AN ASSESSMENT OF THE EXTENT OF ICT INTEGRATION IN FOUR ZAMBIAN UNIVERSITIES AND ITS IMPACT ON QUALITY ENHANCEMENT IN THE TEACHING AND LEARNING PROCESS

Thesis submitted in accordance with the requirements of the University of Liverpool United Kingdom for the degree of Doctor of Education

by

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ABSTRACT

An Assessment of the Extent of ICT Integration in Four Zambian Universities and its Impact on Quality Enhancement in the Teaching and Learning Process

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The high demand for higher education (HE) in Zambia created by the increased youthful population, alongside the deteriorating HE infrastructure and learning facilities due to reduced budgets, obliges Zambia to turn to ICT integration to improve teaching and learning. This research determined the extent of ICT integration in four Zambian universities and its effect on enhancing pedagogy.

The study explored the ICT investments trends in Higher Education Institutions (HEIs) between 2011 and 2013; it determined the ICT technology installed; whether lecturers use ICTs in teaching and learning; and identified the lecturers' ICT knowledge and skills and any enablers and barriers to ICT usage.

The research used case study method: questionnaires, interviews and documentation from the HEIs websites. Population data was gathered from a sample of faculty and senior administrators, policy and HEIs strategic documents.

The results show that: ICT investment greatly increased during the period; the national policy, regulatory framework and institutional strategies to support ICT integration exist; and there are sufficient hardware devices, communication infrastructure and adequate software. The lecturers' interests, attitudes, perceptions and beliefs are conducive to technology adoption. However, no ICT implementation framework was found in any of the universities. The majority of lecturers mainly used standard software and the internet, while a few used software that supports teaching and learning. This was due to lecturers' unawareness of the existence of ICTs that support pedagogy, lack

of training in instructional technology, and the non-existence of learning technologists to support the lecturers in integrating ICTs in pedagogy.

The research recommends establishing ICT implementation targets; employing learning technologists, increasing lecturer ICT awareness and skills; equipping ICT learning facilities; linking learning environment to facilitate learning anywhere and anytime; promoting remote content access and local content development; and promoting ICT supported learning in conformity with the principles of best practice in higher education learning. The results from the research inform policy makers, HEI leaders and HE technologists.

Key Words

Information technology in teaching, Information technology in learning, eLearning, higher education, computers and education, virtual learning, education technology, learning technologist, internet and education, digital technology in education.

LIST OF ABBREVIATIONS

AccPack	Accounting Package
Amb.	Ambassador
CBU	Copperbelt University
CDS	Course Design Software
CID	Center for International Development
CSCL	Computer Supported Collaborative Learning
DBMS	Database Management System
DMS	Document Management System
Doc	Doctor
DOI	Diffusion of Innovation
DW	Data Warehousing
e-Books	Electronic Books
ECAR	Educause Center of Applied Research
eLearning or e-Learning	Electronic Learning
e-Library	Electronic Library
e-Mail	Electronic Mail
ERP	Enterprise Resource Package
FDIs	Foreign Direct Investments
FY2008	Financial Year 2008
GDP	Gross Domestic Product
HE	Higher Education
HEI	Higher Education Institution
HEIs	Higher Education Institutions
ICT	Information and Communications Technology
ICTs	Information and Communications Technologies
KAI	Kirton Adaption- Innovation
LAN	Local Area Network
LCD	Liquid-Crystal Display
LibMS	Library Management System
LibSUB	Library Subscription System
LMS	Learning Management System
MAN	Metropolitan Area Network

Manag.	Management
MDGs	Millennium Development Goals
MOOC	Massive Open Online Courses
MoU	Memorandum of Understanding
NIF	National Implementation Framework
NRI	Network Readiness Index
OECD	Organisation for Economic Co-operation and Development
OS	Operating System
PCF	Participant Consent Form
Ph. D or PhD	Doctor of Philosophy
PIIT	Personal Innovativeness in Information Technology
PIS	Participant Information Sheet
QID	Questionnaire identity number
SNDP	Sixth National Development Plan
SPSS	Statistical Package for Social Sciences
SRL	Self-Regulated Learning
SRS	Students Records System
TAM	Technology Acceptance Model
TEL	Technology enhanced learning
TPACK	Technology, Pedagogy, and Content Knowledge
TPCK	Technology, Pedagogy, Content Knowledge
TTS	Time Table System
UK	United Kingdom
UNESCO	United Nations Educational, Scientific and Cultural Organization
UNESCO-UIS	United Nations Educational, Scientific and Cultural Organization Institute for Statistics
UNZA	University of Zambia
USA	United States of America
WAN	Wide Area network
WSIS	World Summit on Information Society
WWW	World Wide Web

ZAMREN	Zambia Research and Education Network
ZAQA	Zambia Qualifications Authority
ZICTA	Zambia Information and Communications Technology Authority

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CHAPTER ONE: INTRODUCTION

1.1 Background

Zambia's vision for 2030 is to be a middle-income industrial nation. While the country is well endowed with a youthful population (24 years old or younger), which represented 66% of the population in 2010, it requires skilled human capital educated at the higher education institutions, besides land and financial capital, to achieve its vision. Meanwhile, as the demand for higher education has escalated due to the population growth rates, the expansion of the HE infrastructure and facilities has not followed suit, because of the reduction of financial support to the HEIs. Zambia is looking to information and communication technologies (ICTs) integration into teaching and learning processes to maintain and improve the quality of higher education.

This study sought to find out how far the local HEIs have integrated ICTs in teaching and learning in order to provide quality higher education to empower the Zambian youthful population so that they develop capacity to respond to the global, continental and national aspirations. The research provides advice on the areas where ICT investments should be prioritised in Zambian HEIs in order to improve quality of teaching and learning.

Discussing his "*college campus of tomorrow*," Dew (2010) quoted Theobald and Scott's (1972) prediction for 1994. They foresaw that by that year, ICTs would provide several learning options to facilitate learning where, when and how the learner chooses and would facilitate the conducting of research and communicating with peers and mentors through electronic media. Some of the contemporary researchers who have covered the trends in higher education, including Rajasingham (2011), Dew (2010), Bloland (2005), and Green and Gilbert (1995), tend to agree with the above prediction and have featured prominently the impact of ICTs on teaching and learning as discussed later in the literature review.

1.2 Why is it necessary to integrate ICTs in Higher Education?

Bloland (2005) says that ICTs are used to create, disperse and apply knowledge, meaning that ICTs are tools to facilitate the creation, dissemination and usage of knowledge, which are the core functions of universities. Chewe and Chitumbo (2012) also claim that ICTs are integrated in teaching-learning processes because they provide: greater information access; greater communication; synchronous and asynchronous learning; increased cooperation and collaboration; cost effectiveness and pedagogical improvement.

Tinio (2003) in the *E-Primer on ICT in Education* presents "The Promise of ICTs in Education," which includes: contributing to the expansion of education access; helping in the preparation of individuals for the workplace; facilitating improvement of quality education; and assisting in the learning environment transformation from teacher-centred to learner-centred learning.

Aware of the transformative role of ICTs from teacher-centred to learner-centred learning, UNESCO (2002) recommended all learning institutions to move to using ICTs in learning. Teacher-centred, which I will refer to in this study as lecturer or instructor-centred-learning, is when the students listen to the teacher or lecturer for instruction while learners are passive listeners and take note of what the instructor imparts. On the other hand, the learner-centred learning is when learners collaborate to uncover knowledge while the instructor becomes a facilitator.

