This study adopted the asynchronous definition of eLearning which is described by Hrastinski (2008) as "where the instructors provide materials, lectures, tests, and assignments that can be accessed at any time facilitated by media such as learning management systems, e-mail and discussion boards. Students may be given a timeframe – usually a one week window – during which they need to connect at least once or twice".

1.8.2 Learning process

Student learning process is an "activity or process of gaining knowledge or skill by studying, practicing, being taught, or experiencing something. Learning process is aimed at identifying ways of supporting learners in learning, it involves getting in educational and work environments. The process entail be introduced to it, get to know more

about it, try it out , get feedback and finally, reflect, adjust and try again. Students have to process information actively and construct the knowledge through experience", (Hughes et al. 1992).

1.8.3 Information and Communication Technology (ICT)

"ICTs are a diverse set of technological tools and resources use for creating, storing, managing and communicating information", (Vajargah et al. 2010).

1.8.4 Learning Management System (LMS)

"LMS is a web - based technology which facilitates in planning, distribution and estimation of a particular learning process. LMS offers possibilities for changing and developing new method in education as well as facilitating flexibility for institutions. The administrator manages eLearning course as well as keeping track of students' progress", (Ayub et al. 2010; Brown & Johnson 2007).

1.8.5 ELearning benefits

It means the advantages gained from something. They include "benefits, students' response and comfort and compatibility with teaching and learning", (Adedokun-Shittu 2012).

1.8.6 ELearning challenges

It refers to a matter or situation regarded as unwelcome or harmful and needing to be dealt with and overcome. In this study challenges will include problems, constraints and technical issues (Adedokun-Shittu 2012).

1.8.7 ELearning Integration

It is the process of incorporating an aspect into an existing situation. It includes incorporating in students' learning, incorporating into the curriculum, integration in curriculum as well as blend of approaches (Adedokun-Shittu 2012).

1.8.8 ELearning Incentives

This is what encourages one to do something. It includes motivation, adequacy, access and training (Adedokun-Shittu 2012).

1.8.9 ELearning environment

The traditional meaning of the term "learning environment" meant a place and space, such as a school, a classroom, a library. In 21st century where the world is interconnected and technology - driven world, a "learning environment can be virtual, online, remote; in other words, it doesn't have to be a place at all. Perhaps a better way to think of 21st century learning environments is as the support systems that organize the condition in which humans learn best – systems that accommodate the unique learning needs of every learner and support the positive human relationships needed for effective learning. Learning environments are the structures, tools, and communities that inspire students and educators to attain the knowledge and skills the 21st century demands of us all. Modern learning environments support strengths-based teaching and can offer students and teachers flexibility, openness and access to resources", (Osborne 2013). For the purpose of this study, eLearning environment is taken to encompass Interface design, instructional design, instructional content and learners' support. Könings, Brand-Gruwel & Merriënboer (2005) noted that the "characteristics of the learning environment are expected to have positive effects on student learning. Moreover, students' perceptions of a learning environment affect their subsequent learning behaviour and the quality of the learning outcomes".

2.0 CHAPTER TWO: LITERATURE REVIEW

2.0 Introduction

This section examines literature on eLearning evaluation with specific focus on benefits/positive effects of eLearning on students' learning process, eLearning challenges on students' learning process, eLearning incentives on students' learning process and finally eLearning integration on students' learning process. Review of both CIPP evaluation model and Kirkpatrick's model guided the development of a blended model - the new Adedokun-Shittu 2013 ICT impact assessment model. This new model will be adopted in this study.

2.1 Students' learning process

Learning processes are aimed at identifying ways of supporting learners and learning in educational and work environments. "Learning activities are what students actually do in their course in order to learn. A model of the learning process developed by Hughes and colleagues (1992) provides a helpful guide to the development of learning and teaching strategy through the selection or design of specific learning activities. This model suggests that in order to learn something one needs to be introduced to it which involves overviews, preliminary reading, listening to discussions, and demonstrations as well as both audio and visual media clips. Secondly, get to know more about it: it entails lectures, further reading, group discussion, demonstrations, participating in questions and answer sessions, relating to earlier learning experience, interactive web portals , audio and video media, research projects. Third, try it out which involve practical projects, students discussing the ideas with fellow students and lecturers, design projects, organized experiences, role play, skills laboratories, writing. Fourth, is get feedback which involve participating in both formal and informal feedback and responses from personal search for knowledge, request to understand concepts from fellow students, from lecturers, from colleagues in different workplaces, from family and friends and finally, reflect, adjust and try again: this is done through contemplation, writing, reflective journals, discussion", (Hughes et al. 1992).

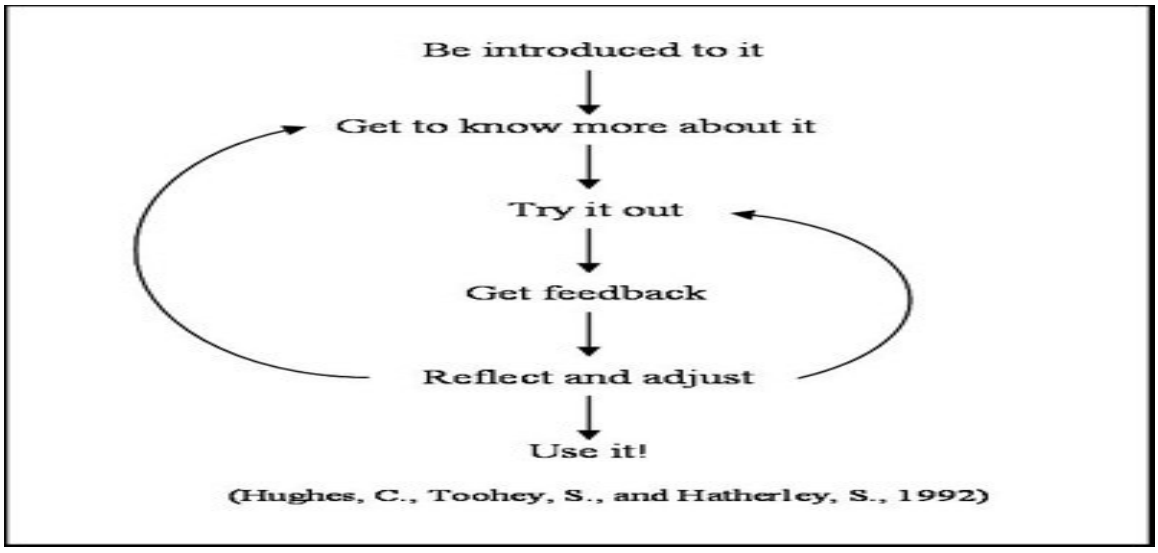

Figure 1: Students' Learning Process (SLP)

2.2 The effect of eLearning on students' learning process

2.2.1 Benefits of eLearning in Institutions of Higher Learning

Student performance considers the level and quality of learning outcomes as well as the student's overall performance in examinations. "In Institutions of Higher Learning, student participation is a primary feature of enhanced performance. This is seen in instances where students actively participate in class-room discussions and group assignments, students also get time to read in advance. It can be concluded that eLearning enables students' to perform better than those on more traditional schemes", (Lieberman, 2002). There is evidence to suggest that the students who employ eLearning tend to be always effective and efficient than those who go through traditional courses. The introduction of eLearning by Carnegie Mellon University (CMU) in America, has seen students' exam results to not only improved but also have acted as educational bridges between subjects, breaking the traditional existing boundaries between disciplines", (Scott, 2000). The meaning of this is that Institutions of Higher Learning (IHL) that effectively utilises technology in learning (eLearning) enhances the performance of students in assessments as well as produce educated graduates who are both theoretically and practically prepared for working in a competitive and diverse information economy driven by information and knowledge (Holley 2002).

2.2.2 Greater accessibility of education

ELearning is undoubtedly giving students extensive access to learning as opposed to the traditional learning systems. Both full time and part time students can access chosen degree programs from any university within and beyond the geographical areas. This has additionally given students an "opportunity to continue accessing education despite of their continuous change of localities and environments caused by issues such as work travel, work place transfers which occasion's relocation. Additionally, students who have formerly not had access to university education now have the opportunity to study at their convenient environments. This technology has further given other groups of people such as students with disabilities the opportunity to advance their education from home. It has given other groups of people such as students with disabilities the opportunity to advance their education from home", (Brown, Cromby & Staden, 2001; Hemsley, 2002; Sadler-Smith, 2000). There exist various research aspects that have been carried and show that students' who learn from their comfort zones for example home environment will not have positive learning experience. "Home access to education may seem a positive way forward but the learning process is often disrupted, as the environments are not necessarily conducive to study", (Shaba, 2000).

Education through this model is facilitated by availability of computers are an indispensable element of effective eLearning courses (Ribiero 2002). "Students who have computers connected to the internet may have the opportunity to experience a more flexible learning process as opposed to those IHL and students who do not have access to this opportunity occasioning the fail to benefit from this opportunity, due to students not being able to afford or gain access to a computer. It can therefore be concluded that students with no computer at home are disadvantaged in eLearning environments", (Shaba 2002).

2.2.3 Access to diverse sources of educational materials

The availability, access to and the capabilities of Internet has allowed universities to ubiquitously provide their academic and non-academic services as well as create global learning institutions for today's information age (Wilson, 2001). The opportunity to access worldwide academia and associated resources has resulted to unlimited

availability of enhanced informational materials to students and even teaching staff in universities (O'Hearn, 2000). The researcher further stated that global eLearning programmes provide platform which enables students to connect amongst themselves and share knowledge resources, such as educational materials and research findings from anywhere in the world. This may point to those students who utilises eLearning in studying diverse degrees may be more prepared for a global work market due to their holistic and diverse access to knowledge and skills that could best suit universal work force requirements.

Other eLearning benefits include "ease in teaching and learning, access to information and up to date resources, online interaction between staff and students, establishing contact with the outside world through exchange of academic work, lecturers' and students' comfortability with ICT and its compatibility with their teaching and learning needs as other benefits of eLearning on students' learning experience. Comfortability and high proficiency in ICT use in learning, formal and informal students and lecturer interaction, better access to resourceful information, student/ lecturer collaboration, ease in teaching and learning, interaction with the outside world", (Adedokun-Shittu and Shittu, 2012).

2.2.4 Cost effectiveness

Ruiz, Mintzer, and Leipzig (2006), explains that effective and efficient eLearning brings about cost-effectiveness; learner satisfaction; learners demonstrating better retention of knowledge and skills acquired. A substantial body of evidence showing sophisticated cost analysis, that eLearning can result to up to 50% cost reduction which is a significant cost savings, compared with traditional learning methods. Hussain, (2009) noted that these savings come from reduced lecturing time, elimination of continuous travel costs, as well as labor costs, reduced institutional infrastructure as well as decreased costs associated to buying printed educational materials that are always predominant in non-eLearning setup.

2.3 ELearning challenges in Institutions of Higher Learning (IHL)

IHL that uses eLearning experiences challenges that rotate around three pillars such as connectivity, capacity and content. These three aspects are yet that are yet to be recognized in Africa (Balanskat et al. 2006). Some of these are lecturer/teacher-level barriers, institutions/school-level barriers and system-level barriers.

ELearning challenges associated to lecturers or teachers capacity

Balanskat et al. (2006) identified eLearning challenges associated with lecturer/teacher level to include "lack ICT skills; lack of motivation and confidence in using ICT". Andersson & Grönlund (2009) and Adedokun (2008) further identified eLearning challenges to include those pertinent to individuals' characteristics of lecturers/teachers, inadequate ICT skills amongst teachers and insufficient training on how to integrate ICT into the subject they teach Educators' "attitudes, expertise, lack of autonomy and lack of knowledge to evaluate the use and role of ICT in teaching (or 'technophobia' in educators) that are the prominent factors hindering educators readiness and confidence in using ICT support", (Bingimlas, 2009).

ELearning challenges associated with institutions/school level /connectivity

These challenges include the absence or poor quality ICT infrastructure, inappropriate hardware and software, limited access to ICT equipment, institutions/schools' limited project-related experience, poor or even lack of experience in project-based learning, absence of ICT mainstreaming into schools' strategies, high cost of ICT

infrastructure, low internet bandwidth, poor usability of eLearning systems and lack of connection to electricity (Balanskat et al. 2006; Namisiko, Munialo and Nyongesa, 2014; Alemneh and Hastings, 2006; Andersson and Grönlund, 2009; Cuban, 2001). Chitanana, Makaza and Madzima (2008), also identifies low computer to student ratio as another challenge. The challenges facing eLearning in African countries include the absence of eLearning programs, the inability of students access the few that exist. Furthermore, "the average African university has bandwidth capacity equivalent to a broadband residential connection available in Europe, pays 50 times more for their bandwidth than their educational counterparts in the rest of the world, and fails to monitor, let alone manage, the existing bandwidth. As a result, what little bandwidth that is available becomes even less useful for research and education purposes", (Steiner et al. 2005).

Alam & Farid (2011); Hennessy, (2010) and Mbambo-Thata (2009) asserts that other social issues such as poverty, growing prevalence of HIV/AIDS, and a lack of political will to alleviate the situation through proper planning are still negatively affecting the ability of students to fully utilise eLearning technologies. This is seen in instances where learners are unable to purchase these technologies.

ELearning challenges associated with system-level /content /capacity

System-level barriers occur whenever the existing education system cannot support the introduction of ICTs (Balanskat et al. 2006). This is further reiterated by Namisiko, Munialo, & Nyongesa (2014) who explains that the challenge is that many curriculum developers are using the same models to create eLearning instruction as they used to design and develop face to face teacher and learner instruction (f2f). Other challenges highlighted include misappropriation of education technology funds, continuous and up-to-date professional development in the integration of teaching and learning should be given a reasonable budget, maintained and sustained rather than investing in only computer hardwares and softwares (Adedokun, 2008).

The slow take up of eLearning by lecturers may partly be due to "their lack of awareness of e-learning facilities and their reported lack of preparedness. This can be a result of poor coordination of stakeholders in the universities during the launch and implementation of eLearning programmes. Another challenge is lack of training as evidenced by the lecturers' expression for the need for professional development. The results indicate that no university in Zimbabwe is offering training and continuing professional development for learning and teaching staff to enhance their skills, knowledge and competencies for the provision of high quality eLearning; Lack of technical support/advice; lack of administrative support/initiative at faculty level; lack of awareness regarding ways to integrate the software into teaching; lack of access to computer lab with your classes, including these is lack of confidence in e-learning systems by both lecturers and students, old and slow computers and lack of pedagogical support. Others include over reliance on ICT, large students' population, inadequate facilities and limited access in terms of working hour that minimize the positive impacts derived from ICT use in the university", (Adedokun-Shittu and Shittu, 2012).

Perceived usefulness of eLearning students is also a major factor that affects learners' attitudes towards a software tool and further affect individuals' beliefs and behaviours when adopting eLearning. ELearning systems that are perceived to be easily usable seems to be adopted and used as expected (Sun et al. 2008). Similarly, inadequate and sometimes totally lack of neither the students nor the teachers who are the primary users of the ICT facilities

integrated in the schools are consulted before the implementation of eLearning technologies (Adedokun, 2008). The researcher further reiterated that learning should drive the use of technology rather than technology driving education. Choosing technology first and then trying to fit ourselves, our pedagogies, and our learning goals in it is a great mistake educators make and this has led to numerous false-starts and failures (Adedokun, 2008).

2.4 Factors driving the adoption of eLearning /eLearning Incentives

Gaebel et al. (2014) and Adedokun-Shittu and Shittu (2012) explains that some of the motivating factors that drive adoption and consequent use of eLearning include the "need for flexibility of learning, enhanced efficiency of classroom time, and the need for more and better learning opportunities for students, training and motivation are provided; availability of internet service as well as software and other facilities. ELearning is also perceived by the majority of institutions as a means for collaborating within the institution and with other international higher education institutions. Also mentioned is the need to facilitate teaching and instructing larger numbers of students, and also enables them to collaborate with each other". Omwenga, Waema and Wagacha (2004) and Bichsel (2013) further reiterated that the need to provide more-flexible education hence the need for eLearning in Kenya. This flexibility allows the learner some critical choices in the learning situation in order to meet needs at personal level, internet availability, need for cost reduction, cheaper computers, and young population who have embraced the internet and smart phones. Flexibility can be in terms of "time, content, entry and completion, instructional approach, learning resource, technology use, interactivity and communication, course logistics, as well location", (Collis, Vingerhoets and Moonen 1997).

2.5 eLearning integration

2.5.1 Global perspective of eLearning integration into learning in Institutions of Higher Learning

E-Learning has become part of education system in developed countries and the presence of lecturer in classroom is becoming less significant as ICT continues to provide solutions to deliver services. "The global aggregate growth rate for eLearning is 7.6% but several world regions appear to have significantly higher growth rates, the highest growth rate is in Asia at 17.3%, followed by Eastern Europe, Africa, and Latin America at 16.9%, 15.2%, and 14.6%, respectively", (Docebo, 2014). The use of ICT in the education sector will be a dominant trend over the next decade. Since eLearning allows students to study anytime-anywhere, basic education and up skilling becomes more available to more people. ELearning has become a norm in the United States; a recent study indicated that 6.7 Million university learners enrolled for at a minimum of one online course to account for 32% of the students in higher education (Babson Survey Research Group 2013).

In European higher education institutions, "all higher education institutions of the sample have started to embrace eLearning. Most of the surveyed institutions uses blended learning (91%), integrating eLearning into conventional teaching, but surprisingly 82% of institutions also indicate that they offer online learning courses. Less frequent, but seemingly also on the rise, are other forms of provision such as joint inter-institutional collaboration and online degree courses", (Gaebel, Kupriyanova, Morais, and Colucci 2014). ELearning implementation in Europe is by the vast majority (96%) of universities that is 238 out of 245 institutions EUA (2014). Over 40% of institutions involve less than 25% of their students in e-learning due to decentralized eLearning while centralized model institutions

have 50% of the students on eLearning. The region has a body known as European Distance and E-Learning Network (EDEN) that assists its 200 members with collaboration for eLearning. With all these statistics, it is paramount for impact assessment to be done.

2.5.2 ELearning integration in Institutions of Higher Learning (IHL)

ELearning in many developing countries "is likely to have a huge potential for governments in helping to meet an increasing demand for education and address the growing decline of trained teachers, (UNESCO, 2006). Many learners in developing countries are not exposed to many ICT solutions and further observes that majority of LMS implemented in Sub-Saharan countries tend to fail; partially or totally. This failure can be attributed to various barriers to eLearning in developing countries. The absence/inadequate infrastructure are a barrier to access of eLearning among students in developing countries. For instance, the Internet penetration rate in the developing world is 31% compared to developed world which is 77%. Internet penetration rate in Africa is merely 16%", (Global Internet Usage, 2013; Ssekakubo et al. 2011).

ELearning in countries like Libyan higher institutions still face many challenges such as "cultural and linguistic background of students and instructors, and their awareness of and attitudes towards eLearning; the underdeveloped technological infrastructure and the often prohibitive cost of educational technologies; the lack of local expertise in curriculum development for eLearning; and, the lack of educational management mechanisms to support eLearning initiatives", (Rhema and Miliszewska 2010). "In Ethiopia, under the UniversityNet programme, all 12 Ethiopian universities have been networked and have eLearning centres. This is Under the SchoolNet, 500 secondary schools including the Technical and Vocational Education and Training schools are networked via satellite (Reif, 2005). Similarly, ICT has become the tool for teaching and learning at all levels of Namibians education (Cowan, 2005). In the year 2005, six Somali tertiary institutions launched an Online Distance Learning Initiative that would enable students to attain accredited university qualifications through partnerships with institutions in other countries", (AVU, 2005c).

2.5.3 ELearning integration into institutions of Higher Learning in Kenya

Universities in Kenya are used to teaching by the means of lecturers physically present in front of the class to deliver their lectures to students. The concept of physical presence learning environment accounts for the largest group of students in most universities in developing nations according to Kashorda and Waema (2014), 78 per cent have enrolled for physical class lecture courses. The concept of eLearning is emerging in most universities but it has not fully been adopted to have significant number of student enrolled in the eLearning program. Information Communication Technology has a great potential to create bigger opportunities, improve service delivery and access to education. The use of ICT has made it possible for universities to develop eLearning centers to deliver their programs, however its impact is not significant in Kenyan universities. According to Kashorda et al. (2014) "about 73 per cent of university students preferred blended courses compared to only 14.9% who choose online-only courses. Only 11 per cent of the students reported that all or nearly all courses they took were blended while about 78 per cent say that only a few or none of the courses were mixed". It is also noted that the market for students in Kenya willing to enroll to eLearning is available but universities have failed to capitalize on this Kashorda et al. (2014).

Kenyan public and private universities are being compelled by government to introduce eLearning as an alternative delivery system (Kenya Vision 2030, 2007). The University of Nairobi (UoN) for instance implemented eLearning in 2004 using Wedusoft platform. Kenyatta University (KU) on the other hand launched eLearning in 2005 and is Moodle platform. JKUAT implemented eLearning in 2006 and is currently using Moodle platform. Moi University (MU) started in 2007 with MUSOMI as their eLearning platform. Other public universities are also still implementing this technology. Private universities such as Mount Kenya University (MKU) and Strathmore University have eLearning programs. Furthermore, African Virtual University (AVU) since its inception in 1997 has trained more than 43,000 students using eLearning (Virtual 2012).

2.5.4 Integration of ICTs in students' assessment

JISC (2013) define e-assessment "as the use of computers in assessment, that is, the setting, delivery, marking and reporting of assessments. Assessing learning in an electronic environment is being used by lecturers and institutions worldwide at an increasing rate", (Crisp 2007). He further stated that several "e-assessment tools have been developed, tested and used as plugins or embedded in Learning Management Systems (LMS)". This has led to increased time taken by lecturers to assess students. The all process can turn to be cumbersome in case of large classes leading to waste of time and effort that could have otherwise be used in improving learning content. Charman and Elms (2013) pointed out that Institutions of Higher Learning can effectively utilize e-solutions in order to minimize time taken on students' assessments. This becomes a strong justification to use the e-assessment in universities. Sometimes there is little relevant and specific feedback or none at all concerning what areas students need to revisit to help them improve their learning. In Strathmore University, paper booklets for assessments can be expensive in the long run. The university spends Kshs 1,000,000 in purchasing paper booklets per semester t. In terms of four years, that is a lot of money that could be invested in other projects (Mukandutiye 2014).

2.5.5 E-Assessment implementation in Institutions of Higher Learning

Oyenkule et al. (2012) explained the adoption of computers to make to make assessments better. In their study, they found out that e-assessment is used to "administer examinations for courses with large population of students of 500 and above. The highlighted advantages of e-assessment to include standardized examination questions, elimination of incidence of malpractices, missing results and manipulations, quick release of results, unbiased test administration and scoring, faster decision making and reduction in cases of impersonation. Moskal (2007) did a research in the University of Central Florida where large classes of 250 or more students presented particular challenges which made administering and grading paper based exams difficult and time-consuming. The University adopted the use of WebCT/Blackboard and an e-assessment tool inherent in the LMS. An overwhelming majority of students who responded (86.2%) indicated that they were satisfied with e-assessment. Over a period of time, computer-based exams were offering significant cost savings over paper-based exams. Since the adoption of e-assessment, the University estimated a savings of between $135,000 and $163,000 in the cost of paper. Edinburgh's Telford College embedded the use of e-assessment across the College through the development of a dedicated e-assessment Centre, e-assessment authoring tools and delivery platforms", (JISC 2013). Evidence gathered from the students showed that they enjoyed using the Centre and e-assessment. Among the things they enjoyed were, "getting instant feedback/immediate results and also believe it is a more environmentally friendly option as it saves on paper. The

lecturers have been pleased by the accessibility benefits of e-assessment. The institution has also realized reductions in the use of paper, printing costs and offsite storage".

However, several research/studies have showed that the challenges associated with e-assessments includes questions such as "what extent e-assessment enhances student learning; enhancement of feedback in dissertation supervision; e-portfolios promoting active engagement in student-centered learning groups, difficulty in developing an e-assessment strategy that incorporates pedagogic and technical aims, investment up front to establish the materials/content, introducing sustainable ways of supporting computer-based assessments, setting up a viable physical and Information Technology (IT) infrastructure to support e-assessment to the required scale, instituting policies and procedures to ensure the validity of e-assessments, plagiarism management and careful design of questions to enable the testing of higher order skills To practitioners, challenges are such as allocating time for e-assessment-related skills development, ensuring the accessibility of e-assessments for a diversity of learners, achieving a best fit between e-assessment design, course objectives and the needs of learners, developing confidence and expertise in a full range of e-assessment approaches and assimilating changes in working practices", (Angus and Watson (2009); Heinze and Heinze (2009) and Barbera (2009).

"It can be summarized from the five cases presented above that e-assessment has brought benefits such as standardized examination questions, elimination of incidence of malpractices, missing results and manipulations, quick release of results, unbiased test administration and scoring, faster decision making and reduction in cases of impersonation, significant cost savings over paper-based exams in terms of printing costs and offsite storage, students' enjoyment, students getting instant and timely feedback/immediate results, more environmentally option as it saves on paper. E-feedback ca also facilitates lecturers and students to easily suggest additional relevant resources. Based on the findings of the research carried out in Strathmore University, it is evident that the use of ICT in assessment would be a great tool to manage assessments of large classes. It is time-consuming in the beginning to set up a question bank but it is beneficial in the long run as it can be easily updated and reused", (Mukandutiye 2014).

2.6 Theoretical frameworks

2.6.1 The CIPP Evaluation Model

CIPP Evaluation Model is a "broad framework for guiding evaluations of programs, projects, institutions, and systems particularly those aimed at effecting long-term, sustainable improvements. The acronym CIPP stands for context, input, process, and product evaluation. This type of study is a comprehensive assessment conducted for the purpose of accountability which requires determining the overall effectiveness or merit and worth of an implementation. It requires using impact or outcome assessment techniques, measuring anticipated outcomes, attempting to identify unanticipated outcomes and assessing the merit of the program", (Stufflebeam 2004).

Stufflebeam (2004) identified the first element in this framework as impact. It assesses whether the introduction and incorporation of eLearning innovation and other ICT infrastructures in teaching and learning "has a direct effect on the lecturers and students, what the effects are and whether other aspects of the system changed as a result of this deployment? Effectiveness checks whether the programme achieves intended and unintended benefits, or is it effective for the purpose of improved teaching and learning for which it is provided? Transportability measures

whether the changes in teaching and learning and its improved effects can be directly attributed or associated to the deployment of ICT facilities. Lastly, sustainability looks into how lasting the effect of the ICT deployment will be on the students and lecturers and how well they utilize and maintain it for teaching and learning purposes. This limits its scope to the product evaluation in this model which is suitable for impact studies and is designed for external evaluators to collect data about program-wide effectiveness. It therefore facilitate managers in making judgments about programs' worth", (Stufflebeam, 2004). It is because of these that this model was not adopted in this study.

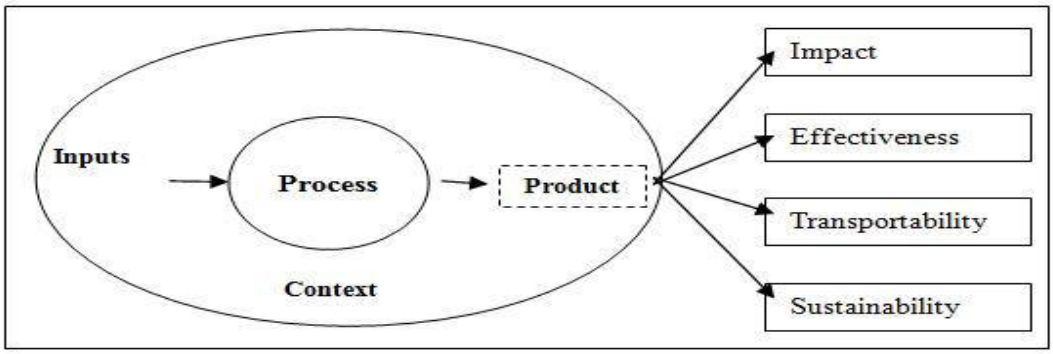

Figure 2: CIPP Evaluation Model

2.6.2 Kirkpatrick Model of Evaluation

Kirkpatrick's successive four-level model of evaluation is a way of "determining the reaction, learning, behaviour and results that occur in users of a program to determine the program's effectiveness. Although this model is originally developed for assessing training programs, it is however, useful in assessing the impact of technology integration and implementation in organizations", (Lee, 2008; Owston, 2008). "The first level is reaction, measures the relevance of the objectives of the program and its perceived value and satisfaction from the viewpoints of users. The second stage is learning. This stage evaluates the knowledge, skills and attitudes acquired during and after the program. It is the extent to which participants change attitudes, improve their knowledge, or increase their skills as a result of the program or intervention. It also assesses whether the learning that occurred is intended or non-intended. In the transfer stage the behaviour of the users is assessed in terms of whether the newly acquired skills are actually transferred to the working environment or whether it has led to a noticeable change in users' behaviour. It also includes processes and systems that reinforce, monitor, encourage and reward performance of critical behaviors and ongoing training. Finally, the result level measures the success of the program by determining increased production, improved quality, decreased costs, higher profits or return on investment and whether the desired outcomes are being achieved", (Kirkpatrick & Kirkpatrick 2007). Kirkpatrick's' model is often utilized by internal evaluators to measure the impact of a specific treatment.

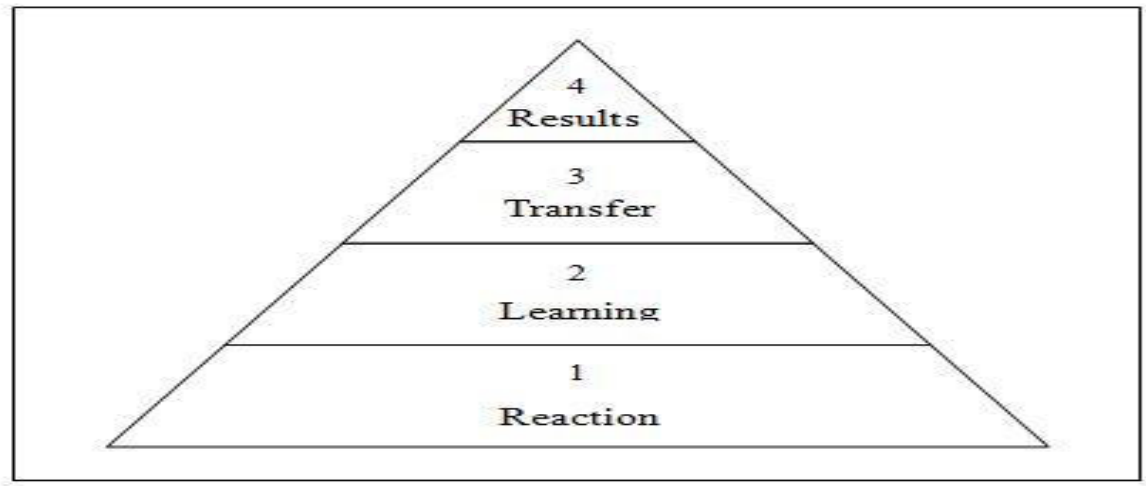

Figure 3: Kirkpatrick's Successive Four-level model of evaluation

2.6.3 ICT Impact Assessment Model by Adedokun-Shittu and Shittu 2013

This model extends the elements of Kirkpatrick (reaction, learning, behaviour and results) and Stufflebeams' CIPP (Context, Input, Process and Product) models by introducing the element of challenge. The combination of the frameworks is affirmed by Lee (2008) who concludes in his assessment on research methods in education by saying; "there is no such thing as a perfect teaching model and a combination of models is needed to be able to adapt to the changing global economy and educational needs". "The ICT impact assessment model represents a theoretical framework for research in impact assessment and is made up of the themes generated from Adedokun-Shittu's 2012 study: positive effects, challenges, incentives and integration (Figure 1). Its form is cyclic because the assessment process can start from any stage, and can be done either individually or holistically making it useful for both formative and summative assessment of ICT integration in teaching and learning. The cyclic representation also indicates the central strength the elements in the model provide to ICT impact and depicts that: to assess ICT impact, the process can start from any of the four elements", (Adedokun-Shittu and Shittu, 2013).

This study adopted ICT impact assessment model by Adedokun-Shittu and Shittu 2013 because of its extensive capability. It takes into consideration element challenges. This element is important because of the evolving nature of ICT in education which necessitates addressing the challenges related to teacher preparation, curriculum, pedagogy, assessment, technical issues, updating and maintaining ICT facilities, and managing return on investment, this extension becomes crucial for impact assessment. It also fills a crucial gap left by both models. This makes the ICT impact assessment model more appropriate than the other existing impact evaluation models. The resultant model (ADEDOKUN-SHITTU 2011 ICT impact assessment model) generated through a mixed method research design has four components which are substitutable to CIPP and Kirkpatrick models.

"ELearning positive effects entail eLearning benefits, students' response and ICT compatibility/comfort in teaching and learning. Some of the contributions of eLearning benefits include ease in learning, access to up to date resources and important informational resources and online interaction between staff and students, establishing contact with the outside world through exchange research and academic work and taking less time to achieve, students enjoy

taking online assignments. Furthermore, students' use the internet to search for academic resources; students' learn other ICT skills that facilitate efficiency in class. Secondly, the challenges in this model entail; problems, constraints and technical issues. Some of the problems are; plagiarism, absenteeism and over reliance on ICT. Constraints entails inadequate facilities and limited access in terms of working hours, insufficient buildings for the conduct of computer based exams, insufficient technical staff, no viable policy on ICT in place and epileptic power supply. The technical issues revolve around hardware, software and internet services. The third component of this model is the incentives. It comprises accessibility, adequacy, training and motivation. These incentives need to generate some impact to be felt in the area of integration into teaching and learning before the deployment of ICT facilities in higher education Institutes could be deemed productive. The fourth part of this model is integration. These include ICT integration in teaching and learning, ICT integration in curriculum, use of ICT technologies in administering exams and even CATs as well as using ICTs in traditional class room setup", (Adedokun-Shittu and Shittu, 2013).