1.3 Research Problem

The Zambian education sector researchers Musambachime (1990), Kelly (1991) and Chipindi (2009) concluded that university education quality in Zambia is being compromised. One of the major causes for the quality compromise is the high population growth rates since Zambia's independence, which resulted in unprecedented growth in enrolments in higher education institutions which were not accompanied by expansion in infrastructure and teaching and learning resources. The other major cause for quality

compromise was attributed to the prolonged economic recession that occurred between 1975 and 1985 (Kelly,1991), which continues to affect higher education institutions. This has resulted in the reduction of budgets allocated by successive Zambian governments to the development of university infrastructure for learning. The Ministry of Education NIF III (2010, p.66) states that,

> "*The need to use new technologies to raise the quality and efficiency of education cannot be over emphasized."*

The current Zambian Government hopes that the use of information technologies will facilitate accommodation of larger numbers of students without major infrastructure expansion.

The Zambian policy makers and university leaders need information to determine whether recent budget allocations to ICT investments have translated into ICT integration in teaching and learning. They also want to know whether increased ICT implementation in HEIs has improved quality in teaching and learning and if not, why not. Where ICT integration has not occurred, they need to be informed about the barriers causing the lack of integration of ICTs.

1.4 My position in my research context

My position in this research context, as a practitioner includes: having had the experience as an ICT project implementor in several businesses; having chaired the board overseeing the implementing ICT related policies, in particular those to support HEIs; and as a champion to introduce Learning Management Systems in our own university, led me to start asking questions as to how I would know that ICTs would enhance quality in HEIs.

My B.Sc. in Mathematics with education from University of Zambia, gave me the opportunity to be recruited and trained by IBM as a Systems Engineer. For eight years I led computerisation of business processes, including accounting, financial, human resource, fixed asset management and other processes. I was recruited from IBM by the African Development Bank (AfDB) as one of the

pioneer ICT personnel, to install computer systems and corporate applications for the institution. I served the African Development Bank for twenty-four years installing and supporting ICT products, training users in ICT applications and managing ICT resources and infrastructure that linked twenty-five different African countries, where the Bank had offices at the time. My experience in the organisations was that, while I was an expert in ICTs and how they worked, I always had colleagues in the project implementation team, who were experts in the business processes. This ensured that the computerised processes functioned according to the respective professional norms while introducing the speed, efficiency and effectiveness of ICTs.

As I read Green and Gilbert (1995) in which they asserted that implementing ICTs in HEIs is slower than corporate organisations, I reflected on my previous experience and wondered what made HEIs different from corporate organisations where I had installed ICT applications. I therefore became curious to find out the conditions and factors that differentiate HEIs from corporate organisations, in integrating ICTs in their production processes.

My progression in the managerial echelons, motivated me to acquire management skills. I therefore took a sabbatical leave to do my Masters in Public Administration, majoring in Public Policy and Management from Harvard University, USA. I acquired skills to formulate and manage the implementation of policy. This knowledge facilitated my appointments to sit on several boards, including board member of a commercial bank, board member of a railways company, a board chairperson of the regulator of the ICT sector in Zambia, and board chairperson of a university board.

I founded the Victoria Falls University of Technology (VFU), which commenced its operations in 2010 in Livingstone, Zambia. I have been managing it as its Vice Chancellor since then while chairing the University Board as well. I acquired and installed ICT infrastructure and some applications to support VFU in its operations such accounting and financial management, and human resource managements. I also acquired a learning management system called Moodle, employed a consultant to install and train lecturers in its

implementation. The other enterprise applications are successfully running and supporting the university operations while the LMS is very slow in its implementation and VFU has not yet benefitted from learning process improvement as anticipated. The difference is that the enterprise applications are implemented and used by the process experts, such as, accountants, human resources experts, etc. whereas the LMS is operated by content experts than the teaching methodology process experts. This outcome pushed me to find out how other universities are faring in integrating ICTs in their learning processes.

As the board chairperson of the Zambia Information and Communications Authority (ZICTA), the regulator of the ICT sector in Zambia, between 2009 to 2013, our board oversaw the implementation of the Republic of Zambia (2009) ICT Act No.15, which mandated the regulator to create the Universal Access Fund, through which ICT connectivity was provided to public HEIs to promote ICT integration. It is this policy support that motivated policy makers to increase investments in ICTs for HEIs. Therefore, from my involvement as an ICT policy implementor and a HEI leader, I was puzzling why, after all this policy support and HEIs ICT financial support, Chipindi (2009) and Hamududu, et al. (2014) still highlighted the challenges of the quality of HE education faced by most of the HEIs.

Therefore, my positionality and exposure motivated me to ask my research question, particularly the level of ICT integration in the Zambian HEIs and whether it is enhancing quality of the learning process.

1.5 Proposed Research Aim

The study's purpose was to carry out research to determine ICT investments made over three recent years (2011, 2012 and 2013) in four local universities, identify the different ICT resources available in the local universities, and to find out what the ICTs are used for in general and how much is dedicated to teaching and learning. It was to reveal the barriers, if any, to the use of ICTs in teaching and learning and also provide an opportunity to measure the

knowledge and skill levels of staff in relation to ICTs in the local universities. The study was meant to reveal whether ICT integration has contributed to the quality enhancement of teaching and learning, and if not, why not.

1.6 Research Objectives

The objective of this research is to determine if ICT integration in four major Zambian universities has contributed to enhancing quality in teaching and learning in these selected universities.

In terms of specific research objectives, this study seeks to:

a. Determine whether the budgets allocated to ICTs in Zambian universities over the three years 2011 to 2013 have increased;

b. Ascertain the availability of ICT infrastructure, devices and software in the selected universities;

c. Identify barriers and enablers that are likely to hinder or facilitate respectively, in ICT integration in HE learning and teaching.

d. Discover what proportion is being used in supporting principles of best practice in teaching and learning;

1.7 Proposed Research Questions:

The main question to this research is:

“To what extent has ICT integrated the Zambian Universities and whether it has enhanced the quality of HE teaching and learning?”

In order to respond to this research question, the study answers the following specific questions:

i. What are the trends of ICT investments in Zambian HEIs over a period between 2011 and 2013?

ii. What ICT products, infrastructure and resources have been installed?

iii. In terms of academic staff, are they using the ICTs in the classroom? If not, why not? What are the barriers which are impacting the use of ICTs in teaching and learning?

iv. Are the ICTs integrated in the teaching - learning process? If not, why not?

v. To what extent are the ICT resources being used in implementing principles of best practices in higher education teaching and learning? If not, why not?

1.8 Rationale

The research findings will benefit all leadership in higher education in planning ICT integration in their respective institutions and will inform policy makers and HE leaders, not only locally in Zambia but also on the African continent. They are expected to provide guidance regarding the best ways to prioritise ICT investments in HEIs and integrate ICTs in teaching and learning. The expected outcome of the research includes determining whether those investments have resulted in improved teaching and learning, otherwise the research will reveal the contributing causes of failure.

1.9 Organisation of the Thesis

This research is organised into the following chapters:

- Introduction consisting of the research problem, the main research objective, the specific research objectives; the research questions, and the rationale;
- Zambian Higher Education;
- Literature review;
- Research methodology;
- Research Findings and Analysis; and
- Research Conclusions, Recommendations and Summary

CHAPTER TWO: ZAMBIAN HIGHER EDUCATION

2.1 Introduction

Zambia aspires to be a strong and dynamic middle-income industrial nation in its Vision 2030 (The Republic of Zambia 2006). Recognising the three factors of production, which are land, capital and labour, Zambia focuses on these factors for its national development. The report by Hamududu et al. (2014) to the Fourth Session of the Zambian National Assembly confirmed that Zambia has sufficient land for its development, GDP growth has ranged between 6% to 7% and foreign direct investments (FDIs) have been flowing into the country to finance development during the period of this study. However, the report points out that labour takes time to develop. Therefore, concerted national efforts are needed to develop human capital equipped with the knowledge, skills and attitudes necessary for Zambia's rapid economic and social development. As one of its pillars, the Sixth National Development Plan (SNDP) prioritised human capital development (The Republic of Zambia, 2011). This national strategy places higher education institutions (HEIs) as primary actors in realising the national vision of producing productive human capital.