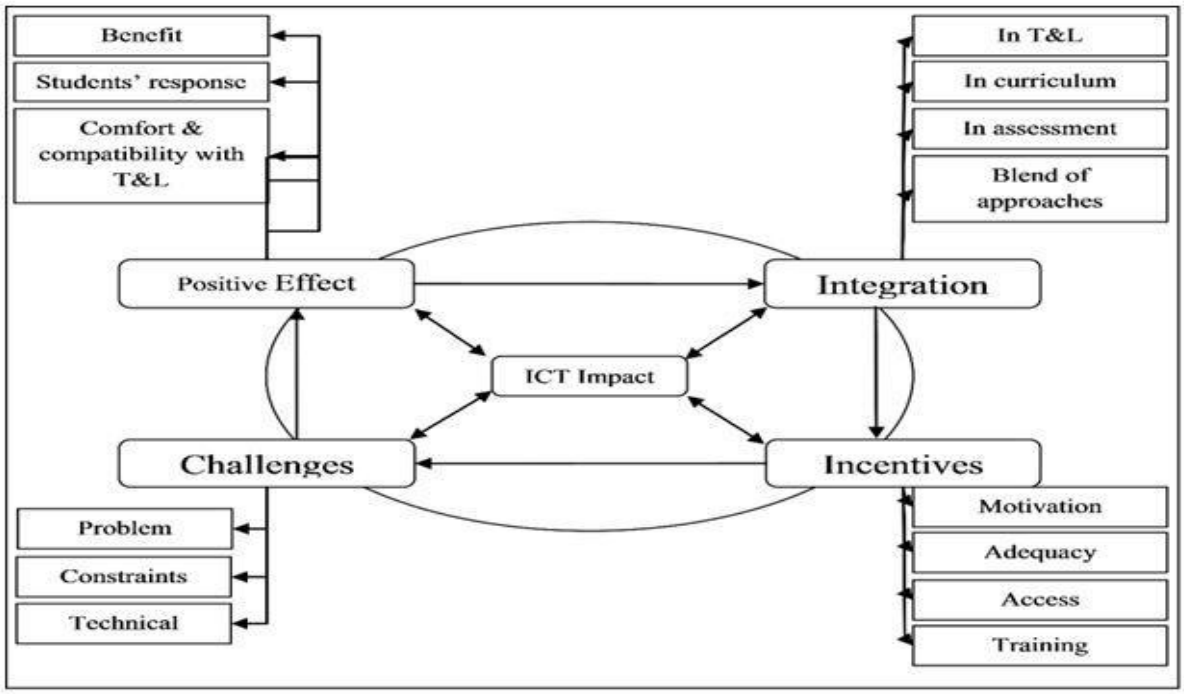

Figure 4: ICT impact assessment model (Adedokun-Shittu and Shittu, 2013)

2.7 The conceptual framework

Conceptual framework is a group of concepts that are broadly defined and systematically organized to provide a focus, a rationale, and a tool for the integration and interpretation of information.

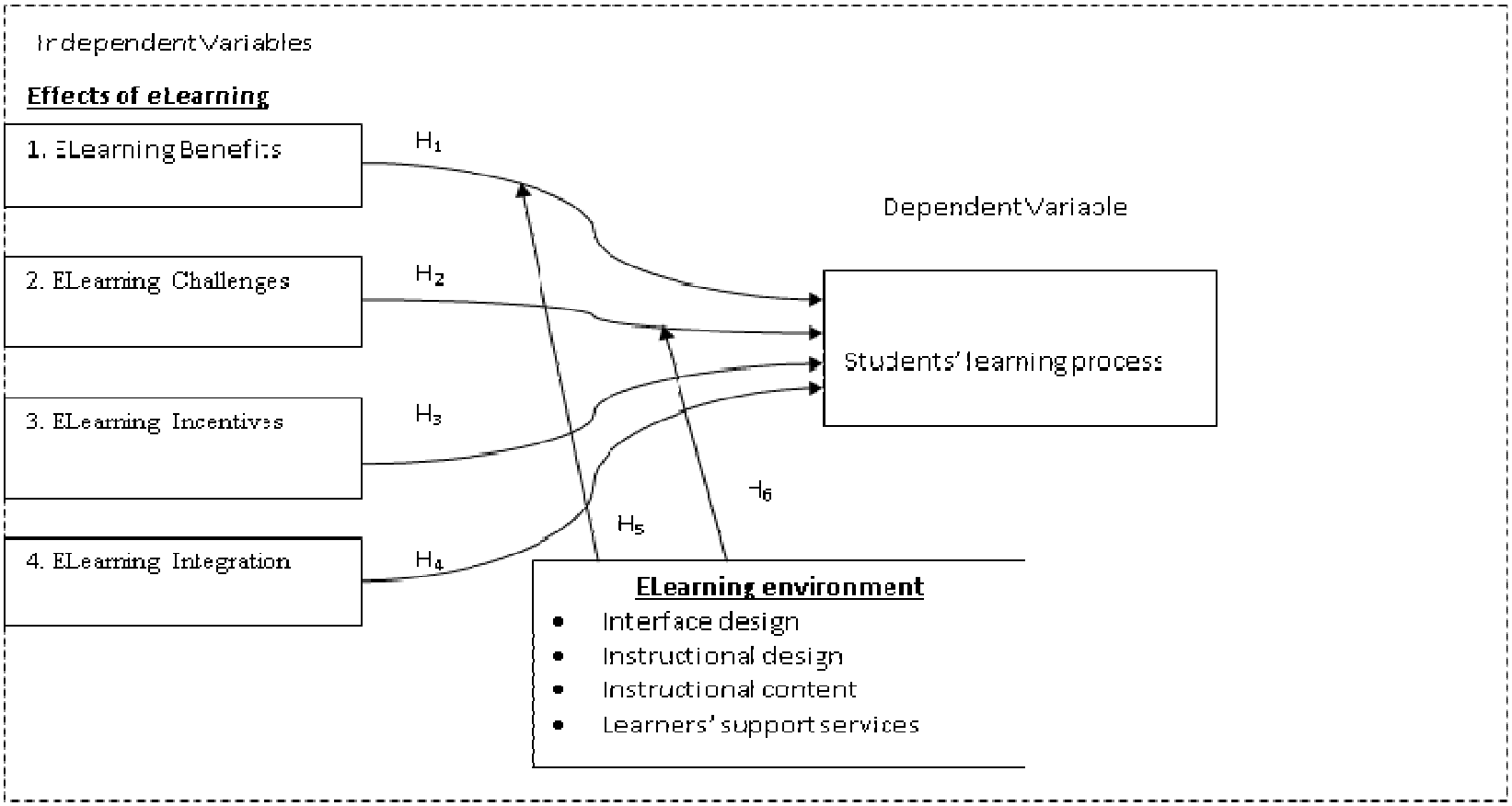

Figure 5: Conceptual framework

2.8 Empirical literature

2.8.1 Introduction

Ginns and Ellis (2007) in their study on quality student learning in nstitutions of Higher Learning noted that quality learning is achieved by students whenever a number of concepts are taken into consideration. These concepts include students' prior experience, knowledge, conceptions and reasons for studying; students' perception of teaching-learning environment; type of teaching-learning environment available; University teachers' pedagogical course knowledge and conceptions of teaching; how course material is selected, organized, presented, assessed; and finally approaches to learning and studying. Goi and Ng (2009) also explained the aspects deemed important to the eLearning users (students), to include "program content, Web page accessibility, learners' participation and involvement, website security and support, interactive environment, instructor competency, and presentation and design. Könings, Brand-Gruwel and Merriënboer (2005) noted that the characteristics of the learning environment have got a significant effect on students learning process. The characteristics of the learning environment are expected to have positive effects on student learning. Moreover, students' perceptions of a learning environment affect their subsequent learning behaviour and the quality of the learning outcomes. Rather than the learning environment itself, the students' perceptions of a learning environment determine how much they will learn and how effective a learning environment will be (Entwistle, 1991). The way students perceive and interpret a learning environment is influenced by their conceptions about learning, tasks, and environments, together called 'instructional metacognitive knowledge", (Elen & Lowyck, 1999). "The common aspects highlighted to affect an effect on students' learning process include designing eLearning system to be at least with good and adequate program content, which is presented well and can be accessed easily, and to allow high user participation and involvement in the virtual learning environment. User-centered design is where different users who may have different requirements on how the program content should be displayed", (Costabile et al. 2005).

Discrepancies between designers' and students' interpretation of a learning environment will usually cause "suboptimal use of a learning environment. What is really needed is a reciprocal relationship between designers, teachers, and students, so that there is exchange of ideas about learning and perceptions of learning environments. Only in this way, can more congruence be created between interpretations of learning environments by designers, teachers, and students, which will lead to the development of more effective learning environments and, eventually, more effective learning", (Elen & Lowyck, 1999).

2.8.2 Relationship between learning environment and the students' learning process

The traditional meaning of the term "learning environment" suggests place and space – a school, a classroom, a library. In the 21st century where the world is interconnected and technology - driven, a learning environment can be "virtual, online, remote; in other words, it doesn't have to be a place at all. Perhaps a better way to think of 21st century learning environments is as the support systems that organize the condition in which humans learn best – systems that accommodate the unique learning needs of every learner and support the positive human relationships needed for effective learning. Learning environments are the structures, tools, and communities that inspire students and educators to attain the knowledge and skills the 21st century demands of us all. Modern learning environments

support strengths-based teaching and can offer students and teachers flexibility, openness and access to resources", (Osborne, 2013).

This research focuses on the effect of eLearning on students' learning process. The effects highlighted include the eLearning benefits, eLearning challenges, eLearning incentives and eLearning integration. Introduction of this intervention (eLearning) which is coupled with eLearning environment is expected to facilitate students' learning process.

"The increasing heterogeneity of the users' population, the diversification of learners' learning needs and tasks, and the decreasing tolerance of users' frustration motivate the application of the user-centred model in eLearning design", (Zaharias and Poylymenakou 2009). Penna, Stara and De Rose (2009), identified the common step to start designing a successful eLearning system is to design usable user interfaces. It is very important because it has a negative impact on user performance if it is not done correctly (Avouris et al. 2001). It can be generalized that to ensure the success of the eLearning system, it is critical to "create a system that supports rather than frustrates users.

However it is important to note that instructors are also the main users who play important role in designing the course content and the information layout display. It is also proved that instructor's attitudes toward e-learning have a significant effect on learners' satisfaction. In other words, instructor should handle e-learning activities and respond to students' problems promptly to improve learning satisfaction. Therefore it is important to design a system to encourage the instructors to use the eLearning system as a tool to promote learning", (Sun et al. 2008).

2.8.3 Technology and the Interface characteristics and its usability

ISO 9241 standards define "usability as the extent to which a product can be used by specified users to achieve specified goals with effectiveness, efficiency and satisfaction in a specified context of use. Usability plays significant role towards the success of eLearning applications which in turn affect students' learning process. If an eLearning application is not usable enough, it obstructs students learning: the learners would not spend more time learning how to use the software rather than learning the contents", (Ardito et al. 2006). The data analysis indicated that "technology interface influenced student participation and interaction. Moore (1989) described learner-learner interaction, learner-instructor interaction, and learner-content interaction as the three types of interaction in a distance learning course. According to Hillman, Willis and Gunawardena (1994), new technologies create a fourth type of interaction: learner-interface interaction. They defined learner-interface interaction as the interaction that takes place between a student and the technology used to mediate a particular distance education process. Swan (2004) argued that course interface can significantly impact the quality and the quantity of the interactions between peers, students, and instructor, and student and content which ultimately affect SLP".

Vonderwell and Zachariah (2005) explain that students' technology skills and the discussion board interface design influenced the level of student participation and their reflective focus in the course. It is the characteristics of a learning environment that influence student learning. Frydenberg (2002) reiterates that interactivity is generally left undefined by the documents, and, in many cases, interaction with a computer in a complex branching program that guides the learner in a "step-and-remediation" process will qualify as interactive.

Ardito et al. (2006) explains that ensuring usability and accessibility to the largest number of users should be one of the main goals of eLearning application developers as well as prerequisite that should allow users to profitably

exploit such applications. The purpose of educational software is to support learning. Thus designers should be able to come up with tools that are able to "engage novice learners and to support their learning even at a distance. Clearly educational software should take into account the different ways students learn and ensure that student's interactions are as natural and intuitive as possible. There should be a synergy between the learning process and a student's interaction with the software. Usability features should not only allow people to efficiently manipulate the interactive software, but should also be appropriate for the intended learning task", (Ardito et al. 2006). Vonderwell and Zachariah (2005) noted the conditions interface and online discussion design create disorientation and confusion, and how they can be overcome and investigated. They further explained that "students' experiences of disorientation and confusion with the discussion board indicated that interface design may result in information overload as well as cognitive overload. There is a need to develop pedagogically user-friendly online course interface and management systems. Students need to be prepared for technology, learning management systems, pedagogical practice, and the social roles required for online learning. Effective online learning requires interdependence for a shared understanding of learning goals in a learning community. Monitoring student participation and patterns of participation closely can help instructors identify student needs and scaffold learning accordingly".

Many parties are also offering standards for the design and development of eLearning programs. Pennsylvania State University report titled "*An Emerging Set of Guidelines for the Design and Development of Distance Education* (IDE, 1998) presents the following five aspects of course design with specific principles for each: 1) learning goals and content presentation; 2) interactions; 3) assessment and measurement; 4) instructional media and tools; and 5) learner services and support. Design and development of e-Learning, then, is comprised of all the activities that go into getting ready to enable learning to take place. Unlike traditional education, however, e-Learning is heavily front-loaded".

2.8.4 Quality of instructional content

Frydenberg (2002) noted that none of the reports and position papers they had reviewed, indicated availability of materials (text, video, and audio) as essential as a highly rated component of a quality education program. This is "not surprising as the standards-writers arrive at their proposals from the context of traditional educational institutions in which the role of faculty is paramount to their mission. But failure to stipulate standards for instructional materials is curious in light of the recent announcement by the Massachusetts Institute of Technology (MIT), that will make available on the Web a large portion of its instructional materials (such as syllabi, papers, lecture notes). In most cases, the standards under the heading technology have yet to identify criteria related to the functions of material access and interactivity, as well as to deeper technical issues such as system maintenance, up-time, redundancy, network access, and so on", (Frydenberg 2002).

2.8.5 Learner support services

Rekkedal et al. (2003) noted that support services in eLearning', is "stressing the need for support measures in addition to those built into the pre-produced eLearning package. Most institutions offering distance education or online courses have understood that student support is necessary to secure quality of learning, student satisfaction and to reduce attrition rates. Student support applies both to counselling and advice on all aspects of distance study

as well as to teaching and guidance within the specific course". The researcher also went ahead to explain that a lesson learnt from "telecourse experience", is the need to provide learner support services "that reduce the isolation of learning. Of much wider importance is the overarching lesson that a new way of facilitating learning may require a different approach to classroom (or lecture hall) teaching". What this point suggests is that there is clearly a need to emulate some student support services in the eLearning environment where often much attention is paid to the design and delivery of "course content but scant or no attention at all to the provision of supports and services which are often considered essential to the successful progress from enrolment to accreditation by students in a traditional campus. The unique capacities of web-based technologies to host media-rich content and support many forms of synchronous and asynchronous (one-to-one, many-to-one, and one-to-many) communication also indicate a potential to facilitate student support services above and beyond what is possible via traditional means". This is also in tandem with Venkatesh, Morris, David, & David (2003) who noted that the presence of enabling parameters and conditions that include user support and training are still found to relate to perceptions and acceptance of technology (in this case eLearning technology acceptance to facilitate students' learning process). "Student support services Made Possible by E-Learning Technologies include Live FAQ area for problems directly to do with courses and for any technical problems; Interactive Troubleshooting Tool/s; Student Homepage area; Automated Self-evaluation/testing Services; Web-based information sources and services including web-based OPACs and document ordering facilities; Automated web-based tutoring systems; Integrated and fully-searchable student record database" as well as Instructor intervention

CHAPTER THREE: RESEARCH METHODOLOGY

3.1 Introduction

This chapter describes the research philosophy, research design, population of the study, sample size, sample design, and data collection methods that was be used to assess the effect of eLearning on students' learning process at The University of Nairobi. Interviews and questionnaires were used as instruments of data collection. The study was guided by the following six objectives: To determine the effect of eLearning benefits on students' learning process; to investigate the effect of eLearning challenges on students' learning process; to establish eLearning incentives and the effect it has on students' learning process'; to find out the effects of eLearning integration on students' learning process; to investigate the effect of eLearning environment on the relationship between the eLearning benefits and eLearning challenges on students' learning process; to develop and test a model for establishing the effect of eLearning on students' learning process at The University of Nairobi.

The eLearning centre at University of Nairobi aims at implementing the University's Strategic Plan. More specifically, the function also aims at implementing activities around national priorities related to educational concerns such as eLearning and distance education which is currently taking the center stage as an option of implementing accessible higher learning as outlined in various strategic and policy statements issued by the Ministry of Education and the Ministry of Information and Communication Technologies. ELearning in The University of Nairobi is embedded in the current strategic plan of 2013 – 2018 by a key strategic statement. The mandate of the eLearning Centre is to support, guide, facilitate, and develop policy documents that will serve as instruments for addressing and mainstreaming the implementation and adoption of eLearning processes of the University of Nairobi. The centre promote, implements and maintains the use of educational technologies with the objective of storing and moving educational content efficiently, marketing University programmes and gaining cost-benefit advantages by extending scarce human resources to larger student audiences. To achieve its objectives the Centre collaborates with internal faculties, schools, institutes and departments.

3.2 Research philosophy

There are three research philosophies: positivism, Interpretivist and pragmatism. Benbasat et al. (1987) explains "that no single research methodology is intrinsically better than any other methodology, many authors calling for a combination of research methods in order to improve the quality of research". This research adopted Pragmatism. This is because pragmatism allows the combination of both positivism and interpretivist. This approach allows adequate answering of all research questions. One approach may be 'better' than the other for answering particular questions as well as instances where questions are not explicitly positivist or interpretivist philosophy. Tashakkori and Teddlie (1998) suggest that "it is more appropriate for the researcher in a particular study to think of the philosophy adopted as a continuum rather than opposite positions. They noted that at some points the knower and the known must be interactive, while at others, one may more easily stand apart from what one is studying", (Tashakkori and Teddlie, 1998:26). "Pragmatism is intuitively appealing, largely because it avoids the researcher engaging in what they see as rather pointless debates about such concepts as truth and reality. In their view you should study what interests you and is of value to you, study in the different ways in which you deem appropriate,

and use the results in ways that can bring about positive consequences within your value system", (Tashakkori and Teddlie, 1998; Tashakkori and Teddlie, 1998).

3.3 Research choices/approach

This study adopted deductive approach where hypotheses and research design were carefully developed and tested against the adopted framework (Collis and Hussey, 2003).

3.4 Research Design

This study employed both qualitative and quantitative descriptive research design. The major purpose of using descriptive research was to depict the existing state of affairs. According to Kothari (2004), studies concerning individuals, groups or situations with the aim of obtaining complete and accurate information are best done using descriptive studies. The researcher has no control over the variables instead will report the situation as it is (Kothari 2004). The researcher must also clearly define the objectives that he/she wants to measure as well as design adequate methods of measuring each of the objectives with clear definition of population under study. Kothari (2004), the design must focus on the following: formulating the objectives of the study; designing data collection methods; choosing the sample; data collection; data processing and analysis and finally reporting the findings.

In this case the study looked into the effect of eLearning on students' learning process at the University of Nairobi by employing both quantitative and qualitative approaches. Campbell and Stanley (1963) and Cook and Campbell (1979) further contended that the mixed design format is effective when examining data involving respondent's attitudes. These features of descriptive survey design is, therefore, considered the most appropriate for carrying out the study on effects of eLearning on students' learning processes in University of Nairobi.

3.5 Study site

The study was conducted at The University of Nairobi – Chiromo campus with a focus on the college of health sciences which encompasses dental school, school of pharmacy and school of medicine.

3.6 Target population

The target population was 530 respondents. The target population is the group of individuals or object having characteristics that can be observed and measured (Mugenda and Mugenda, 2003). A total of 10 staff from department of eLearning and 520 students using Claroline Learning Management System (CLMS) accessible through (http://elearning.uonbi.ac.ke) in University of Nairobi formed the total population. The target population of 520 respondents was drawn from The Dental School; The School of Pharmacy and The School of Medicine and Surgery. First year students at these Schools were selected for the study because they were the ones using eLearning to learn human anatomy and behavioral sciences at the time the research was conducted and thus made it suitable for the study. The target population comprised of four different groups as depicted in Table 1 below.

S.No	University of Nairobi	Programme	Total
1.	Dental School	Bachelor of dental surgery - Preclinical studies	55
2.	School of Pharmacy	Bachelor of Pharmacy - Preclinical studies	115
3.	School of Medicine	Bachelor of Medicine and Surgery - Preclinical studies	350
4.	eLearning staff	ELearning staff members in Chiromo campus, eLearning and ICT directors and other members of management of UoN.	10
TOTAL NO. OF RESPONDENTS			**530**

Table 1: Distribution of the target population at UoN

Source: Researcher, 2016

3.7 Sampling design

This study is a survey where the researcher used a section of the population to represent the total population. The researcher employed both probability sampling and non-probability sampling. According to Kothari (2004) non-probability sampling which is also called deliberate sampling, purposive sampling or judgmental sampling. This type of sampling was applied to select the respondents who are staff from the department of eLearning. On the other hand, probability sampling was used to select respondents from the three schools under study.

3.8 Sample Size

The sample size of this study was 100 respondents. Gall and Borg (2008), defines a sample as a carefully selected subgroup that represents the whole population in terms of characteristics. It is a subset selected from the accessible population and should be a representative of the actual population. Several factors affect the sample size; the intention of the research, the objective of the research, what is at stake, what will be useful, what will have credibility and what can be done with available time and resources (Sekaran, 2003). Owing to the difficulties with responses from large groups, a total of 100 respondents were chosen by the researcher. The representative sample size with known confidence and risk levels was selected based on Yamane (1967) formula. The appropriate response rate of 100 respondents was then determined. The formula used is illustrated below.

$$n = \frac{N}{1 + N(e)^2}$$

Figure 6: Yamane (1967) formula for calculating sample size

Where n = sample size

N = target population

e = the level of precision/ the acceptable sampling error

Using Yamane's formula above, acceptable sampling error of 9% and confidence level of 91% gave 100 respondents. From the stratas, a sample size was calculated. It then followed the method of proportional allocation for each stratum. The results are as shown in Table 2 below.

	Schools/Section	**Description**	**Target population**	**Sample size**
1.	Dental school	Bachelor of dental surgery	55	10
2.	School of pharmacy	Bachelor of Pharmacy	115	22
3.	School of medicine	Bachelor of Medicine and Surgery	350	66
4.	eLearning staff and management	ELearning staff members in Chiromo campus, eLearning and ICT directors and other Top members of management of UoN.	10	2
TOTAL			**530**	**100**

Table 2: Distribution of the sample size

Source: Researcher, 2016

3.9 Sampling Techniques

The population was divided into four different stratas where purposive sampling was used to select respondents from eLearning department while simple random sampling was used to select respondents from the three different schools/stratas. This is intended to reduce sampling error. "Simple random sampling is a subset of a target population in which each member of the subset has an equal probability of being chosen. Purposive sampling is considered more appropriate when the universe happens to be small and a known characteristic of it is to be studied intensively", (Kothari, 2004; Biggam, 2008). The researcher employed purposive sampling while selecting respondents from eLearning centre.

3.10 Data collection instruments

This researcher employed both questionnaires and interviews as instruments of data collection. Data collection "refers to the process of gathering information to serve or prove some facts" (Kombo & Tromp, 2006).

3.10.1 Questionnaires

A structured questionnaire was used to collect data for this research. Kumar (2005) observes that a questionnaire is a written list of questions which requires answers to be recorded by respondents. Questionnaire were administered by drop and pick method to avoid interrupting respondent work schedule. The use of questionnaire is one of the best impersonal techniques that will be used to elicit data from respondents (Leedy 1993). The use of questionnaires was presumed to cover a large number of samples and give standardised questions that will be processed easily by the researcher. Milne (1999) asserted that with a questionnaire, the respondents are free to express their views on issues without fear and also answer the questions at their own pace. The questionnaires comprised of both closed and open-ended questions (see appendices 1).

3.10.2 Interviews

Interviews were used to collect data. It involved personal interviews with members of eLearning department as well as first year students in college of Health Sciences at UoN.

3.11 Data Analysis

The analysis of data in assessment of the effect of eLearning on students' learning process employed correlation and simple regression models. These were used to establish the multiple regression coefficient of correlation and difference between extents of the relationship between eLearning and students' learning process. The beta (β) coefficients for each independent variable generated from the model were subjected to regression model that was used to test the effect of eLearning on students' learning processes is as shown below.

$$y = \beta_o + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \beta_4 X_4 + \varepsilon \quad \ldots\ldots 1$$

$$y = \beta_o + \beta_1 X_1 + \beta_2 X_2 + \varepsilon \quad \ldots\ldots 2$$

$$y = \beta_o + \beta_1 M_1 + \varepsilon \quad \ldots\ldots 3$$

$$y = \beta_o + \beta_1 X_1 + \beta_2 X_2 + \beta_m M + \varepsilon \quad \ldots\ldots 4$$

y Students' learning process

β_0 Is the constant

X_1 Positive effect

X_2 Challenges

X_3 Integration

X_4 Incentives

β_1- β_4 Are the coefficient regression or change induced in y by change in x

ε error term

3.12 Operationalization of the research variables

Operationalization is the process of defining both dependent and independent variables into quantifiable factors. The process defines concepts and allows them to be measured, empirically and quantitatively. Using ICT impact assessment framework/model by Adedokun and Shittu (2013), the dependent variable was ICT impact/Students' Learning Process (SLP), whereas, the independent variables were: positive effect, challenges, integration and incentives. The variable factors considered under each of the independent variables are shown in Table 3 below.

No.	**I. variable**	**Perceived factors**	**D. variable**
1.	**eLearning Benefits**	Advantages, what is as assistances, the comfort students achieve as a result of exploiting this innovation	Students' Learning Process (SLP)
2.	**eLearning Challenges**	Problems, Constraints and Technical issues.	Students' Learning Process (SLP)
3.	**eLearning Integration**	ICT incorporation in learning, introduction of ICTs in the curriculum as well as exploiting the use ICT to administer exams.	Students' Learning Process (SLP)
4.	**eLearning Incentives**	Accessibility, Adequacy, Training and Motivation.	Students' Learning Process (SLP)

Table 3: Independent and Dependent Variables

3.12.1 ELearning benefits

These include effortlessness in learning, access to latest information and resources, virtual interaction between staff and students, creating contact with the external world through exchange of academic work and taking less time to accomplish so much. Furthermore, students use the internet to search for resources and this allows them to be always ahead of the lecturer, access of education anywhere, access of education anytime, eLearning is cost effective, facilitates better retention of knowledge, enables students study at their own pace, Immediate feedback on exam results.

3.12.2 Challenges

ELearning challenges include problems, constraints and technical issues. Students over rely on ICT – thinking that ICT can do the trick, lack of interaction between students and lecturers, inadequate computers with internet connections, insufficient technical staff support, no existing eLearning policy, epileptic power supply, slow internet connectivity, unreliable network connections.

3.12.3 Incentives

This comprises of the fact that eLearning has improved adequacy of learning materials, necessitated training, motivates students to learn, enhanced flexibility in learning, enhanced efficiency of class time, eLearning has improved accessibility to education.

3.12.4 Integration

These include the areas where ICT is incorporated in students learning, introduction of ICTs in the curriculum as well as exploiting the use ICT to administer exams.

CHAPTER FOUR

4.0 DATA ANALYSIS, PRESENTATION AND DISCUSSIONS

4.1 Introduction

This chapter analyses the results of data obtained from the field by the researcher. Due to the nature of the study both qualitative and quantitative data was used. The data obtained from the study were clearly tabulated, analyzed, and presented using SPSS version 21.0 analytical tool.

4.2 Response rate

The researcher administered 100 questionnaires to the respondents. A total of 80 questionnaires (representing 80%) were filled and returned. Out of these, 58 of the questionnaires (72.5 %) were administered to students pursuing Bachelor of Medicine and Surgery, Another set of 15 (18.8 %) administered to students pursuing Bachelor of Pharmacy and the remaining 7 (8.8 %) were filled administered to students pursuing Bachelor of Dental Surgery. This amounted to 100 questionnaires administered in total to the respondents (students) in three different schools. A follow up interview was carried out with a member of eLearning department. The frequencies of response for each of the three Schools are as shown in Table 4 below.

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Bachelor of Medicine and Surgery	58	72.5	72.5	72.5
	Bachelor of Dental Surgery	7	8.8	8.8	81.3
	Bachelor of Pharmacy	15	18.8	18.8	100.0
	Total	**80**	**100.0**	**100.0**	

Table 4: Name of courses enrolled by students

Source: Researcher, 2016

4.3 Descriptive Analysis: Analysis of responses for constructs measuring statements

The respondents rated specific aspects of the dependent variable and each independent variables on a Likert scale in the questionnaire which had five options, ranging from 1-5 (1=Strongly Disagree, 2=Disagree, 3=uncertain, 4=Agree and 5=Strongly Agree). During analysis, the first two (Strongly Disagree and Disagree) were combined into Disagree, and the last two (Agree and Strongly Agree) were combined into Agree. These resulted into three measures (Agree, Uncertain and Disagree).

4.4.1 Students' learning process

Hughes et al. (1992) describes Learning processes to be aimed at identifying ways of supporting learners and learning in educational and work environments. Learning activities are what students engage themselves into in

order to learn. It entails students' being introduced to it, getting to know more about it, trying it out, getting feedback, reflecting and adjusting and finally using it.

Descriptive Statistics

	Mean	Std. Deviation	Minimum	Maximum	N
Accessibility of eLearning anytime and anywhere facilitates S.L.P	4.36	.815	1	5	80
Relevant and appropriateness of eLearning content promotes S.L.P	3.85	1.069	0	5	80
Use of eLearning to administer CATs and exams facilitates S.L.P	4.10	.722	1	5	80
Use of eLearning in giving exams feedback and results facilitates S.L.P	4.36	.875	1	5	80
Use of ELearning enhances retention of knowledge and skills acquired in S.L.P	3.43	1.028	1	5	80
ELearning interaction between lecturers and students facilitates S.L.P	3.45	1.168	1	5	80
AVERAGE MEAN & STD. DEV	**3.93**	**.946**			**80**

Table 5: Descriptive Statistics for SLP

Source: Researcher, 2016

The respondents generally agreed (mean of 3.93) on various aspects of students' learning process. Accessibility of eLearning anytime and anywhere facilitates S.L.P (M=4.36, SD=.815), Relevant and appropriateness of eLearning content promotes S.L.P P (M=3.85, SD=1.069), Use of eLearning to administer CATs and exams facilitates S.L.P (M=4.10, SD=.722), Use of eLearning in administering exams feedback and results facilitates S.L.P (M=4.36, SD=.875), Use of ELearning enhances retention of knowledge and skills acquired in S.L.P (M=3.43, SD=1.028), and finally ELearning interaction between lecturers and students facilitates S.L.P (M=3.45, SD=1.168). The descriptive analysis results are as shown in Table 5 above.

4.4.1 The benefits of eLearning to students' learning process

The respondents generally agreed (mean of 3.86 and std. deviation of 1.001) that eLearning has brought about the following benefits to the students' learning process.

	Mean	Std. Deviation	Minimum	Maximum	N
Eases learning process	4.06	.862	1	5	80
Access of latest informational materials	4.21	.791	1	5	80
Virtual students and lecturers interaction	3.45	1.168	1	5	80
Contact with outside world of academia	3.64	1.225	1	5	80
Students achieve more in less time	3.88	1.036	1	5	80
Access of education anywhere	4.36	.815	1	5	80
Access of education anytime	4.36	.815	1	5	80
eLearning is cost effective	3.76	1.183	1	5	80
eLearning facilitates better retention of knowledge	3.43	1.028	1	5	80
Access to relevant and appropriate content	3.85	1.069	0	5	80
eLearning enables students study at their own pace	3.95	.992	1	5	80
Immediate feedback on exam results	4.36	.875	1	5	80
Class becomes more interactive	3.26	1.199	1	5	80
Use of internet to search for resources	3.73	1.043	1	5	80
Students teach lecturers on use of some softwares	3.40	1.063	1	5	80
eLearning facilitates students proficiency in ICT skills	4.14	.853	1	5	80
Average Mean and Std. Deviation	**3.86**	**1.001**			80

Table 6: Descriptive Statistics for eLearning benefits

Source: Researcher, 2016

Eases learning process (M=4.06, SD=0.862), access of up-to date information (M=4.21, SD=0.791), online interaction between lecturers and students (M=3.45, SD=1.168), contact with outside world of academia - through exchange of academic work and linking with academic databases of other institutions (M=3.64, SD=1.225), students achieve more in less time (M=3.88, SD=1.036), access of education anywhere (M=4.36, SD=0.815), access of education anytime (M=4.36, SD=0.815), eLearning is cost effective (M=3.76, SD=1.183), eLearning facilitates better retention of knowledge (M=3.43, SD=1.128), access to relevant and appropriate content (M=3.85, SD=1.069), eLearning enables students study at their own pace (M=3.95, SD=0.992), immediate feedback on exam results (M=4.36, SD = 0.875), class becomes more interactive (M=3.26, SD=1.199), use of internet to search for resources (M=3.73, SD=1.043), sstudents' teach lecturers on use of some softwares (M=3.40, SD=1.063) and eLearning facilitates students proficiency in ICT skills (M=4.14, SD=0.853). The mean from all respondents regarding all the above mentioned benefits is 3.86 while the standard deviation is 1.001. It can therefore be concluded that Majority

of respondents agreed that eLearning has brought benefits to students' learning process at The University of Nairobi as shown on table 6 above.

4.4.2 The eLearning challenges in students' learning process

Respondents slightly agreed (mean of 3.53, std. deviation of 1.093) that there still exist eLearning challenges facing students' learning process at The University of Nairobi. These challenges include;

	Mean	Std. Deviation	Min	Max	N
Students plagiarise and copy other students work	3.76	1.070	1	5	80
Students over rely on ICT	3.25	1.073	1	5	80
Lack of interaction between students and lecturers	3.93	1.145	1	5	80
Inadequate computers with internet connections	4.18	.897	2	5	80
Insufficient technical staff support	3.76	1.117	1	5	80
No existing eLearning policy	3.59	.951	1	5	80
Epileptic power supply	3.79	1.040	1	5	80
Slow internet connectivity	4.13	1.023	1	5	80
Unreliable network connections	3.81	1.202	1	5	80
Inadequate lecturers knowledge on use of eLearning	2.94	1.151	1	5	80
Inappropriate content	2.79	1.187	1	5	80
Inadequate computer and internet skills	3.23	1.180	1	5	80
Unreliable availability of eLearning system	3.31	1.086	1	5	80
Computer hardware failure	3.50	1.125	1	5	80
eLearning software failure	3.43	1.077	1	5	80
Poor design of eLearning system interface	3.33	1.123	1	5	80
Out-datedness of computer hardware	3.23	1.136	1	5	80
Average Mean and Std. Deviation	**3.53**	**1.093**			

Table 7: Descriptive Statistics for eLearning challenges

Source: Research 2016

These challenges include students plagiarise and copy other students work (M=3.76, SD=1.070), Students over rely on ICT – thinking that ICT can do the trick (M=3.25, SD=1.073), lack of interaction between students and lecturers (M=3.93, SD=1.145), inadequate computers with internet connections (M=4.18, SD=.897), insufficient technical staff support (M=3.76, SD=1.117), no existing eLearning policy (M=3.59, SD=.951), epileptic power supply (M=3.79, SD=1.040), slow internet connectivity (M=4.13, SD=1.023), unreliable network connections (M=3.81, SD=1.202), inadequate lecturers knowledge on use of eLearning (M=2.94, SD=1.151), inappropriate content (M=2.79, SD=1.187), inadequate computer and internet skills (M=3.23, SD=1.180), unreliable availability of

eLearning system (M=3.31, SD=1.086), computer hardware failure (M=3.50, SD=1.125), eLearning software failure (M=3.43, SD=1.077), poor design of eLearning system interface (M=3.33, SD=1.123), out-datedness of computer hardware (M=3.23, SD=1.136). It is therefore evident that out of the 17 eLearning challenges, only 9 had a mean of above 3.50 (agreed to be challenges). Inadequate computers with internet connections and slow internet connectivity had averages of above 4. It can therefore be concluded that challenges still exist though some do not have serious effect as shown on table 7 above.