The increased governmental focus on expanding higher education and the private sector motivation to expand higher education are based on the thinking presented by Lungwangwa (1991), when he states that the role of higher education is to produce high level manpower, degree-holders who are critical to modern economic sector development. Lungwangwa (1991, p.16) further states that,

> "*Advocates of human capital theory considered higher education as the source of professional and skilled manpower ….. for technological advancement and economic growth*."

Hamududu et al.'s (2014, p.3) report asserted that there was "*a rapid increase in the number of institutions of higher educations.*" While this research has not addressed all issues raised by the above-mentioned report, it looked at the

issues of quality of higher education and how ICTs could be used to address some of these issues.

This chapter will discuss the following:

- the state of higher education in Zambia from 1966 to 2009;
- new developments in higher education from 2010 to-date;
- policy and legal responses to address the higher education challenges;
- conclusions on the state of higher education in Zambia.

2.2 The state of higher education in Zambia from 1966 to 2009

Musambachime (1990) discussed how rapid population growth negatively impacted the higher education system in Zambia. The population had grown rapidly from 3,490,170 in 1963 to 1980 when it reached 5,661,801. When the first university, the University of Zambia, was founded in 1966 the education quality was as good as that obtained overseas because the economy could support the student expansion. Kelly (1991, p.26) explains that the Zambian population in 1980 was characterised by its youth*:*

> *"those aged 14 and under, constituted 49.8 percent of the population".*

This is due to the high population growth rate, which had a serious impact on educational provision from 1975 to 1985. He predicted that,

> *"the population's growth rate will remain high"* (Kelly 1991, p.26).

Besides the consequences of the high Zambian population growth rate, Kelly (1991) also asserts that the quality and relevance of higher education was also negatively impacted by economic decline.

He also said that even though the enrolments in the University of Zambia (the only university at the time) had been growing, the numbers of graduates in areas of national development and manpower needs were still below the requirements.

Kelly (1991, p.177) also said that,

> *"some people have expressed concern about the mediocre quality of some of those who do not go abroad and their inability to respond flexibly, creatively, and competently to the responsibilities that are placed on their shoulders."*

According to him, the mediocre quality of some graduates is due to the method of teaching, which is teacher-centred rather than student-centred.

Chipindi (2009) conducted research to find out the impact of the rapid student enrolments on the quality of university education at the University of Zambia (UNZA) and the Copperbelt University (CBU), which were the only universities in Zambia at the time. He explains that the Zambian population grew in 2007. The rapid increase in population pushed the Government to allow UNZA to introduce another admission scheme in the academic year 1998/1999. Chipindi (2009, p.5) explains that the high growth rates of the Zambian population induced

> '*unprecedented expansion of enrolments at both University of Zambia (UNZA) and Copperbelt University (CBU)*".

Chipindi (2009) further attests that during the same period of rapid population expansion, whereas the student enrolment population at UNZA was 312 students in 1966, it grew to 10,107 students in 2007. For CBU, student population almost doubled from 2,534 in 2003 to 4,155 in 2007. The Strategic Plan for FY2008-2012 (University of Zambia, 2008) put the UNZA student population at 7,558 in 2003 and it increased to 10,107 in 2007. Chipindi (2009) concludes that the increased student population had a negative impact on the teaching at both universities. His research concluded that quality of higher education was negatively impacted by the rapid expansion of enrolments.

Education researchers in Zambia have shown that HE in Zambia needed improvement. The University of Zambia's situation analysis of the teaching and learning environment, in its Strategic Plan for FY2008-2012 (University of Zambia 2008), confirmed the deterioration of the teaching and learning environment. According to the University of Zambia (2008, p. iii) this decline in quality is due to the following factors:

> *"…. the consequential increase in enrolments, has taken place in a situation of lack of physical expansion in facilities and also neglected infrastructure."*

2.3 New developments in higher education from 2010 to-date

The subsequent censuses of 2000 and 2010 saw the Zambian population grow to 9,885,591 and 13,092,660 respectively. While the World Population Review (2014) estimates Zambia's population at 15,021,002 with a growth rate of 3.2%. This confirms Kelly's (1991) population prediction.

Wina (2015, p.2-3), the current Zambian Republican Vice-President, states that,

> "*….Zambia is experiencing a youth bulge, because 82% of the population is 35 or younger, and 66% is 24 or younger. This implies that Zambia is well endowed with human capital. However, for the country to benefit from this human capital dividends there is a pressing need to provide quality tertiary education to empower this youthful population*."

It is critical for Zambia, which is focussed on industrialisation by 2030. This can only be achieved if universities offer quality higher education.

At the present time there are eight public universities established, of which six are operational while two are still being built, and 35 private universities which have been registered by the Higher Education Authority as at 31 August 2016.

However, the Ministry of Education National Implementation Framework (NIF) III (2010, p.43) states that

> *"..the reality in our universities is that there are serious shortfalls that render the quality of university education poor. These shortfalls… include….inadequate infrastructure,… and insufficient ICT facilities."*

Hamududu et al.'s (2014, p.3) report confirms that the poor quality of higher education has been caused by the demand by the citizenry for higher education, which the public universities have not been able to cope with, while

the gap is partially being filled by private universities, in the absence of a regulatory environment to ensure quality assurance. The report also highlighted poor infrastructure and poor teaching systems among the reasons for the poor quality of university education. It recommended the implementation of already legalised institutions, such as the Higher Education Authority, to improve higher education quality. The same report draws attention to the calls by some economic sector players to the effect that the graduates from the universities do not possess the skills and attributes needed by industry.

2.4 Policy, regulatory and legal responses to address the higher education challenges

2.4.1 Policies

In view of the challenges faced by the education system the Zambian Government decided to accelerate human capacity development through two policies and an implementation framework. The first policy is the Ministry of Education policy called *Educating Our Future* (Ministry of Education, 1996) which emphasises the promotion of open learning, life-long education and a variety of modes of distance learning which require the use of ICTs. The second is the Ministry of Communications and Transport's (2006) ICT policy, which specify the integration of ICTs in learning and teaching. It was after this stage that the UNZA Strategic Plan for FY2008-2012, included the integration of ICTs in its objectives to improve the situation described up to 2007 (University of Zambia, 2008).

The National Implementation Framework (NIF III), (Ministry of Education, 2010, p.55) has the following four objectives:

"(a) To enhance the quality of teaching and learning through the use of ICTs
(b) To enhance the efficiency and effectiveness of education services through use of ICT
(c) To increase access to education through use of ICT
(d) To improve equity in education through the use of ICTs".

In comparing the above goals to the UNESCO-UIS (2009) ICT integration goals, it is clear that the objectives (b) and (c) above is combined in the first

goal; objective (a) above is the second goal while the objective (d) is the same as the third goal. This is clear that the NIF III of 2010 was as a result of the UNESCO-UIS (2009) ICT integration goals

2.4.2 Regulatory Framework

The Zambia Information and Communications Authority (ZICTA) the regulator of the ICT sector in Zambia, is under the Ministry of Transport and Communications. The Republic of Zambia (2009) ICT Act No.15 mandated the Zambia Information and Communications Technology Authority to create the Universal Access Fund, through which it was "*to promote the widespread availability and usage of electronic communication networks and services throughout Zambia".* ZICTA was mandated under the ICT Act 15 of 2009, "to provide universal access" (The Republic of Zambia, 2009). It was permitted by the Government to sign an MoU with Zambia Research and Education Network (ZAMREN) to support "Last-Mile Connectivity." ZAMREN which was operationalised in June 2012, whose main objective is to finance fibre optic broadband connectivity to its member institutions, including universities. to the dedicated global research and education resources and to the internet. This partnership between ZAMREN and the regulator has led to the success of improving broadband connectivity for the public universities and member private universities.

In addition, the then Minister of Communication and Transport launched the *Connecting Learning Institutions* project on 9 June 2013, which besides providing ICT equipment and services to schools and colleges, also provided the last mile link for the three public universities at the time to the fibre optic network.

The Higher Education Act of 2013 found on the website, National Assembly of Zambia (2013), was passed and some of the its objectives included the creation of the Higher Education Authority (HEA) with defined functions and powers which include provision of: quality assurance and quality promotion in higher education; establishment, governance and regulation of public higher

education institutions; and registration and regulation of private higher education institutions.

Applications to be registered from private universities are submitted to HEA, which is the regulator. All universities are required to provided documented evidence of facilities, systems, which include, technological installations, qualifications of personnel, policies, academic quality frameworks and other requirements. They carry out physical inspections to ensure that what has been documented is actually in place. In addition, it reviews all academic programmes offered by universities to ensure completeness.

2.4.3 Legal Framework

The Zambia Qualifications Authority (ZAQA) Act No. 13 of 2011 was passed by Parliament to establish the Zambia Qualifications Authority, which would develop, oversee and maintain the National Qualifications Framework and accredit qualifications from the primary school certificate to PhD degrees. This would ensure that the higher education qualifications from all registered universities are accredited, registered and are internationally comparable.

The above efforts made by the Government show that not only was it ready to provide the policy, regulatory and legal framework to integrate ICTs to prepare knowledge workers and increase student population rapidly, but also was going ahead putting into action the promotion of ICTs in universities, colleges and schools.

2.5 Conclusions on the state of higher education in Zambia

The discussion of the state of Zambian higher education shows that while the quality of education was comparable to that which was found in other countries during the early years of the first university, the quality has deteriorated since 1974 and continues to deteriorate according to Hamududu et al. (2014). The deterioration of education quality is due to increasing demand for higher education. The increased demand for higher education is attributed to high population growth rate, deteriorating infrastructure, and high demand for

qualified labour. The Government has placed its hope to improve HE through the integration of ICTs in HEIs and have enacted policies accordingly.

CHAPTER THREE: LITERATURE REVIEW

3.1 Introduction

The literature reviewed here gives different lenses through which the theme of this research has been viewed by other scholars in different contexts. The review helps focus on new aspects not yet addressed and asks questions not yet asked regarding ICT impact on the practice of higher education. It also presents different interpretations for the phenomena that emanate from the findings of this study.

This chapter covers topics that provide theory to facilitate understanding of the study findings. The topics covered include:

3.2 Determining the teaching/learning process

3.3 ICT integration in pedagogy;

3.4 Enhancing quality in HE teaching and learning: the role ICTs play in supporting best practices in teaching and learning;

3.5 Global, continental and national perspectives on the importance of ICT integration in HEIs;

3.6 Factors influencing the integration of ICTs;

3.7 Technology and innovation adoption models.

I initially sought the meaning of the three variables that are key to the understanding of what the study is searching for, that is, “teaching/learning process,” “integrating ICTs” in teaching and learning, and “enhancing” quality in higher education teaching and learning. The clear understanding of the variables, as they relate to this particular research, sharpens the focus of this research and clarifies the kind of data sought in the practice. Therefore, literature has been reviewed to understand what other scholars say about what constitutes a teaching and learning process and what constitutes ICT integration in higher education institutions. The review of the literature permits me to know what to look out for in order to determine the extent to which ICT integration has taken place in any higher education institutions studied.

Literature abounds with different meanings on how higher education teaching and learning can be enhanced and it is important to clarify what it means in this research. That is, the attributes that will be used in this research to determine quality enhancement have to be known. Discussions by other scholars clarify the different views provided regarding quality enhancement in teaching and learning in the context of this research, and how ICT integration can enhance it.

The next section in this literature review presents a variety of ICT integration impacts on HEIs at the global, continental and national levels. The section further discusses different scholars' explanations of why ICT integration in higher education has become such an issue. This is followed by a section discussing the importance of ICTs to the learning and teaching practices by showing the roles ICTs play in supporting the best practice recommended by UNESCO.

In order to understand how technologies are adopted, another group of literature related to different theories concerning technology and innovation adoption has been also perused. A number of researchers in the field of ICTs in education have discussed some of the factors either enabling or hindering integration of ICTs in the teaching and learning process. The barriers likely to frustrate ICT integration efforts, discussed by other researchers, will also be included within the factors.

3.2 Determining the teaching/learning process

Although the desired impact is on the learner, Ertmer (1999) states that teachers are key change agents within their teaching context. Therefore, it is necessary to identify the context and the components of the learning/teaching process. For this purpose, the learning process model from Voogt and Knezek (2008), a graphical representation of which is presented in figure 1 below, was used as a basis. The model represents the key elements of the learning process. Although it was meant for primary and secondary schools, it has been adapted to be applicable to higher education.

Voogt and Knezek's (2008) adapted conceptual framework depicts the learning process with four key influential factors: the lecturer and the learner being the key actors; the content or the curriculum, which is the object for the learning process; and the infrastructure which includes the learning facilitation materials and the physical and/or virtual learning environment supporting the learning process. The learning process is the pedagogy or teaching methodology. They explain that ICT can play two roles in this learning process conceptual framework, as a curriculum or content to be learnt or as the physical and/or virtual learning environment or platform. The university environment provides the organisational structure to support the learning while the societal policy and regulations are also required to make the learning effective and relevant. The adapted figure below has replaced the teacher by the lecturer, the school environment by the university environment.

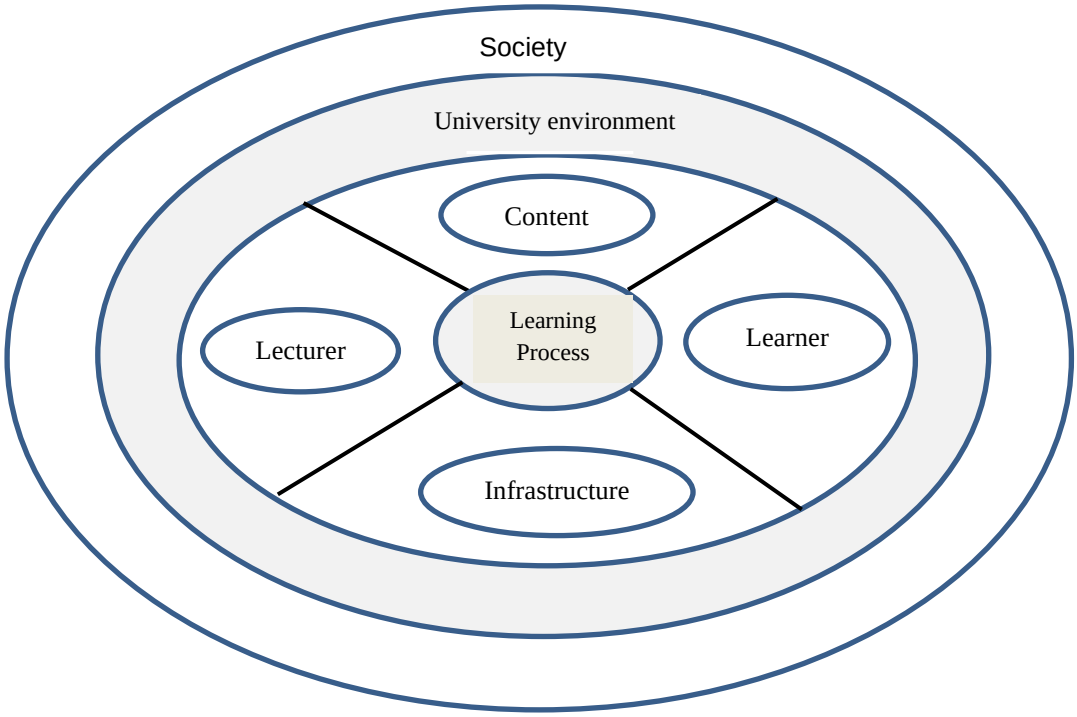


Figure 1: The learning process adapted from Voogt and Knezek (2008)