4.4.3 The eLearning incentives to students' learning process

The respondents agreed (M=4.05, SD=.775) that eLearning has brought incentives to students' learning process at The University of Nairobi (UoN).

	Mean	Std. Deviation	Min	Max	N
eLearning has improved accessibility to education	4.43	.497	4	5	80
eLearning has improved adequacy of learning materials	4.11	.636	2	5	80
eLearning has necessitated training	3.93	.938	1	5	80
eLearning motivates students to learn	3.70	1.036	1	5	80
eLearning enhances flexibility in learning	4.33	.546	3	5	80
eLearning has enhanced efficiency of class time	3.80	.999	1	5	80
Average Mean and Std. Deviation	**4.05**	**.775**			**80**

Table 8: Descriptive Statistics for eLearning incentives

Source: Researcher, 2016

These incentives include eLearning has improved accessibility to education (M=4.43, SD=.497), eLearning has improved adequacy of learning materials (M=4.11, SD=.636), eLearning has necessitated training (M=3.93, SD=.938), eLearning motivates students to learn (M=3.70, SD=1.036), eLearning enhances flexibility in learning (M=4.33, SD=.546), eLearning has enhanced efficiency of class time (M=3.80, SD=.999). The descriptive analysis independent variable – eLearning incentives on students' learning process is as shown in Table 8 above.

4.4.4 The eLearning integration to students' learning process

Majority of the respondents agreed (M=4.05, SD=.754) that eLearning has been integrated to students learning process at The University of Nairobi.

	Mean	Std. Deviation	Min	Max	N
eLearning has been integrated in delivery of learning content	4.11	.574	2	5	80
eLearning is used to administer exams	4.10	.722	1	5	80
eLearning is used to administer CATs	4.09	.750	1	5	80
ICT has been integrated in curriculum	4.14	.807	1	5	80
Combination of ICT based learning with traditional method	3.80	.920	1	5	80
Average Mean and Std. Deviation	**4.05**	**.754**			

Table 9: Descriptive Statistics for eLearning integration

Source: Researcher, 2016

It has been integrated to the following aspects: eLearning has been integrated in delivery of learning content (M=4.11, SD=.574), eLearning is used to administer exams (M=4.10, SD=.722), eLearning is used to administer CATs (M=4.09, SD=.750), ICT has been integrated in curriculum (M=4.14, SD=.807) and finally Combination of ICT based learning with traditional method (M=3.80, SD=.920). The descriptive analysis independent variable – eLearning integration to students' learning process is as shown in Table 9 above.

4.5 Correlation Analysis

Pearson correlation was used to establish the degree of association between variables under consideration i.e. independent variables and dependent variable. Pearson correlation coefficients range from -1 to +1. Negative value indicates negative correlation and positive values indicates positive correlation.

A positive *r* value expresses a positive relationship between the two variables (the larger the independent variable, the larger the dependent variable) while a negative *r* value indicates a negative relationship (the larger the independent variable, the smaller/lesser the dependent variable). A correlation coefficient of zero indicates no relationship between the variables at all. In instances where Pearson coefficient <0.3 indicates weak correlation, Pearson coefficient >0.3<0.5 indicates moderate correlation and Pearson coefficient >0.5 indicates strong correlation.

The results from table 10 below indicate that there are four positive correlations on student learning process. These are eLearning benefits, eLearning incentives, eLearning integration and eLearning environment (r=.787, r=.216, r=.193 and r=.289). On the other hand, there exist a negative correlation between students' learning process and eLearning challenges (r=-.225).

There is a strong relationship between eLearning benefits and students' learning process (r=.787**). This means that introduction of more benefits will strongly influence students' learning process in a positive direction. The independent variables incentives and integration consecutively have correlation coefficients of .216 and .193 to students' learning process. This means that there is a weak positive relationship between the two independent variables and the dependent variable. This means that as one variable increases or decreases, there is a lower probability/chances of change in the other variable. Thus changes in one variable are not correlated with changes in the second variable. The eLearning challenges have a negative correlation of -.225*. This means that the effectiveness and efficiency of students' learning process is increased or reduced by corresponding increase or decrease of eLearning challenges.

The relationship between students' learning process and eLearning benefits has severe Multicollinearity. Sig. (2-tailed): the correlation between eLearning benefits and students' learning process is highly significant at .000. The relationship of eLearning challenges and students' learning process is also significant at .045. Correlation is always significant whenever the Sig (2-Tailed) value is less than or equal to 0.05. It can therefore be concluded that there is a statistically significant correlations of each of the two independent variables and students' learning process. However, the correlations between eLearning incentives and eLearning integration with students' learning process are 0.055 and 0.087 respectively.

The rule is always If the Sig (2-Tailed) value is greater than 0.05, it can always be concluded that there is no statistically significant correlation between eLearning incentives and integration with students' learning process as a dependent variable. That means, increases or decreases in any one of the independent variables do not significantly relate to increases or decreases in students' learning process. Finally, eLearning environment has a positive weak correlation of 0.289 with students' learning process. But the relationship is statistically significant at 0.009. The results for the Pearson correlation test are presented on table 10 below.

Correlations

		eLearning benefits	**eLearning challenges**	**eLearning incentives**	**eLearning integration**	**eLearning environment**	**Students' learning process**
eLearning benefits	Pearson Correlation	1					
	Sig. (2-tailed)						
	N	80					
eLearning challenges	Pearson Correlation	-.130	1				
	Sig. (2-tailed)	.250					
	N	80	80				
eLearning incentives	Pearson Correlation	.432**	.063	1			
	Sig. (2-tailed)	.000	.577				
	N	80	80	80			
eLearning integration	Pearson Correlation	.044	.063	.072	1		
	Sig. (2-tailed)	.695	.581	.526			
	N	80	80	80	80		
eLearning environment	Pearson Correlation	.438**	.003	.300**	.141	1	
	Sig. (2-tailed)	.000	.979	.007	.213		
	N	80	80	80	80	80	
Students' learning process	Pearson Correlation	**.787****	**-.225***	**.216**	**.193**	**.289****	1
	Sig. (2-tailed)	**.000**	**.045**	**.055**	**.087**	**.009**	
	N	80	80	80	80	80	80

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

Table 10: Correlations table
Source: Research data 2016

4.6 Regression Analysis of dependent variable and independent variables

4.6.1 Analysis of all independent variables

The coefficient of determination is a measure of linear relationship. R^2 is a statistical term saying how good one term is at predicting another. If R-Square (R^2) is 1.0 then given the value of one term, you can perfectly predict the value of another term. If R^2 is 0.0, then knowing one term does not help to know the other term at all. More generally, a higher value of R-Square means that you can better predict one term from another.

The rule of thumb is that, usually an R square of more than 50% is considered as better. Combining the four independent variables, the R-square is 0.680 representing (68.0%) implying that these are important factors that influence the dependent variable – students' learning process (This is quite a respectable result). This however shows that there are other factors (32%) contributing to students' learning process. The results are shown in Table 11 below.

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Change Statistics				
					R Square Change	F Change	df1	df2	Sig. F Change
1	.825[a]	.680	.663	.28914	.680	39.877	4	75	.000

a. Predictors: (Constant), eLearning integration, eLearning benefits, eLearning challenges, eLearning incentives

Table 11: Model summary for all independent variables

Source: Researcher, 2016

Analysis of variance model (ANOVA Model)

The ANOVA table 12 below assesses the statistical significance of the results. The results indicated that the above discussed coefficient of determination was significant as evidence on the Sig. column where P value 0.000 and it is less than <0.05. Thus, the model (eLearning benefits, eLearning challenges, eLearning incentives and finally the eLearning integration) is fit to predict students' learning process.

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	13.335	4	3.334	39.877	.000[b]
	Residual	6.270	75	.084		
	Total	19.606	79			

a. Dependent Variable: Students' learning process

b. Predictors: (Constant), eLearning integration, eLearning benefits, eLearning challenges, eLearning incentives

Table 12: ANOVA table showing significance – Sig

Source: Researcher, 2016

Coefficients of all independent variable

The output shown on the coefficients table 13 below is used to know which independent variables included in the model contributed to the prediction of the dependent variable (SLP).

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	1.004	.433		2.316	.023
	eLearning benefits	.800	.071	.828	11.250	.000
	eLearning challenges	-.100	.056	-.119	-1.789	.078
	eLearning incentives	-.137	.068	-.147	-2.005	.049
	eLearning integration	.181	.068	.174	2.649	.010

a. Dependent Variable: Students' learning process

Table 13: Coefficients of all independent variables

Source: Researcher, 2016

In this case the researcher was interested in comparing the contribution of each independent variable by looking down the beta values on Standardized Coefficients column and find which beta value is the largest but disregarding any negative sign. The one with the highest value meant that it made the strongest unique contribution to explaining the dependent variable. If it were less, it would mean it contributes less to the dependent variable. Similarly, the column marked Sig. tells whether this variable is making a statistically significant unique contribution to the equation or not. If the Sig. value was less than 0.05, then the variable would be making a significant unique contribution to the prediction of the dependent variable. If greater than .05, then it can be concluded that that variable is not making a significant unique contribution to the prediction of the dependent variable. The contribution of each independent variable was as follows: ELearning benefits made a strongest unique contribution of **0.828** and the variable is statistically significant to the equation at **0.000**. ELearning challenges at **0.119** making less unique contribution and the variable has a significance of 0.078 which is not statistically significant to SLP because it is greater than 0.05. Similarly, eLearning incentives contribute uniquely at 0.147 and the contribution is statistically significant to the equation at 0.049. Finally, eLearning integration is making a unique contribution of 0.174. This is statistically significant to the equation at 0.010. The standardised coefficients – Beta column as well as Sig. column shows the contribution of each independent variable as shown in the Table 13 above.

4.6.2 Focus on both eLearning benefits and challenges

Table 14 below shows the relationship between the independent variables eLearning benefits, eLearning challenges and dependent variable Students' Learning Process (SLP).

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Change Statistics				
					R Square Change	F Change	df1	df2	Sig. F Change
1	.797[a]	.635	.626	.30474	.635	67.057	2	77	.000

a. Predictors: (Constant), eLearning challenges, eLearning benefits

Table 14: Model Summary for both eLearning benefits and eLearning challenges

Source: Researcher, 2016

The R Square for the two independent variables is 63.5%. This means that the contribution of eLearning benefits and eLearning challenges is at 63.5%. The significance of the two independent variables is significant at 0.000 as shown in Table 15 below.

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	12.455	2	6.227	67.057	.000[b]
	Residual	7.151	77	.093		
	Total	19.606	79			

a. Dependent Variable: Students' learning process

b. Predictors: (Constant), eLearning challenges, eLearning benefits

Table 15: ANOVA - Analysis of two independent variables

Source: Researcher, 2016

4.6.3Focus on the effect of eLearning environment on the relationship between eLearning benefits and SLP

ELearning environment encompasses of instructional design, content design, interface design and learner support. The researcher found out that eLearning benefits contributed 62.0% of SLP and with the introduction of favourable eLearning environment, SLP in enhanced by 0.4%. Similarly, the existence and non-existence of the moderator shows that the relationship is significant at 0.000 as shown in Tables 16 and 17 below.

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Change Statistics				
					R Square Change	F Change	df1	df2	Sig. F Change
1	.787[a]	.620	.615	.30907	.620	127.239	1	78	.000
2	.790[b]	.624	.614	.30948	.004	.794	1	77	.376

a. Predictors: (Constant), eLearning benefits

b. Predictors: (Constant), eLearning benefits, eLearning environment

Table 16: Model summary for eLearning benefits with moderating variable

Source: Researcher, 2016

ANOVA summary

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	12.155	1	12.155	127.239	.000[b]
	Residual	7.451	78	.096		
	Total	19.606	79			
2	Regression	12.231	2	6.115	63.849	.000[c]
	Residual	7.375	77	.096		
	Total	19.606	79			

a. Dependent Variable: Students' learning process

b. Predictors: (Constant), eLearning benefits

c. Predictors: (Constant), eLearning benefits, eLearning environment

Table 17: ANOVA table showing significance

Source: Researcher, 2016

		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	.982	.263		3.730	.000
	eLearning benefits	.762	.068	.787	11.280	.000
2	(Constant)	1.124	.308		3.646	.000
	eLearning benefits	.791	.075	.818	10.519	.000
	eLearning environment	-.065	.073	-.069	-.891	.376

a. Dependent Variable: Students' learning process

Table 18: eLearning benefits coefficients table

Source: Researcher, 2016

4.6.4 Focus on the effect of eLearning environment on the relationship eLearning challenges and SLP

Table 19 below shows the relationship between the independent variables eLearning challenges and dependent variable students' learning process with and without the moderating variable. The R Square for eLearning challenges (independent variables) on SLP is 5.1% and with the moderating variable, it goes to 13.4%. The contribution of the independent variable is significant at .045 and .004 as shown in Table 20 below.

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Change Statistics				
					R Square Change	F Change	df1	df2	Sig. F Change
1	.225[a]	.051	.039	.48848	.051	4.164	1	78	.045
2	.367[b]	.134	.112	.46947	.084	7.445	1	77	.008

a. Predictors: (Constant), eLearning challenges

b. Predictors: (Constant), eLearning challenges, eLearning environment

Table 19: Model summary for eLearning challenges

Source: Researcher, 2016

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	.994	1	.994	4.164	.045[b]
	Residual	18.612	78	.239		
	Total	19.606	79			
2	Regression	2.634	2	1.317	5.976	.004[c]
	Residual	16.971	77	.220		
	Total	19.606	79			

a. Dependent Variable: Students' learning process

b. Predictors: (Constant), eLearning challenges

c. Predictors: (Constant), eLearning challenges, eLearning environment

Table 20: ANOVA table showing significance

Source: Researcher, 2016

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	4.591	.331		13.880	.000
	eLearning challenges	-.189	.093	-.225	-2.041	.045
2	(Constant)	3.524	.504		6.993	.000
	eLearning challenges	-.190	.089	-.226	-2.131	.036
	eLearning environment	.271	.099	.289	2.729	.008

a. Dependent Variable: Students' learning process

Table 21: eLearning challenges coefficients table

Source: Researcher, 2016

4.6.5 Focus on eLearning benefits and eLearning challenges with the moderating variable

The researcher was further interested in establishing the effect of eLearning environment on the relationship between effects of eLearning and students' learning process. The researcher established that with the introduction of eLearning environment on the relationship between eLearning benefits and eLearning challenges on SLP, the R-Square change is 0.003, making it 63.8% as shown on table 22 below.

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Change Statistics				
					R Square Change	F Change	df1	df2	Sig. F Change
1	.797[a]	.635	.626	.30474	.635	67.057	2	77	.000
2	.799[b]	.638	.624	.30551	.003	.615	1	76	.436

a. Predictors: (Constant), eLearning challenges, eLearning benefits

b. Predictors: (Constant), eLearning challenges, eLearning benefits, eLearning environment

Table 22: Model summary for eLearning benefits and eLearning challenges

Source: Researcher, 2016

Analysis of Variance (ANOVA)

ANOVA Table 23 below indicates that the regression model predicts the outcome variable significantly well at 0.000. This value is less than 0.05 which means that the variables in the model (eLearning benefits and eLearning challenges) are statistically significant in predicting students' learning process at The University of Nairobi.

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	12.455	2	6.227	67.057	.000[b]
	Residual	7.151	77	.093		
	Total	19.606	79			
2	Regression	12.512	3	4.171	44.686	.000[c]
	Residual	7.093	76	.093		
	Total	19.606	79			

a. Dependent Variable: Students' learning process

b. Predictors: (Constant), eLearning challenges, eLearning benefits

c. Predictors: (Constant), eLearning challenges, eLearning benefits, eLearning environment

Table 23: ANOVA table for eLearning benefits and eLearning challenges

Source: Researcher, 2016

		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	1.411	.353		4.000	.000
	eLearning benefits	.746	.067	.771	11.109	.000
	eLearning challenges	-.105	.058	-.125	-1.798	.076
2	(Constant)	1.523	.381		3.995	.000
	eLearning benefits	.772	.075	.798	10.287	.000
	eLearning challenges	-.102	.059	-.121	-1.737	.086
	eLearning environment	-.057	.072	-.060	-.784	.436

a. Dependent Variable: Students' learning process

Table 24: Coefficients table for eLearning benefits, challenges and eLearning environment

Source: Research 2016

4.7 Hypotheses testing

Hypothesis testing is the formal procedure used by statisticians to accept or reject statistical hypotheses. After the analysis, hypothesis stated in earlier chapter of this research was tested. Rule of the thumb when accepting or rejecting a hypothesis is accept when p-value is less than α and reject a hypothesis when p-value is more than α. For this study α = 0.05 and will be compared with p-values applicable to the stated hypotheses as below (Sekaran, 2003). Hypothesis 1 (H01) stated that there is statistically significant relationship between eLearning benefits and students' learning process. The study findings showed that eLearning benefits had coefficients of estimate which was positively associated with students' learning process and had a significant effect basing on β1 =.828 (p-value = 0.000 which was less than α = 0.05). This implies that with one unit increase in eLearning benefits, students' learning process changes by .828 units as shown in Table 25 below. Therefore, the alternative hypothesis was accepted and it was concluded that eLearning benefits has a statistical significant effect on students' learning process.