Ten Brummelhuis and Kuiper (2008) in Voogt and Knezek (2008) state that for ICT to enhance the higher education learning process, it has to intervene in

each component of the learning process. This means that at the societal level, there should be a national policy spelling out how ICT should be used to improve the delivery of effective education; the learning institution should have an ICT strategy and an implementation plan for integrating ICTs to enhance learning; there needs to be a learning management platform or environment to facilitate constructivist learning; there should be a reliable and effective ICT infrastructure and ICT enabled content delivery tools; and both the lecturers and the learners should be willing users of the ICT technology. The appropriate pedagogy or methods of teaching should be applied to deliver the desired learning. In this research, I am looking at the second aspect of ICTs in the learning process, that of supporting the learning process.

3.3 ICT Integration in pedagogy

3.3.1 Defining ICT integration in pedagogy

Ertmer (1999) states that ICT integration in teaching and learning is recognised not only in terms of the amount of ICT hardware and software available, but also in terms of the ICT- enabled opportunities in teaching and learning. She further states that integrating ICT is about the level at which ICT technology is being used to deliver knowledge through the teaching and learning process. She compares the three **R**s (standing for **reading, 'riting and 'rithmetic**, which are the basics of learning in the traditional learning environment) to the three **C**s representing **c**ommunication, **c**ollaboration and **c**reative problem solving enabled by ICTs, as the basics of learning in the ICT integrated learning environment. However, my experience is, while in the traditional learning environment the teachers are trained in the methodology to teach the three **Rs**, the lecturers in HEIs are not taught any methodology to teach the three **Cs** to the learners.

Lishan (2003) used indicators such as broadband capacities, web presence, internet hosts and high internet penetration in institutions to determine ICT integration in the African universities he studied. Lishan's (2003) choice of indicators covers the technological view but excludes the pedagogical view

and does not cover the learning process model presented by Voogt and Knezek (2008). I therefore deemed Lishan's (2003) indicators to be insufficient to determine ICT integration in higher education institutions.

Haslaman et al. (2008, p.1) present two ways of understanding ICT integration: the technological and the pedagogical views. The technological view implies the

> '*integration of the technological infrastructure and systems in the educational environment*'

while the pedagogical view means the

> '*integration of ICT materials and programs in terms of social constructivist learning principles*.'

This definition implies that, as I search for ICT integration in higher education, it is mandatory to look for the availability of ICT hardware and software and the connectivity and communication technologies available in any institution being studied. Besides that, these technologies should be used in delivering knowledge to the learner in the classroom. Further, it is also necessary to determine whether the lecturers have the knowledge and skills to utilise these technologies in the classroom. The implication of this perspective on ICT integration means that ICTs can only be said to be integrated if the different ICT technologies are used to facilitate the delivery of knowledge to the learners.

The challenge in the two views presented by Haslaman et al. (2008) is that they do not reflect all aspects of the learning process model in figure 1 adapted from Voogt and Knezek (2008). They do not reflect the content to be learnt nor the enabling policy and institutional environment. Without these two components, I judge that the model falls short of what is needed to integrate ICTs in the learning process.

Czerniewicz and Brown (2005) support this idea when they assert that in studies of integration of ICTs to enhance teaching and learning in South African HEIs, it is not enough to talk about ICTs in terms of numbers of computers: the complete resources should be studied, including content,

personnel and contextual resources. In their research they used indicators including the technology resources; the content resources; personnel resources and skills; and finally, social resources, which include the policy and regulatory support available.

However, their understanding of 'technology resources' appears to be limited since it does not obviously include software:

> "…*we define technology resources as the tangible components of computers and associated telecommunication infrastructure,*" (Czerniewicz and Brown, 2005, p.47)

In the ICT integration models discussed above, the researchers do not specify the knowledge and the skills the personnel (lecturers) should acquire. It is always assumed that they should have knowledge of the content or discipline they teach and also of the ICT technology.

However, Mishra and Koehler (2006) updated in Mishra and Koehler (2008) specify the kind of knowledge and skills the lecturers require in order to be able to integrate ICT in the learning process, by explaining that the teacher or, in our case, the lecturer requires knowledge of the discipline or content s/he is expert in, the methodology or pedagogy of teaching in the classroom particular to that content, and the technology necessary to deliver the content. Mishra and Koehler (2006, p.1029) state about their model that,

> "*our model of technology integration in teaching and learning argues that developing good content requires a thoughtful interweaving of all* three *key sources of knowledge: technology, pedagogy, and content".*

This model, called the Technology, Pedagogy, Content, Knowledge Model (TPCK), updated to (TPACK), implies that, for any teacher or lecturer to be effective, they should be expert and knowledgeable in the subject matter, in the classroom methods of delivering the content, and the technology used for effective delivery of the learning. Since we are addressing the integration of ICT technology, the lecturer therefore should be trained in the use of ICT technology for pedagogy. Mishra and Koehler (2006) proposed examples of educational technology courses, such as creating learning videos, designing a learning resources website and designing online courses.

After considering the different models I chose and discussed, I therefore decided to adapt the Czerniewicz and Brown (2005) model as presented in **Figure 2** to assess how ICT integration had impacted on teaching and learning. I propose the adapted model below to include the technology resources (hardware, software and the telecommunication infrastructure); the content resources which included digital material online; personnel resources which cover a lecturer's attributes (Interest, attitude, beliefs, and innovativeness), lecturer's knowledge (technology, pedagogy and content), and skills in using computers (ICT support and learning or pedagogical technologists); and finally, social resources, which is the policy, regulatory and institutional support available.

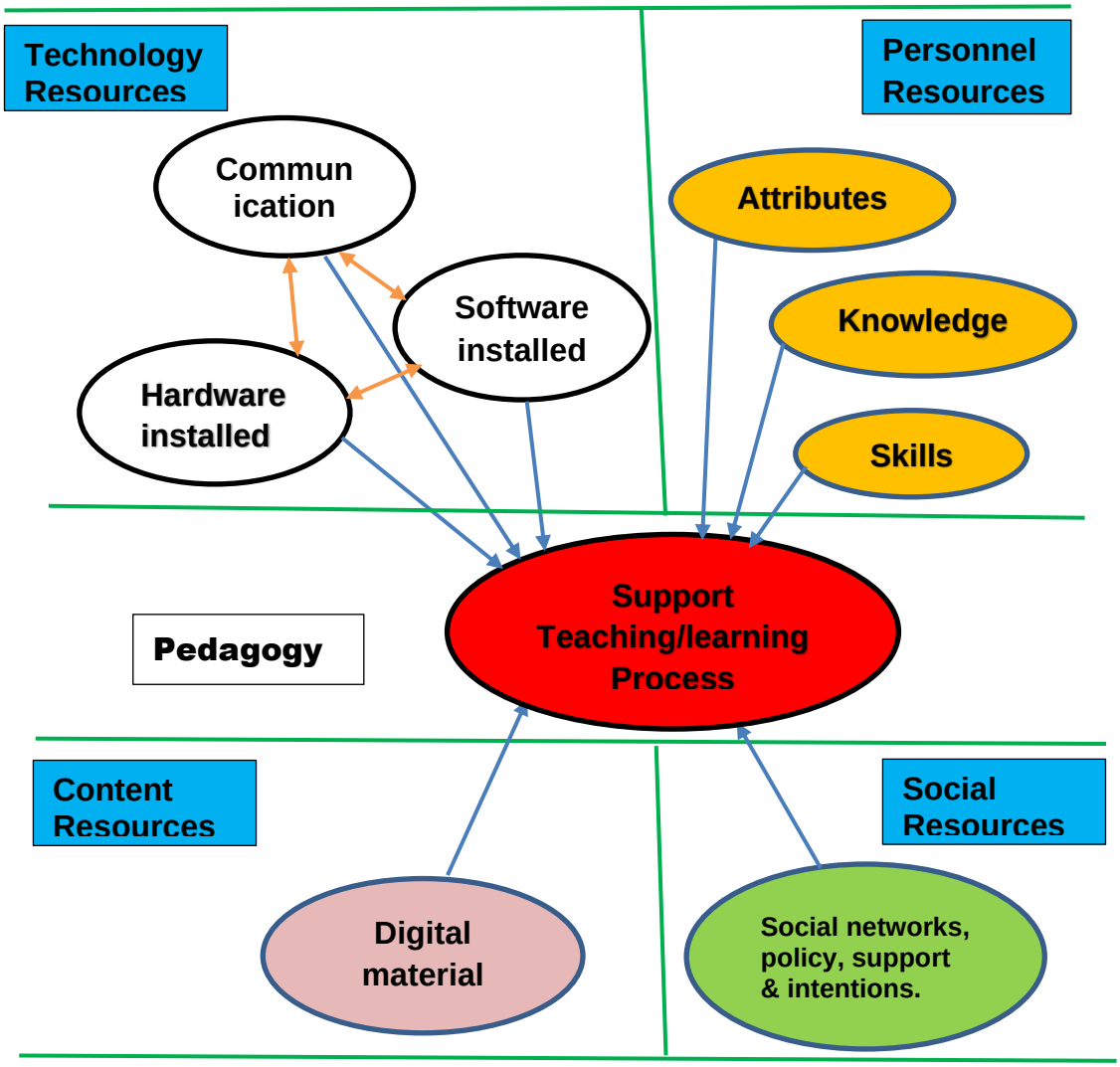


Figure 2: ICT integration model adapted from Czerniewicz and Brown (2005)

3.3.2 Support function for ICT integration

Three studies propose a critical support function, that of a learning or pedagogical technologist, that is mandatory for the successful implementation of training lecturers in learning technologies.

Ellaway et al. (2006) state, based on their evidence, that:

> *" the professional role of those who design, implement and control these encompassing technologies has emerged as a major component of the success"* [p.75]… *"the role of the learning*

> *technologist is clearly central to the way that e-learning systems and tools are built, implemented and used.*" [p.83]

Fox and Summer (2014, p.92) assert that;

> "..*there can be no doubt that learning technologies and the staff that support them are increasingly important in the design and delivery of higher education."*

Mitchell et al. (2017) present the different titles given to learning technologist in a technology enhanced learning (TEL) environment and the roles they perform. In this study I shall maintain the title of the learning technologist. However, it suffices to take note of the claims from these authors about the critical nature of the role they perform in ICT supported pedagogy.

3.3.3 Stages of ICT integration

Green and Gilbert (1995) proposed that, in order to appreciate that ICT has more potential to offer in education than just a promise, it helps in learning from the experience of businesses and other organisations in terms of their ICT implementation cycles, shown in **figure 3** below. **Figure 3** indicates that the implementation cycle usually spans a number of years. They assert that for university functions similar to those of general businesses, the HEIs can also move through the ICT implementation cycle much faster. However, in academic units, academicians functions differ from normal business functions as explained in the third paragraph on the next page. Green and Gilbert (1995) said that moving through the stages of the cycle is much slower than in corporate organisations. They claimed that most HEIs find themselves in stage 1 of the implementation cycle without explaining the challenge faced by HEIs which impacting the rate of ICT implementation. Green and Gilbert (1995) asserted that HEIs need to learn how to move to stages 2 and 3 of the implementation cycle. It is also important to be aware that the twenty-four years old model in the ICT integration environment, has most likely changed in the fast-changing ICTs environment.

Reference	**Stage 0:**	**Stage 1**	**Stage 2**	**Stage 3**
Green and Gilbert (1995) **For Business**	Planning, investigation and experimentation	Increase in planned capital investments, ICT application training, implement business applications, modest gains	Annual investments stabilise, capacity grow and new functions developed	Achieves new levels of efficiency, effectiveness and transformation

Figure 3: Stages of ICT Implementation Cycle by Green and Gilbert (1995)

As discussed earlier, my own experience in implementing the computerisation of business functions suggests that the process owners or experts form an integral part of the ICT integration team. The process owners in HEIs are the lecturers, who are expected to be experts in the TPACK as proposed by Mishra and Koehler (2008). However, the Green and Gilbert (1995) stages were proposed before the TPACK model of lecturer development proposed by Mishra and Koehler (2008).

I tried to understand why the HEIs primary actors (lecturers) differ from the standard business professionals, in terms of the type of organisation structure, in terms of ability to integrate innovations and the difference between academics and the standard enterprise professionals.

- Cosh and Hughes (2012) discovered that firms that selected a decentralised, formal structures exhibited significantly higher tendency to introduce an innovation. This conclusion could used to look at the innovation adoption.
- The concept of organisation culture has failed to reflect the dual position of academics in their disciplinary and institutional contexts. Most of academician identities are influenced by their discipline rather than the institutional context, (Silver,2003). Therefore, the majority of academicians are not familiar with the methodology of teaching their discipline. They need to be trained as proposed by Mishra and Koehler (2008). Therefore, I have proposed an adaptation of the ICT integration model in Figure 4 below.

Reference	**Stage 0:**	**Stage 1**	**Stage 2**	**Stage 3**	**Stage 4**
Adopted using TPACK model of Mishra and Koehler (2006) and **my experience of Business applications implementation** **For HEIs**	Planning, investigation and experimentation	Increase in planned capital investments, ICT application training, implement business applications, modest gains	Increase in planned capital investments, Staff development and training in pedagogy and ICT learning technologies using the TPACK model	Annual investments stabilise, capacity grow and new functions developed	Achieves new levels of efficiency, effectiveness and transformation

Figure 4: Stages of ICT Implementation Cycle adapted from Green and Gilbert (1995)

3.4. Enhancing quality in HE teaching and learning: the role ICTs play in supporting principles of best practices in teaching and learning

The discussion here first looked at the research pertaining to the globally accepted principles of best practices for enhancing teaching and learning in higher education and how the technology can support these principles and then looked at the research on the Zambian higher education scene, including actions taken to introduce ICTs in higher education.

3.4.1. Some views on quality enhancement in teaching and learning

In order to define high quality in a higher education teaching and learning environment, Chickering and Ehrmann's (1996) model is used. This model has been in use for more than two decades. I had fears that the model might only be applicable to traditional face-to-face learning and not applicable to learning using ICTs including the learning management systems and e-Learning in general. However, Gomez Alvarez del Carmen (2005, p.7) confirmed that their study,

> *"…expanded our knowledge of the "seven principles" to include graduate courses in online environments"*

Grant and Thornton (2007) used the "*Seven Principles of Good Practice in Undergraduate Education*", to determine applicability and effectiveness in conducting adult learners' online courses. Among their conclusions they stated that;

> *" the traditional practices associated with the seven principles of good undergraduate education were adaptable, .. for, online instruction ."* (Grant and Thornton, 2007, p.350)

Kruger (2010) who conducted a study in the a blended learning environment, refers to the study conducted by Grant and Thornton (2007) and demonstrated how the Chickering and Ehrmann's (1996) model was used to link the students' appreciation of learning benefits drawn from integrating technology learning interventions.