Model		**Unstandardized Coefficients**		**Standardized Coefficients**	**t**	**Sig.**
		B	Std. Error	Beta		
1	(Constant)	1.004	.433		2.316	.023
	eLearning benefits	.800	.071	.828	11.250	.000
	eLearning challenges	-.100	.056	-.119	-1.789	.078
	eLearning incentives	-.137	.068	-.147	-2.005	.049
	eLearning integration	.181	.068	.174	2.649	.010

a. Dependent Variable: Students' learning process

Table 25: Coefficients table for all Independent variables

Source: Research 2016

Hypothesis 2 (H02) states that eLearning challenges has statistically significant effect on students' learning process. The study findings showed that eLearning challenges has coefficients of $\beta 1 = -0.119$ and $p = 0.078$ which is not significant as it is more than 0.05. This implied that with one unit increase in eLearning challenges, students' learning process reduces by 0.119. Therefore the alternate hypothesis was rejected and it was concluded that eLearning challenges has a negative relationship with SLP which is not statistically significant on students learning process. This is shown in Table 25 above.

Hypothesis 3 (H03) states that eLearning incentives has statistically significant effect on students' learning process. The research findings showed that eLearning incentives had coefficients of estimate of $\beta 1 = 0.147$ and p-value = .049 which was less than $\alpha = 0.05$. This implied that with one unit increase in eLearning incentives, students' learning process will increase 0.147 units as shown in Table 25 above. Hence the alternate hypothesis was accepted and it was concluded that eLearning incentives has a statistically significant effect on students learning process.

Hypothesis 4 (H04) states eLearning integration has significant effect on students' learning process. The researcher found that eLearning integrations had coefficients of $\beta 2 = 0.174$ and p-value = 0.010 which is less than $\alpha = 0.05$. This implies that eLearning integration has statistically significant effect on students' learning process. It further implies that with one unit increase in eLearning integrations, students' learning process will increase by 0.174 units. Hence the alternate hypothesis was accepted and it was concluded that eLearning integrations has statistical significant effect on students' learning process.

Hypothesis 5 (H05) states eLearning environment has a significant effect on the relationship between eLearning benefits and students' learning process. The researcher found that eLearning benefits had coefficients of $\beta 2 = 0.787$ and p-value = 0.000 which is less than $\alpha = 0.05$. This implies that eLearning benefits have statistically significant effect on SLP. With the introduction of moderating variable – eLearning environment, the coefficient is 0.818 and p-value = 0.000 which is less than $\alpha = 0.05$. This implies that eLearning environment has a significant effect on the relationship between eLearning benefits and SLP. Hence the alternate hypothesis was accepted and it was concluded that eLearning environment has significant effect on the relationship between eLearning benefits and SLP.

Hypothesis 6 (H06) states eLearning environment has significant effect on the relationship between eLearning challenges and Students' Learning Process (SLP). The researcher found that eLearning challenges had coefficients of $\beta 2 = -0.225$ and p-value = 0.045. Similarly, with the introduction of moderating variable – eLearning environment, the coefficient $\beta 2 = -0.226$ and p-value = 0.036 which is less than $\alpha = 0.05$. This implies that eLearning environment has a statistically significant contribution to the relationship between eLearning challenges and SLP. Hence the alternate hypothesis was accepted and it was concluded that eLearning environment has a statistically significant contribution on the relationship between eLearning challenges and SLP. The results are as shown in Table 25 above.

Hypotheses	Coefficient P- Values	Conclusion
H_1: eLearning benefits have significant effect on students' learning process.	P= **.000** and it is < 0.05	**Accept H_1**
H_2: eLearning challenges have significant effect on students' learning process.	P=**.078** and it is >0.05	**Reject H_2**
H_3: eLearning incentives have significant effect on students' learning process.	P=**.049** and it is < 0.05	**Accept H_3**
H_4: eLearning integrations have significant effect students' learning process.	P=**.010** and < 0.05	**Accept H_4**
H5: eLearning environment has significant effect on the relationship between eLearning benefits and SLP	P=**.000** and < 0.05	**Accept H_5**
H6: eLearning environment has significant effect on the relationship between eLearning challenges and SLP	P=**.036** and < 0.05	**Accept H_6**

Table 26: Hypotheses testing table

Source: Researcher, 2016

4.8 Testing and fitting the model

Regression equation for establishing the SLP is: $\mathbf{Y = \beta_o + \beta_1X_1 + \beta_2X_2 + \beta_3X_3 + \beta_4X_4 + \varepsilon}$. Regression analysis was conducted so as to establish the association between student learning process and four other independent variables. According to coefficient regression, a unit increase in E-learning Benefits leads to .672 increase in students' learning process; a unit increase in E-learning challenges leads to -.116 on students' learning process; a unit increase in E-learning incentives leads to -.115 on students' learning process and finally, a unit increase in eLearning integration leads to .226 increase in students' learning process. As shown in Table 27 below.

It can therefore be deduced that:

$\mathbf{y = 1.004 + 0.800X_1 - 0.100X_2 - 0.137X_3 + 0.181X_4 + \varepsilon}$

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	1.004	.433		2.316	.023
	eLearning benefits	.800	.071	.828	11.250	.000
	eLearning challenges	-.100	.056	-.119	-1.789	.078
	eLearning incentives	-.137	.068	-.147	-2.005	.049
	eLearning integration	.181	.068	.174	2.649	.010

a. Dependent Variable: Students' learning process

Table 27: Co-efficients without the mediating variable

Source: Research 2016

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	1.411	.353		4.000	.000
	eLearning benefits	.746	.067	.771	11.109	.000
	eLearning challenges	-.105	.058	-.125	-1.798	.076
2	(Constant)	1.523	.381		3.995	.000
	eLearning benefits	.772	.075	.798	10.287	.000
	eLearning challenges	-.102	.059	-.121	-1.737	.086
	eLearning environment	-.057	.072	-.060	-.784	.436

a. Dependent Variable: Students' learning process

Table 28: Co-efficients with the mediating variable

Source: Research 2016

$$y = \beta_o + \beta_1 X_1 + \beta_2 X_2 + \varepsilon \ldots\ldots 2$$

$$Y = 1.411 + .746X_1 - .105\ X_2 + \varepsilon$$

$$y = \beta_o + \beta_1 M_1 + \varepsilon \ldots\ldots 3$$

$$Y = 1.523 + -.057\ M_1 + \varepsilon$$

$$y = \beta_o + \beta_1 X_1 + \beta_2 X_2 + \beta_m M + \varepsilon \ldots\ldots 4$$

$$y = 1.523 + .772X1 + -.102X2 + -.057M + \varepsilon$$

y Students' learning process

β_0 Is the constant

X_1 Positive effect

X_2 Challenges

X_3 Integration

X_4 Incentives

β_1- β_4 Are the coefficient regression or change induced in y by change in x

ε error term

4.9 Discussions of the findings

Linear regression was used to explain how the four independent variables (eLearning benefits, eLearning challenges, eLearning incentives and eLearning integration) affect students' learning process. ELearning benefits, eLearning incentives and eLearning integration have statistically significant contribution of values P= .000, P=0.049 and P=.010 consecutively to SLP. While eLearning challenges has a P value of 0.078 which is not statistically significant to SLP. These findings are in tandem with the research by Adedokun-Shittu et al. (2012) who stated that eLearning benefits, eLearning incentives and eLearning integration have positive significant values. Their findings further noted that motivation also had positive significant values to teaching and learning. This research further established that eLearning challenges had a less statistically significant to SLP of 0.078.

4.9.1 The eLearning benefits on Students' Learning Process (SLP)

The respondents generally agreed (mean of 3.86 and standard deviation of 1.001) that eLearning has brought benefits to the students' learning process. The SD further confirms that that these values in the data set are not further away from the mean. The most accepted benefits (above 3.50) of eLearning to students' learning process include ease learning process as confirmed by Scott (2000) who explains that with the "introduction of eLearning by Carnegie Mellon University (CMU) in America, students' exam results have not only improved but also have acted as educational bridges between subjects, breaking the traditional existing boundaries between disciplines". The meaning of this is that Institutions of Higher Learning (IHL) that effectively utilises technology in learning (eLearning) enhances the performance of students in examinations as well as produce graduates who are skilled for the knowledge based economy (Holley 2002). A study by Shaba (2002) found that students who have computers connected to the internet may have a chance to experience a more flexible learning process as opposed to those students in IHL who do not have access to this opportunity occasioning the fail to benefit from this opportunity. Access of up-to date information, contact with outside world of academia through exchange of academic work and linking with academic databases of other institutions, students achieving more in less time, access to education anytime, eLearning is cost effective – by eliminating material costs, cost of training rooms and labour costs, access to relevant and appropriate content, eLearning enables students study at their own pace – this allows learners to have control over their learning process in a manner that classroom learning does not, immediate feedback on exam results which enhances the performance of students in assessments (Holley 2002).

ELearning also facilitates the use of internet to search for resources, access of education anywhere as well as facilitating students' proficiency in ICT skills, the students get to learn some basic ICT skills necessary for current workplace. These benefits are in tandem with Hemsley (2002); Ruiz, Mintzer, and Leipzig (2006) and Adedokun-Shittu et al. (2012) who noted that eLearning facilitates access to education anywhere and anytime, cost-effectiveness; learner satisfaction; learners demonstrating better retention of knowledge and skills acquired. "A substantial body of evidence shows a sophisticated cost analysis through the adoption and use of eLearning can result in significant cost savings, sometimes as much as 50%, compared with traditional instructor-led learning". Hussain (2009) argues that "learners' satisfaction rates increase with eLearning compared to traditional learning. This is due to perceived ease of use and access, navigation, interactivity, and user friendly interface design and benefits such as better access to resourceful information, student/ lecturer collaboration, interaction with the outside world". Other benefits that respondents did not perceive to have serious effect include online interaction between lecturers and students, eLearning facilitates better retention of knowledge, class becomes more interactive and students' may also show lecturers how to use some softwares. These benefits were not perceived as having great effect. Their analysis revealed a mean of less than 3.50. For example, class becoming more interactive was not a strong effect because these students were not having classes for the subjects that were administered through eLearning. The mean from all respondents regarding all the above mentioned benefits is 3.86 while the standard deviation is 1.001. It can therefore be concluded that Majority of respondents agreed that eLearning has brought benefits to students' learning process at The University of Nairobi. The research further established that eLearning benefits have a standardized beta value of 0.828. This is interpreted to mean that eLearning benefits makes a

strongest unique contribution of .828 to SLP and the contribution is statistically significant at p value =0.000 as shown on on regression table 27 above.

4.9.3 The eLearning challenges on Students' Learning Process (SLP)

This research further established the existence of some eLearning challenges (mean of above 3.50) to students learning process. They include students plagiarise and copy other students work, lack of interaction between students and lecturers, inadequate computers with internet connections, insufficient technical staff support, no existing eLearning policy, epileptic power supply, slow internet connectivity, unreliable network connections, computer hardware failure, inadequate access to ICT equipment and unreliable internet connections. These findings are in tandem with the work of Gunga and Ricketts (2007); and Bingimlas, (2009) who noted that most "African countries have inefficient ICT-related infrastructures such as connection to electricity, communication technologies, computers and trained personnel". Twinomugisha, Magochi & Aluoch, (2004) further noted that most tertiary institutions in Africa have inadequate Internet connectivity and those that have connections are always poorly managed. As a result, the little bandwidth that is available becomes even less useful for research and education purposes (Steiner et al. 2005). Alam & Farid (2011) also explains that the quality and conditions of education in Africa are in dire need of urgent attention. The challenges do not only lie in the lack of infrastructure but social issues such as poverty playing a major role. Other challenges associated with eLearning include plagiarism, over-reliance on ICT, laziness and absenteeism as disadvantages of ICT in teaching and learning.

This research further established that lack of interaction between students and lecturers, inadequate computers with internet connections, slow internet connectivity together with unreliable network connections were perceived to be the serious eLearning challenges on students' learning process. Other eLearning challenges that respondents' did not perceive to have serious effect (mean of below 3.50) to students' learning process include students over relying on ICT – thinking that ICT can do the trick, inadequate lecturers knowledge on use of eLearning – this means that the lecturers at UoN have embraced required technological skills and knowledge required for this age. Inappropriate content was also not seen as a challenge by the respondents. This means that the content that have been prepared for students are deemed necessary and important to facilitate students' earning. The respondents further agreed that inadequate computer and internet skills were not a challenge to their learning process. This is so because some of these students learned computer skills way before joining university. In addition the university curriculum has incorporated training of ICT.

Furthermore, unreliable availability of eLearning system was also another challenge. It was however established that unavailability of these systems was not a serious challenge. This means that the university has ensured that the systems are always available by maximising on up-time. ELearning software errors, poor design of eLearning system interface and out of date computer hardware were also not regarded as eLearning challenges to SLP. It is therefore evident from the findings that out of the 17 eLearning challenges, only 9 had a mean of above 3.50 (agreed to be the existing eLearning challenges). Inadequate computers with internet connections and slow internet connectivity had averages of above 4. Further analysis of the findings revealed that eLearning challenges have a standardized beta value of -0.119. It is interpreted that eLearning challenges makes a unique contribution of .119 to SLP and the contribution is not statistically significant at p value =0.078 as shown on regression table 27 above. The

research further analysed qualitative data from a range of interviews conducted with both members of eLearning department and first year students in college of Health Sciences to assess challenges associated with eLearning. It showed that eLearning challenges included problems, constraints, disadvantages and technical issues. Lack of interaction between students and lecturers, inadequate computers with internet connections, insufficient technical staff support, epileptic power supply, slow internet connectivity, uunreliable network connections as well as ccomputer hardware failure

4.9.4 The eLearning incentives on Students' Learning Process (SLP)

This research found out that there exist eLearning incentives on students' learning process. They include improved accessibility to education and improved adequacy of learning materials. ELearning has necessitated training, motivates students to learn, enhanced flexibility in learning, enhanced efficiency of class time – meaning students' learn way ahead before going to class. The standard deviation is 0.775. These findings are in tandem with research findings of Gaebel, et al. (2014) who noted that some of the "motivating factors that drive adoption and consequent use of eLearning are the need for flexibility of learning provision, need for enhanced efficiency of classroom time, and the need for more and better learning opportunities for distance learning and resident students". This argument is also in tandem with the research findings of Omwenga, Waema, & Wagacha (2004) who postulates that the "need to provide more-flexible education is driving the need for eLearning in Kenya. Motivation and incentives in quantitative and qualitative findings respectively both inform the factors that could induce proper ICT integration in teaching and learning". The common ones identified by both analyses are improved access to ICT facilities and training. Further analysis revealed that eLearning incentives have a standardized beta value of -0.147. It is interpreted that eLearning incentives makes a unique contribution of .147 to SLP and the contribution is statistically significant at p value =0.049 as shown on regression table 27 above.

4.9.5 The eLearning integration on Students' Learning Process (SLP)

Respondents agreed that eLearning has been integrated in delivery of learning content, eLearning is used to administer exams, to administer CATs and ICT has been integrated in curriculum and incorporation of ICTs to traditional method. The standard deviation is 0.754 meaning data is more concentrated around the mean. These are in agreement with the work of Adedokun-Shittu et al. (2012) who highlighted that integration reported in both analyses revolves round "integrating ICT into teaching and learning, curriculum and assessment and a blend of ICT with the existing traditional teaching and learning approach. Assessing learning in an electronic environment is being used by lecturers and institutions worldwide at an increasing rate", (Crisp 2007). "Several e-assessment tools have been developed, tested and used as plugins or embedded in Learning Management Systems (LMS). Students' enrolment using eLearning and other ICT infrastructure is also on the rise". Oyenkule et al. (2012) narrates a case of the University of Ilorin which adopted the use of computers to make assessments better.

Further analysis of these research component revealed that eLearning integration have a positive standardized beta value of 0.174. It is interpreted that eLearning integration makes a unique contribution of .174 to SLP and the contribution is statistically significant at p value =0.010 as shown on regression table 27 above.

4.9.6 ELearning environment

The research findings established that introduction of favourable and supportive eLearning environment enhances eLearning benefits on SLP by 0.4% (from 62.0%-62.4%). The significance of this change is 0.000 and 0.000 showing that the component is very significant for the relationship. Similarly, eLearning challenges which have negative effect on SLP are increased from 5.1% to 13.4% as a result of the introduction of unfavourable eLearning environment. The significance of this change was from 0.045 to 0.036. This means that the change moves to a very significant level. These findings are in tandem with a study findings by Popovici & Mironov (2015) asserts that "good experiences (identification of positive effects and challenges) of an innovation bring expertise and lead to confirmation (positive perception). On the contrary, poor experiences lead to changes of perception too, but towards avoidance (negative perception) which in turn affects students' learning process". This can be concluded that negative perception of the eLearning environment negatively affect students learning process. This increases the challenges as well as reducing the positive effects brought by eLearning. Furthermore, Könings, Brand-Gruwel & Merriënboer (2005) found that the characteristics of the learning environment have got a significant effect on students learning process. "The characteristics of the learning environment are expected to have positive effects on student learning".