I had also reservations that the model was developed within one specific cultural context, having been undertaken in the United States of America, and might not apply in other contexts, such as Zambia. However, the study by Kruger (2010) is from Johannesburg University, a university in Africa. It assures me that the model is still an effective tool to measure the enhancement of quality in the learning process in our Zambian HEIs, which is also in Africa.

The model presents seven principles of good practice in undergraduate higher education learning, compiled from decades of research on undergraduate education in the United States since 1987. They explain that for ICT to have a positive effect on higher education, ICT technologies should be applied to support these seven principles of good practice:

i. Encouraging contacts between students and faculty

Student motivation and involvement are increased by frequent student-faculty communication in and out of class. This communication is intended for faculty to support students in resolving issues they do not understand and provide encouragement to continue working. Students are also motivated by the personalised attention from faculty. ICTs can increase access to lecturers, provide students with the opportunity to share useful resources, and facilitate joint problem solving and collaborative learning to enhance face-to-face class meetings. Chickering and Ehrmann (1996) assert that there is a positive impact created by the asynchronous communication supported by ICTs which facilitates speedy and safe communication between students and faculty.

ii Developing reciprocity and cooperation among students

Collaborative learning among students, be it in the form of study groups, group problem solving or discussion of assignments enhances learning. Learning is more effective when it is collaborative and social. Communication among students expands learning opportunities. The

paper proposes ICT tools such as email, webcasts and video casts to facilitate student cooperation during learning.

iii Using active learning techniques

Effective learning demands the students to participate actively in the learning process through discussions on what is being learnt, writing while reflecting on it, comparing it to what they already know and considering how it can be applied. The ICT tools to support this include word processing, communications tools, research libraries, internet search and any software facilitating practice of the concept being learned.

iv. Giving prompt feedback

Students are usually motivated to learn when they have communicated to them the starting level of knowledge, the progress of their learning and also where they are at the end of learning. Therefore, regular communications about student performance motivates them to work more. ICTs can enable the provision of regular feedback to students, such as email, computer simulations, video and audio recordings of students, the auto tracking functions available in word processors and learning management systems with asynchronous communications.

v. Time on task

Optimum utilisation of time on learning activities results in effective learning. The use of time allocated to learning should be respected in order to produce expected learning results. Since ICT provides learning anytime anywhere this increases the time available on the learning task and therefore improves the quality of learning. ICTs which facilitate easy and fast communications between lecturers and students also allow efficient time utilisation on learning tasks. ICT facilities such as library systems, databases and storage such as video, audio, webcasts and others facilitate easy access to learning content and save time as compared to conventional libraries.

vi. Communicating high expectations

When lecturers communicate high expectations to students of different capabilities and motivations, they drive the students to meet those expectations. ICTs provide tools to communicate effectively the high expectations and different views of the problems to be resolved, sharpening their cognitive skills.

vii. Respecting diverse talents and ways of learning

A learning environment that accommodates different learning preferences from different students provides effective learning. All student learning talents should be accommodated in order for them to excel in the learning process.

ICTs provide a range of methods of learning that promote active learning for each student. ICT allows students to use learning options of their choice for effective learning.

Chickering and Ehrmann (1996) then consider how ICTs can contribute to the improvement of higher education teaching and learning by being used to advance these seven principles. Some of the identified uses of ICT to support best practices in HE include using ICT in communicating with students for feedback, or guidance; in accessing resources or making resources available to students; in supporting academic operations; and in academic administration (including using ICTs to support academic operations such as course schemes, timetables and students records and other administrative tasks).

Therefore, to determine quality enhancement in teaching and learning, it is necessary to find out the different ICT products and tools available in institutions and what they are being used for. Once determined, a conclusion can be reached as to whether the ICTs are helping institutions implement principles of best practices in teaching and learning, resulting in enhancing quality of teaching and learning.

3.5 Global, continental and national perspectives on the importance of ICT integration in HEIs

ICT integration in higher education institutions has been widely researched and literature abounds on the subject. The question that keeps turning in the minds of scholars is the motivation behind the rush by higher education institutions to integrate ICTs in their academic operations. The goal of this literature review is to understand the global, African continental and Zambian national views and motivations in relation to the value of ICT within the HE context.

3.5.1 Global discussions concerning trends of ICT in HE

UNESCO Institute for Statistics, (UNESCO-UIS, 2009, p.12) outlines the three major global policies for adopting ICT in education, which were internationally agreed by four global platforms, including the World Summit on the Information Society (WSIS) of 2003 and 2005, the Millennium Development Goals (MDGs), Education for All and the United Nations Educational, Scientific and Cultural Organisation (UNESCO). These global policy goals are:

- *ICT for enhancing teaching and expanding learning opportunities;*
- *ICT for improving curricula and quality of educational achievements and for educational reform; and*
- *ICT for equity and inclusive education (targeting marginalized groups).*

This same reference further states that

> "*the use of ICT in and for education is now seen as both a necessity and an opportunity….*"

The World Economic Forum Global Information Report 2015 declares in its key messages that

> *"..the impact of ICTs extends well beyond productivity gains. ICTs are vectors of economic and social transformation"* (Dutta, Geiger, & Lanvin, 2015, p.v).

The report claims that to achieve their mandate, universities should adopt ICTs to provide learning for economic and social transformation. It is therefore not surprising that universities, in their efforts to engage with society, are

integrating ICTs to take advantage of their characteristics described in the Global Information Report.

Another explanation why HEIs are integrating ICTs is that ICT integration has contributed to the alleviation of the major global pressures facing HEIs as elaborated in the paragraphs that follow.

i. **Rapid increase in university enrolments**: The massive demand for higher education from all sectors of society continues to result in the demand for university education outstripping the supply. This problem is discussed by Lai (2011), Olusola and Alaba (2011), Rajasingham (2011), Dew (2010), Chipindi (2009), Laurillard (2002), Coaldrake and Stedman (1999), Green and Gilbert (1995), Kelly (1991), and Musambachime (1990). The different reasons advanced by different researchers for the rapid expansion in enrolments include: rapid population growth in some countries like Zambia; increased enrolments from other countries induced by globalisation; and the need for more graduates in the knowledge society. Lai (2011) refers to this phenomenon as “massification” because, according to him, the university enrolments at the end of the twentieth century had grown to 200 times more than at the start of the same century.

   While the demand for university enrolments is increasing, the expansion of the university infrastructure is constrained. Research by Coaldrake and Stedman (1999) and Kelly (1991) explains that the constraint has been caused by the reduction of government financial support to universities. Both researchers explain that education is causing HEIs to find alternative strategies such as effective ICT integration.

   The case of reduced budgets is not general to all countries. The Douglass (2010) report from the OECD comparing different OECD countries only indicates that the reduction of budgets was not general in all countries.

ii. **Globalized Learning**: The introduction of e-learning in the university has resulted in what Dew (2010) refers to as “globalized learning” because learners from all parts of the world can be enrolled in any university

anywhere in the world. ICTs provide a platform to link the institutions and provide globalized learning.

iii. **Harmonising international education standards**: Globalized learning needs to harmonise higher education standards in assessment and accreditation and encourages tendencies towards global curricula. This is another pressure pushing universities to turn to ICT integration, particularly in internet usage. The internet carries large volumes of information in terms of electronic libraries, education resources and training audios and videos. This issue has been addressed by Rajasingham (2011) and Dew (2010).

iv. **Shortened shelf-life for university-acquired knowledge**: The coming of the information age is shortening the shelf-life of university-acquired knowledge. The need to update knowledge and acquire new knowledge by graduates has popularised life-long learning by adult students. This results in the changing demography of the student population in universities brought about by increasing numbers of adult students who are involved in life-long education. This new phenomenon is increasing the diversity of the student demography and university enrolments. HEIs are also looking to ICTs to help them serve the diverse student population (Lai 2011; Olusola and Alaba 2011; Rajasingham 2011; Dew 2010; and Green and Gilbert 1995).

v. **The impact of ICTs on teaching and learning**: The pressures on HEIs covered in points **i. to x.** require change in teaching and learning. The assumption in all the discussion of these pressures is that the use of ICTs in teaching and learning would relieve them.