Hypothesis 5 (H05) states that eLearning environment has a significant effect on the relationship between eLearning benefits and students' learning process. The findings indicates eLearning benefits had coefficients of $\beta 2 = 0.787$ and p-value = 0.000 which is less than $\alpha = 0.05$. This implies that eLearning benefits have statistically significant effect on SLP. With the introduction of moderating variable – eLearning environment, the coefficient is 0.818 and p-value = 0.000 which is less than $\alpha = 0.05$ an shown in Table 18 above. This implies that eLearning environment has a significant effect on the relationship between eLearning benefits and SLP. Hence the alternate hypothesis was accepted and is concluded that eLearning environment has significant effect on the relationship between eLearning benefits and SLP.

Hypothesis 6 (H06) states that eLearning environment has significant effect on the relationship between eLearning challenges and Students' Learning Process (SLP). The research findings show that eLearning challenges had coefficients of $\beta 2 = -0.225$ and p-value = 0.045. Similarly, with the introduction of moderating variable – eLearning environment, the coefficient $\beta 2 = -0.226$ and p-value = 0.036 which is less than $\alpha = 0.05$ as shown in Table 20 above. This implies that eLearning environment has a statistically significant contribution to the relationship between eLearning challenges and SLP. Hence the alternate hypothesis was accepted and it can be concluded that eLearning environment has a statistically significant contribution on the relationship between eLearning challenges and SLP.

Vonderwell and Zachariah (2005) explain that "students' technology skills and the discussion board interface design influenced the level of student participation and their reflective focus in the course. It is the characteristics of a learning environment that influence student learning. Frydenberg (2002) reiterates that interactivity is generally left undefined by the documents and in many cases, interaction with a computer in a complex branching program that guides the learner in a step-and-remediation process will qualify as interactive. But failure to stipulate standards for instructional materials is curious in light of the recent announcement by the Massachusetts Institute of Technology

(MIT), that it will be available on the Web a large portion of its instructional materials (such as syllabi, papers, lecture notes)".

It can be generalized that to ensure the success of the eLearning system, it is critical to "create a system that supports rather than frustrates users. Instructors also play important role in designing the course content and the information layout display. Their attitudes toward e-learning have a significant effect on learners' satisfaction. In other words, instructor should handle eLearning activities and respond to students' problems promptly to improve learning satisfaction. Therefore it is important to design a system to encourage the instructors to use the eLearning system as a tool to promote learning", (Sun et al. 2008).

4.10 Proposed model for establishing the effect of eLearning on Students' Learning Process (SLP)

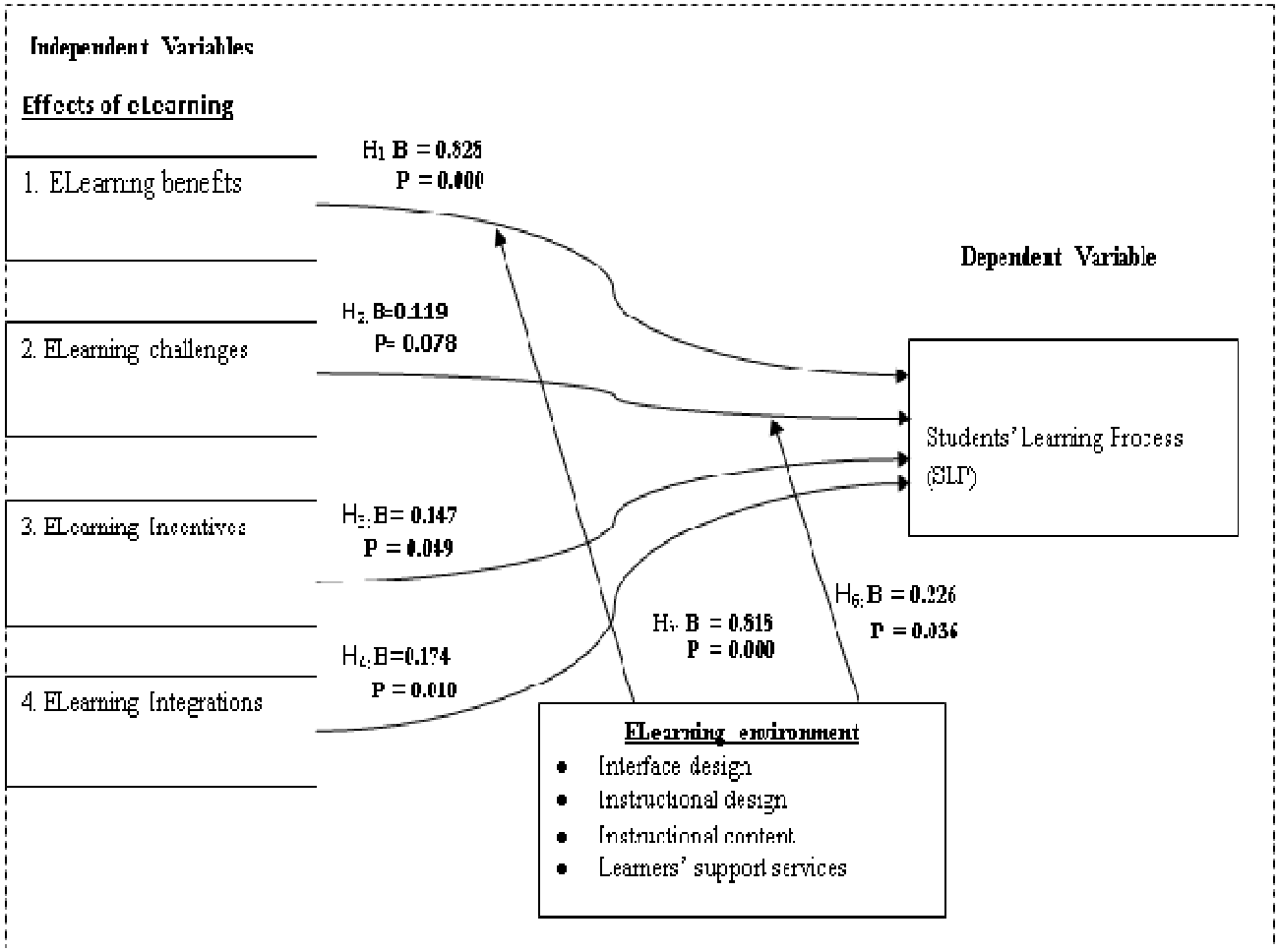

Figure 7: Proposed model for assessing the effect of eLearning on SLP

CHAPTER FIVE

5.0 SUMMARY, CONCLUSION AND RECOMMENDATIONS

5.1 Introduction

This chapter summarises the findings, draws conclusions and gives recommendations based on the outcomes of the study.

5.2 Summary of the Findings

From each objective of the study, it was possible to draw a summary from the research findings. The study established that eLearning benefits, eLearning challenges, eLearning incentives, eLearning integration and eLearning environment have effect on SLP. It is evident that the existing eLearning benefits have a strong and significant contribution to SLP. These benefits include ease of learning process – meaning that eLearning has made learning possible since it can be accessed anywhere and anytime within the shortest period of time. It provides access of up-to date information - this means that eLearning provides students' with an opportunity to have and use latest academic information. It has enabled the students' to have ccontact with outside world of academia where students get the opportunity to interact with other scholars. This has ultimately allowed creation of standardized process and consistency in the delivery of content within the University of Nairobi and beyond.

Students' achieve more in less time – this is seen when students' engage in ubiquitous learning as well as any ongoing conversations in networked communities such as chats thus compressing delivery time. It has also led to cost saving through decreased travel, reduced material costs such as operating room. Using the real environment is costly. Even setting up a false environment has material costs and labor. By creating the environment online and having the learner practice, you won't have to worry about the costs associated with set up, use, and clean up. Furthermore, eLearning has enabled students to study at their own pace since learners always want control a condition that traditional classroom setup do not offer. Students also use of internet as a source of reliable and meaningful information. It also facilitates students' proficiency in ICT skills. These eLearning benefits have a strong positive relationship with SLP. For the realisation of efficient and effective SLP on an online learning environment, eLearning benefits have to be enhanced as well as strengthened.

ELearning challenges on the other hand do not contribute significantly to the SLP. It has a weak negative relationship with SLP. This means that in such cases where eLearning challenges prevalent, SLP is negatively affected. Some of the serious challenges identified in this research include lack of interaction between students and lecturers, inadequate computers with internet connections, insufficient technical staff support, epileptic power supply, slow internet connectivity, unreliable network connections, computer hardware failure and students' plagiarise and copy other students work. It can therefore be concluded that in order for UoN and other IHL in Kenya to realise efficient and effective SLP, they should minimise or totally eliminate eLearning challenges. These were also confirmed to be important factors that affect SLP. The interviews conducted revealed that they included problems, constraints, disadvantages and technical issues. Lack of interaction between students and lecturers, inadequate computers with internet connections, insufficient technical staff support, epileptic power supply, slow internet connectivity, uunreliable network connections as well as ccomputer hardware failure

The research findings revealed eLearning incentives which include improved accessibility to education, improved adequacy of learning materials, eLearning has necessitated training to students, motivated students to learn, enhanced flexibility in learning and enhanced efficiency of class time. These incentives contribute uniquely and significantly to SLP. Furthermore the findings reveal that eLearning has been integrated in delivery of learning content, used to administer exams as well as to administer CATs and ICT has been integrated in curriculum by blend of ICT based teaching with traditional methods. It is evident that both eLearning incentives and eLearning integration both have positive but not strong relationship with SLP.

ELearning environment which encompasses the interface design, instructional design, instructional content and learners' support services have an effect on SLP. It is evident that eLearning benefits are enhanced by good eLearning environment. The research findings established that eLearning benefits on SLP are enhanced at a rate of 0.4% i.e. 62.0% to 62.4% by the introduction of good eLearning environment, both having a significance of 0.000. This means that good eLearning environment leads to efficient and effective SLP. ELearning environment also has a significant effect on eLearning challenges. It is evident that poor eLearning environment increases eLearning challenges by 8.3% (i.e. from 5.1% to 13.4%) these effects are both significant at 0.045 and 0.004. This increase will in turn negatively affect SLP as seen in Table 19 above.

5.3 Conclusion

This research investigated the effect of eLearning on Students' Learning process (SLP) using first year students from college of health sciences as a sample size. From the findings of the study, it is evident that eLearning benefits, eLearning incentives and eLearning integration have unique and significant contributions to Students' Learning Process (SLP). On the other hand, eLearning challenges have unique contribution that is not statistically significant to SLP. However, further qualitative interview of respondents showed that eLearning challenges adversely affect their learning process. IHL need to minimise the occurrence of eLearning challenges in order to realise effective and efficient SLP. The researcher also sought to establish the effect of eLearning environment on the relationship between eLearning benefits and eLearning challenges on SLP. ELearning environment entails Interface design, Instructional design, Instructional content and Learners' support services. It is evident that eLearning benefits are enhanced by good eLearning environment which in turn facilitates SLP while poor eLearning environment increases eLearning challenges which in turn negatively affect SLP.

The findings of the study offer several managerial implications. Importantly, university management should broaden use of eLearning to facilitate Students' Learning Process. With eLearning benefits, eLearning incentives, eLearning integration as well as favourable eLearning environment enhances SLP (teaching, learning and research). On the other hand, institutions and management should carefully reduce on eLearning challenges and unfavourable eLearning environment and this reduces the negative effect it has on SLP. It can therefore be concluded that eLearning environment plays a critical role in enhancing eLearning benefits which in turn facilitates effective and efficient SLP. On the other hand, poor eLearning environment increases eLearning challenges which in turn negatively affect SLP.

5.4 Suggestion for Further Research

ELearning technology is still a relatively new phenomenon with few studies on its effect on Students' Learning Process (SLP). Since this study was only limited to UoN - college of health sciences, the researcher recommends further to be done in private Institutions of Higher Learning in Kenya.

A more detailed study other elements that constitutes to eLearning environment can also be included in further research since this study only focused on Interface design, Instructional design, Instructional content and Learners' support services as the aspects of eLearning environment. This can even go to an extent of investigating how each independent aspect in eLearning environment affects every independent variable (eLearning benefits, eLearning challenges, eLearning incentives as well as eLearning integration).

The independent variables that were studied explained only 68% of SLP. The researcher recommends further study be conducted to determine eLearning aspects that explain 32% of SLP. Furthermore, a comparative study can be carried out on the effect of eLearning on SLP in both public and private universities. This will provide a comprehensive conclusion and recommendation on policies that need to be put in place to ensure that public and private IHL benefits from this innovative technology (eLearning).

REFERENCES

Adedokun-Shittu, N.A. and Shittu, A.J.K., 2011. Critical issues in evaluating education technology.

Alam, M.T. and Farid, S., 2011. Factors affecting teachers motivation. *International journal of Business and social science*, *2*(1), pp.298-304.

Adedokun-Shittu, N.A. and Shittu, A.J.K., 2013. ICT impact assessment model: An extension of the CIPP and the Kirkpatrick models. *International HETL Review*, *3*, p.12.

Browne, T., Hewitt, R., Jenkins, M. and Walker, R., 2008. 2008 Survey of Technology Enhanced Learning for higher education in the UK. *ALT-C 2008: Rethinking the digital divide*.

Chitanana, L., Makaza, D. and Madzima, K., 2008. The current state of e-learning at universities in Zimbabwe: Opportunities and challenges. *International Journal of Education and Development using ICT*, *4*(2).

Chigona, W., Chigona, A., Ngqokelela, B. and Mpofu, S., 2009. MXIT: Uses, perceptions and self-justifications. *Journal of Information, Information Technology, and Organizations*, *4*(1), p.16.

Education, I., 2009. The Positive Impact of eLearning.

Gaebel, M., Kupriyanova, V., Morais, R. and Colucci, E., 2014. E-learning in European higher education institutions: results of a mapping survey conducted in October-December 2013.

Gunga, S.O. and Ricketts, I.W., 2007. Facing the challenges of e-learning initiatives in African universities. *British Journal of Educational Technology*, *38*(5), pp.896-906.

Greenagel, F.L., 2002. The Illusion of e-Learning: Why We Are Missing Out on the Promise of Technology. League White Papers.

Hennessy, S., Harrison, D. and Wamakote, L., 2010. Teacher factors influencing classroom use of ICT in Sub-Saharan Africa. *Itupale online journal of African studies*, *2*(1), pp.39-54.

Hughes, C., Toohey, S. and Hatherly, S., 1992. Developing learning-centred trainers and tutors. *Studies in Continuing Education*, *14*(1), pp.14-27.

Hrastinski, S., 2008. Asynchronous and synchronous e-learning. *Educause quarterly*, *31*(4), pp.51-55.

Kalembera, L. and Majawa, F., 2015, May. The integration of ICTs into the learning activities of the college of medicine undergraduate students. In *IST-Africa Conference, 2015* (pp. 1-10). IEEE.

Ikileng, S.J., 2015. Determinants of adoption of e-learning in Kenyan public universities: a case of Jomo Kenyatta University of agriculture and technology. S*trategic journal of business & change management*, *2*(2).

Nath, J., 2012. E-learning methodologies and its trends in modern information technology. *Journal of Global Research in Computer Science*, *3*(4), pp.48-52.

Omwenga, E., Waema, T. and Wagacha, P., 2004. A model for introducing and implementing e-learning for delivery of educational content within the African context. *African Journal of Sciences and Technology*, *5*(1), pp.35-48.

Tarus, J.K., Gichoya, D. and Muumbo, A., 2015. Challenges of implementing e-learning in Kenya: A case of Kenyan public universities. *The International Review of Research in Open and Distributed Learning*, *16*(1).

Romiszowski, A.J., 2004. How's the e-learning baby? Factors leading to success or failure of an educational technology innovation. *EDUCATIONAL TECHNOLOGY-SADDLE BROOK THEN ENGLEWOOD CLIFFS NJ-*, *44*(1), pp.5-27.

Omwenga, E., Waema, T. and Wagacha, P., 2004. A model for introducing and implementing e-learning for delivery of educational content within the African context. *African Journal of Sciences and Technology*, *5*(1), pp.35-48

Ruiz, J.G., Mintzer, M.J. and Leipzig, R.M., 2006. The impact of e-learning in medical education. *Academic medicine*, *81*(3), pp.207-212.

Kothari, C.R., 2004. *Research methodology: Methods and techniques*. New Age International.

Singh, A.S. and Masuku, M.B., 2014. Sampling techniques & determination of sample size in applied statistics research: An overview. *International Journal of Economics, Commerce and Management*, *2*(11), pp.1-22.

Singh, G., O'Donoghue, J. and Worton, H., 2005. A study into the effects of elearning on higher education. *Journal of University Teaching & Learning Practice*, *2*(1), p.3.

Singh, G., O'Donoghue, J. and Worton, H., 2005. A study into the effects of elearning on higher education. *Journal of University Teaching & Learning Practice*, *2*(1), p.3.

Ruiz, J.G., Mintzer, M.J. and Leipzig, R.M., 2006. The impact of e-learning in medical education. *Academic medicine*, *81*(3), pp.207-212.

Tarus, J.K. and Gichoya, D., 2014. E-Learning in Kenyan Universities: Preconditions for Successful Implementation. *The Electronic Journal of Information Systems in Developing Countries*, *66*.

Virtual, A. (2012) *African virtual university (AVU) - about AVU*. Available at: http://www.avu.org/About-AVU/introduction.html (Accessed: 31 May 2016).

Wiecha, J.M., Gramling, R., Joachim, P. and Vanderschmidt, H., 2003. Collaborative e-learning using streaming video and asynchronous discussion boards to teach the cognitive foundation of medical interviewing: a case study. *Journal of medical Internet research*, *5*(2), p.e13.

Wiecha, J. and Barrie, N., 2002. Collaborative online learning: a new approach to distance CME. *Academic Medicine*, *77*(9), pp.928-929.

Yamane, T., 1973. Statistics: an introductory analysis-3.

Muller, J., 2009. Considering ICT use when energy access is not secured: A case study from rural South Africa. *African Women & ICTs: Investigating Technology, Gender and Empowerment*, pp.33-43.

Herselman, M.E., 2003. ICT in rural areas in South Africa: various case studies. *Informing Science Proceedings*,

Tinio, V.L., 2003. ICT in Education.pp.945-955.

Wagner, D., Day, B., James, T., Kozma, R.B., Miller, J. and Unwin, T., 2005. Monitoring and evaluation of ICT in education projects. *A Handbook for Developing Countries. Washington DC: InfoDev/World Bank*.

Vision, K., 2007. 2030 (2007). *Nairobi: GOK*.

Zhang, G., Zeller, N., Griffith, R., Metcalf, D., Williams, J., Shea, C. and Misulis, K., 2011. Using the context, input, process, and product evaluation model (CIPP) as a comprehensive framework to guide the planning, implementation, and assessment of service-learning programs. *Journal of Higher Education Outreach and Engagement*, *15*(4), pp.57-84.

Könings, K.D., Brand-Gruwel, S. and Merriënboer, J.J., 2005. Towards more powerful learning environments through combining the perspectives of designers, teachers, and students. *British Journal of Educational Psychology*, *75*(4), pp.645-660.

Rinaldi, M., 2013, October. Perception of students towards e-learning. In *Educational Media (ICEM), 2013 IEEE 63rd Annual Conference International Council for* (pp. 1-4). IEEE.

Jokela, T., Iivari, N., Matero, J. and Karukka, M., 2003, August. The standard of user-centered design and the standard definition of usability: analyzing ISO 13407 against ISO 9241-11. In *Proceedings of the Latin American conference on Human-computer interaction* (pp. 53-60). ACM.

Ardito, C., Costabile, M.F., De Marsico, M., Lanzilotti, R., Levialdi, S., Roselli, T. and Rossano, V., 2006. An approach to usability evaluation of e-learning applications. *Universal access in the information society*, *4*(3), pp.270-283.

Frydenberg, J., 2002. Quality standards in eLearning: A matrix of analysis. *The International Review of Research in Open and Distributed Learning*, *3*(2).

Vonderwell, S. and Zachariah, S., 2005. Factors that influence participation in online learning. *Journal of Research on Technology in education*, *38*(2), pp.213-230.

Rekkedal, T., Qvist-Eriksen, S., Keegan, D., Suilleabháin, G., Fritsch, H., Ströhlein, G. and Nardi, E., 2003. Student support services in e-learning. *Retrieved September*, *20*, p.2005.

Osborne, M., 2013. Modern learning environments. *CORE Education*.

Goi, C.L. and Ng, P.Y., 2009. E-learning in Malaysia: Success factors in implementing e-learning program. *International Journal of Teaching and Learning in Higher Education*, *20*(2), pp.237-246.

Sun, P.C., Tsai, R.J., Finger, G., Chen, Y.Y. and Yeh, D., 2008. What drives a successful e-Learning? An empirical investigation of the critical factors influencing learner satisfaction. *Computers & education*, *50*(4), pp.1183-1202.

Tidwell, J., 2010. *Designing interfaces*. " O'Reilly Media, Inc.".

Avouris, N., Tselios, N., Fidas, C. and Papachristos, E., 2001. Website evaluation: A usability-based perspective. In *Advances in Informatics* (pp. 217-231). Springer Berlin Heidelberg.

Penna, M.P., Stara, V. and De Rose, M., 2009. The failure of e-learning: why should we use a learner centred design. *Journal of e-Learning and Knowledge Society*, *3*(2).

Gu, Q. and Sumner, T., 2006, April. Support personalization in distributed e-learning systems through learner modeling. In *Information and Communication Technologies, 2006. ICTTA'06. 2nd* (Vol. 1, pp. 610-615). IEEE.

Dhar, D. and Yammiyavar, P., 2012, July. Design approach for e-learning systems: Should it be user centered or learner centered. In *Technology for Education (T4E), 2012 IEEE Fourth International Conference on* (pp. 239-240). IEEE.

Zaharias, P. and Poylymenakou, A., 2009. Developing a usability evaluation method for e-learning applications: Beyond functional usability. *Intl. Journal of Human–Computer Interaction*, *25*(1), pp.75-98.

Popovici, A. and Mironov, C., 2015. Students' Perception on Using eLearning Technologies. *Procedia-Social and Behavioral Sciences*, *180*, pp.1514-1519.

Lam, P., Lee, J., Chan, M. and McNaught, C., 2011. Students' use of eLearning strategies and their perceptions of eLearning usefulness. *Global Learn Asia Pacific*, pp.1379-1388.

Costabile, M.F., De Marsico, M., Lanzilotti, R., Plantamura, V.L. and Roselli, T., 2005, January. On the usability evaluation of e-learning applications. In *System Sciences, 2005. HICSS'05. Proceedings of the 38th Annual Hawaii International Conference on* (pp. 6b-6b). IEEE.

Smart, K.L. and Cappel, J.J., 2006. Students' perceptions of online learning: A comparative study. Journal of Information Technology Education, 5(1), p.20119.

APPENDIX 1: AUTHORITY TO COLLECT DATA

UNIVERSITY OF NAIROBI
COLLEGE OF BIOLOGICAL AND PHYSICAL SCIENCES
SCHOOL OF COMPUTING AND INFORMATICS

Telephone: 4447870/4444919/4446544
Telegrams: "Varsity" Nairobi
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P.O. Box 30197
Nairobi
Kenya

Our Ref: UON/CBPS/SCI/MSC/ITM/2015

23 June 2016

TO WHOM IT MAY CONCERN

Dear Sir/Madam

RE: HOSEA K. CHUMBA : REG. NO. P54/79222/2015

This is to confirm that the above named is a bona fide student of the University of Nairobi, School of Computing and Informatics.

He is pursuing a M.Sc. course in Information Technology Management. He would like to collect data for his project entitled: ***"Assessment of the Effect of E-learning on Students Learning Process in the University of Nairobi."*** Under the supervision of Dr. Robert. O. Oboko.

Any assistance accorded to him will be highly appreciated.

Yours faithfully

School of Computing & Informatics
University of NAIROBI
P. O. Box 30197
NAIROBI

CHRISTOPHER. A. MOTURI
DEPUTY DIRECTOR
SCHOOL OF COMPUTING & INFORMATICS

APPENDICES

UNIVERSITY OF NAIROBI

College of Biological and Physical Sciences

School of Computing and Informatics (SCI)

USE OF ELEARNING IN INSTITUTIONS OF HIGHER EDUCATION

Research Component

ASSESSMENT OF THE EFFECT OF ELEARNING ON STUDENTS' LEARNING PROCESS IN UNIVERSITY OF NAIROBI

STUDENTS' QUESTIONNAIRE

INTRODUCTION

Dear respondent, I am conducting a research on an assessment of the effect of eLearning on students' learning process in University of Nairobi. The goal is to establish whether eLearning is positively or negatively impacting students learning process. The research findings will be kept confidential and will be used for academic purposes only. Please complete the following questionnaire with specific regard to the above enquiry, by placing a tick in the appropriate box

APPENDIX 2: QUESTIONNAIRE

Please provide the information as guided below

SECTION ONE: GENERAL INFORMATION

a. Name of the course you are enrolled in ……...
b. Year of study…….....
c. Are you using university online eLearning system for your studies **YES** [ ] **NO** [ ]
d. Mode of study: **FULLTIME** [ ] **PART-TIME** [ ] **DISTANCE** [ ]
e. Gender: **MALE** [ ] **FEMALE** [ ]

SECTION TWO: ELEARNING BENEFITS ON STUDENTS' LEARNING PROCESS

a. Has eLearning brought about positive effects to your learning process? YES [ ] NO [ ]

If the answer is YES, Rate the following eLearning positive effects indicators Use the ratings as: **1 = Strongly Agree [SA], 2 = Agree [A], 3 = Uncertain [U], 4 = Disagree [D], 5 = Strongly Disagree [SD]**

If your answer is NO, give your comments in Table 2.

S.NO	eLearning positive effects indicators	1 (SA-Strongly Agree)	2 (A - Agree)	3 (U-Uncertain)	4 (D-Disagree)	5 (SD-Strongly Disagree)
a.	eLearning eases students learning process					
b.	Access to up to date information and resources					
c.	Offers online interaction between lecturers and students					
d.	Establishing contact with academia outside world through exchange of academic content – knowledge					
e.	eLearning facilitates students' achieving more in less time					
f.	Greater accessibility of education (students learn from anywhere)					
g.	Greater accessibility of education (students learn any time)					
h.	eLearning is cost effective (saves on printing and travel costs)					
i.	eLearning enhances better retention of knowledge and skills acquired					
j.	Relevant and appropriate content provided					
k.	ELearning enables completion of units at one's own pace					
l.	ELearning facilitates immediate feedback on exam results					
m	The class becomes more interactive and students enjoy it					

n	Use the internet to search for learning resources and are often-times ahead of the lecturer					
o	Students can teach lecturers how to use of some softwares required to accomplish learning					
p	Proficiency in ICT skills has aided students comfort level and learning (Helps in developing learner's skills)					

b. In your own view, are there other positive effects of eLearning on your learning process?

YES [ ] NO [ ]

If the answer above (b) was YES, list these effects

i. ……
ii. ……
iii. ……
iv. ……
v. ……

c. If the answer above was NO, kindly give your reasons below

i. ……
ii. ……
iii. ……
iv. ……
v. ……

SECTION THREE: ELEARNING CHALLENGES ON STUDENTS' LEARNING PROCESS

a. Are there eLearning challenges on students' Learning process? **YES** [ ] **NO** [ ]

If the answer is **YES**, Indicate your level of agreement with the following statements by ticking at the appropriate box. Use the ratings as: 1 = **Strongly Agree [SA], 2 = Agree [A], 3 = Uncertain [U], 4 = Disagree [D], 5 = Strongly Disagree [SD]**

S.NO	**1. Problems**	**1 [SA-Strongly Agree]**	**2 [A-Agree]**	**3 [U-Uncertain]**	**4 [D-Disagree]**	**5 [SD-Strongly Disagree]**
a.	Students plagiarize/ copy other students' work					
b.	Students over rely on ICT					
c.	Lack of interaction between classmates and instructors					
	2. Constraints:					
a.	Inadequate computers/devices with internet connections					
b.	Insufficient technical staff support					
c.	No viable policy on eLearning in place					
d.	Epileptic power supply in places of study					
e.	Slow internet connectivity and speed(both Wifi and Local Area Network - LAN)					

f.	Unreliable network connections					
g.	Inadequate lecturers' knowledge and skills on use of eLearning system – Learning Management System (LMS)					
h.	Inappropriate content					
i.	Needs perfect computer and Internet skills					
j.	Unreliable learning system availability					
	3. **Technical issues/Challenges**					
a.	Computer hardware faults/failure					
b.	Software failures/eLearning system failure					
c.	Poor design of learning system Interface leading to poor usability					
d.	Out datedness of (hardware and software) technology					

b. In your own view, are there other eLearning challenges on students' learning process?
YES [ ] **NO** [ ]

If the answer above is YES, kindly give the reasons below

i. ……
ii. ……
iii. ……
iv. ……
v. ……

c. If the answer is NO, kindly give your reasons below

i. ……
ii. ……
iii. ……
iv. ……
v. ……

SECTION FOUR: ELEARNING INCENTIVES ON STUDENTS' LEARNING PROCESS

Are there eLearning incentives on students' learning process? YES [ ] NO [ ]

If the answer is YES, Indicate your level of agreement with the following statements by ticking at the appropriate box. Use the ratings criteria below.

1 = Strongly Agree [SA], 2 = Agree [A], 3 = Uncertain [U], 4 = Disagree [D], 5 = Strongly Disagree [SD]

S.NO	Incentives	1 [SA-Strongly Agree]	2 [A-Agree]	3 [U-Uncertain]	4 [D-Disagree]	5 [SD-Strongly Disagree]
a.	eLearning has improved accessibility of education and learning					
b.	eLearning has improved adequacy of learning materials					

c.	eLearning has necessitated training (training on basic ICT skills)					
d.	eLearning is encouraging (motivating) students to learn					
e.	eLearning enhances flexibility in learning (student can learn anytime anywhere)					
f.	eLearning has enhanced efficiency of classroom time					

In your own view, are there other eLearning incentives on students' learning process?

YES [ ] **NO** [ ]

If the answer above is **YES**, kindly give the reasons below

i. ……
ii. ……
iii. ……
iv. ……
v. ……

If the answer is **NO**, kindly give your reasons below

i. ……
ii. ……
iii. ……
iv. ……
v. ……

SECTION FIVE: ELEARNING INTEGRATIONS ON STUDENTS' LEARNING PROCESS

Indicate your level of agreement with the following statements by ticking at the appropriate box

Use the ratings criteria below.

1 = Strongly Agree [SA], 2 = Agree [A], 3 = Uncertain [U], 4 = Disagree [D], 5 = Strongly Disagree [SD]

S.NO	Integration	1 [SA-Strongly Agree]	2 [A-Agree]	3 [U-Uncertain]	4 [D-Disagree]	5 [SD-Strongly Disagree]
a.	eLearning has been integrated in delivery of learning content					
b.	eLearning is used in assessments (administer exams)					
c.	eLearning is used in administrations of Continuous Assessment Tests (CATs)					
d.	ICT has been integrated in the curriculum (ICT courses are currently taught)					
e.	Integrating ICT to the traditional method					

In your own view, are there other eLearning integration aspects on students' learning process?

YES [ ] NO [ ]

If the answer above is YES, kindly give specific areas where eLearning has been integrated to learning

i. ……

ii. ……

SECTION SIX - PART A: EFFECT OF ELEARNING ENVIRONMENT ON THE RELATIONSHIP BETWEEN ELEARNING BENEFITS, ELEARNING CHALLENGES AND STUDENTS' LEARNING PROCESS

Rate the following in a scale of scale of 1-5: where 1 = Strongly Agree [SA], 2 = Agree [A], 3 = Uncertain [U], 4 = Disagree [D], 5 = Strongly Disagree [SD]

S.NO	METRICS	1 (SA-Strongly Agree)	2 (A-Agree)	3 (U-Uncertain)	4 (D-Disagree)	5 (SD-Strongly Disagree)
	Students' perception of Interface design					
a.	The eLearning benefits on students' learning process are enhanced by visibility of eLearning system status (System tells you how far you have reached)					
b.	The eLearning benefits on students' learning process are enhanced by recognition rather than recall of eLearning tools and functionalities					
c.	The eLearning benefits on students' learning process are enhanced by the ease to understand and navigate through eLearning system					
d.	The eLearning benefits on students' learning process are enhanced by memorability - how easy is it to remember and use eLearning system					
e.	**Students' perception of instructional content**					
f.	The eLearning benefits on students' learning process are enhanced by relevance of the eLearning content					
g.	The eLearning benefits on students' learning process are enhanced by clarity of eLearning content objectives					
h.	The eLearning benefits on students' learning process are enhanced by appropriateness of scope and depth of topics of eLearning					
i.	The eLearning benefits on students' learning process are enhanced by accuracy of eLearning content					

j.	**Students' perception of instructional design**					
k.	The eLearning benefits on students' learning process are enhanced by student engagement on eLearning resources					
l.	The eLearning benefits on students' learning process are enhanced by group interactions in eLearning resources					
m.	The eLearning benefits on students' learning process are enhanced by eLearning resources that encourages student creativity (students can develop unique interpretations and solutions)					
n.	The eLearning benefits on students' learning process are enhanced by development of eLearning clear development of clearly defined, explained and illustrated concepts					
o.	**Students' perception of leaner support**					
p.	The eLearning benefits on students' learning process are enhanced by technical support offered by eLearning staff and ICT staff					
q.	The eLearning benefits on students' learning process are enhanced by lecturers support in eLearning (lecturers giving clarifications where necessary)					
r.	The eLearning benefits on students' learning process are enhanced by availability of eLearning "Live" Frequently Asked Questions (FAQ) on technical areas					
s.	The eLearning benefits on students' learning process are enhanced by eLearning automated web-based tutoring systems					

SECTION SEVEN: ELEARNING AND STUDENTS' LEARNING PROCESS

Rate the following in a scale of scale of 1-5: where 1 = Strongly Agree [SA], 2 = Agree [A], 3 = Uncertain [U], 4 = Disagree [D], 5 = Strongly Disagree [SD]

S.NO	METRICS	1 (SA-Strongly Agree)	2 (A-Agree)	3 (U-Uncertain)	4 (D-Disagree)	5 (SD-Strongly Disagree)
a	Accessibility of eLearning anytime and anywhere facilitates students' learning process					
b	Relevant and appropriateness of eLearning content promotes students' learning process					
c	Use of eLearning to administer CATs and exams facilitates students' learning process					
d	Use of eLearning in giving exams feedback and results facilitates students' learning process					
e	Use of ELearning enhances retention of knowledge and skills acquired in students' learning process					
f	ELearning interaction between lecturers and students facilitates students' learning process					

….End….

Thank you for your feedback