Dew (2010), Olusola and Alaba (2011) and Rajasingham (2011) further add that there is pressure on HEIs to integrate ICTs because the delivery of education has changed because lifelong learning, e-learning and distance learning anytime and anywhere require use ICT supported learning environments. However, the use of ICTs in itself is a pressure on universities because it provides new challenges and opportunities. It is for

this reason that Coaldrake and Stedman (1999) point out that since ICTs have had an impact on teaching and learning, universities should therefore note the changing roles and policies that are required in adopting ICTs in teaching and learning.

ICTs provide the opportunity to deliver courses online and to use online teaching resources. Bloland (2005) asserts that ICT complements the mandatory functions of universities in that it improves content and curriculum, and facilitates delivery of content and communication with and among students.

vi **The critical role of ICTs in the knowledge economy**: According to Lai (2011), ICT is the knowledge economy driver, implying that ICT is central to the knowledge economy. He further asserts that power can only be gained from the wealth derived from knowledge access if there is an ability to use and adapt ICTs, implying that goods production and accumulation of capital use knowledge production in the modern globalised economy. Beerkens (2008) quotes Drucker (1969, p.248) who claims that "*knowledge has become the central factor of production*". The preparation of knowledge economy workers requires change in teaching and learning, in particular by way of collaboration between the teacher and the learner (Lai 2011; Rajasingham 2011). Bloland's (2005) assertion on ICTs' knowledge processes implies that this knowledge can be imparted effectively to the future skilled manpower by universities only if' ICTs are integrated in the teaching and learning.

vii **Challenge to the universities' mandate:** The advent of commercialised higher education, which has resulted in the creation of vast reservoirs of information accessible from anywhere and at any time, pushes universities to be competitive and maintain their relevance to society. The universities' monopoly concerning their mandatory function of creating, dispersing and applying knowledge is eroding due to the impact of ICTs in the creation, dissemination and use of knowledge. Universities have to be connected to the knowledge reservoirs and exploit them for teaching and learning

(Dew, 2010; Olusola and Alaba, 2011; Rajasingham, 2011; Bloland, 2005; Coaldrake and Stedman, 1999; Green and Gilbert, 1995).

viii. Emerging ICT resources to address HEI challenges

Ahalt and Fecho (2015) propose some emerging technologies for American HEIs. It is important to mention a few that I feel will address the Zambian universities' learning challenges. They include Learning Management Systems (LMSs); electronic textbooks (e-books); Massive Open Online Courses (MOOCs); These technologies can be accessed without investing too much money because some of the products are available and may be accessed freely.

ix. Changed demands from the information age learners

A number of studies claim that the information age learners' motivations, attitudes and styles have changed, obliging lecturers to adjust their teaching styles, and that this leads to the HEIs' internal stakeholders, including University Board/Council members, university management, lecturers, non-academic support staff and students, to reform their institutions accordingly. Lai (2011) asserts that there is more demand on learning as a constructive process with enquiry supported by technology. Rajasingham (2011) also claims that the trend is from teacher-centred to a lifelong learner-controlled model.

Van Dusen (2014) claims that there is a paradigm shift from a lecturer-centred to a learner-centred philosophy of learning. He elaborates that changes are mainly in the way the learners collaborate in their day to day communication and therefore they use ICT to support collaborative learning and problem-solving among groups with varied learning styles and motivations. Researchers such as Schwartz-Bechet et al. (2012) see opportunities to address these changed demands of learners by promoting ICT-supported international collaborative learning and encouraging the elicitation of peer feedback about individual learners' dilemmas.

Breivik (1998) claims that the information age is a period of rapidly changing technologies and explosion of information requiring learners to acquire information-literacy skills. Information literacy means that the learners should develop skills to: determine when information is needed; identify relevant information sources; evaluate the information; and know how to use it. Therefore, institutions of learning should produce information-literate workers.

Lai (2011) has also observed in his research that most of these information age learners prefer ICTs to be used in the learning process and further claimed that they prefer learning to be a constructive process in which they discover knowledge. The studies of Lai (2011), Rajasingham (2011) and Olusola and Alaba (2011) claim that the learners in the information age prefer to acquire life-long learning skills, including e-learning, due to fast-changing knowledge. Rajasingham (2011) claimed that the new crop of learners is more dependent on the use of internet and mobile phones and they want to use these tools for learning. He confirms what other researchers have discussed, that the new generation learners' preference is for life-long student-centred learning. Laurillard (2002) has pointed out that for the information age learners, learning occurs during work and leisure time, which is anytime, anywhere.

Laurillard (2008) presents a framework for technology supporting learners' needs in motivation, curriculum, logistics, pedagogy, assessment and opportunity, which is shown in **figure 5** below.

Laurillard (2008, p.9) goes on to state that:

"For each stage in the learner's journey it would be possible to identify a combination of technology characteristics that could service almost any of the needs identified, using: access to remotely stored information, search engines, multimedia, synchronous and asynchronous communication, simulation, modelling, adaptive decision-making, user-driven design tools, posting sites for user content, etc."

The discussion in section ix cannot be taken at face value because some claims are not applicable in all the contexts in the world. The researchers cited in this section include three who are discussing the USA context, two who are discussing the European context, two who are presenting the New Zealand context, and only one who is from the Nigerian (African) context.

	Learner's needs		Description of the learners needs
Exit	Where will it take me	opportunity	The link between qualifications and job opportunities or learning opportunities available
	How do I know I have learned?	assessment	Amount of formative assessment and types of summative assessment available
	How will I learn?	pedagogy	The kinds of teaching and learning methods used. The learning support available
	How could I study?	logistics	How and where the learning takes place - in class, in groups, at home, at work, online
	What can I learn?	curriculum	Prospectus, range of curriculum areas, What kind of topics are covered, what kinds of skill are practised
Entry	Why should I learn?	motivation	Information and advice about the value of education and learning. What the experience has meant to other learners

Figure 5: The learner's journey through the education system, showing how education sets out to meet learners' needs at each stage, adapted from the Laurillard (2008) model

The level of ICT usage by learners varies from developed countries to developing countries, such as Zambia. The challenges of ICT usage in

developing countries is similar to those cited by Sife et al. (2007). My experience in heading a university in Zambia is that most of the students completing high school from the rural areas would not be familiar with basic ICT functions and are still dependent on the teacher centred learning. Such learners would therefore conform to the traditional learning.

x. **Status of ICT integration in HEIs**: Lai (2011) claimed that although there have been some large investments in ICTs and e-learning, universities have been slow in integrating ICTs in teaching and learning but have used them to support traditional forms of teaching and administration. A similar sentiment has been expressed by Ertmer and Ottenbreit-Leftwich (2010) when they said that although in North America computer access and technology training has increased, it is still missing in supporting teaching. Alexander (2001) also confirms that investments in ICTs have increased in Australian universities. Both Rajasingham (2011) and Salmon (2005) lament the slowness shown by universities in integrating ICTs in teaching and learning.

To conclude, the global discourse by researchers to explain the impetus by HEIs to integrate ICTs in their primary mandate of teaching, learning and researching is driven by the need for universities to respond to the society needs. They need to adopt ICTs because they are *'vectors of economic and social transformation'* as confirmed by the 2015 Global Information Report (Dutta et al., 2015). Scholars cited earlier also confirm that ICTs are assisting universities to address the major global pressures they face. Another key reason for HEIs' interest to integrate ICTs is that ICTs bring with them opportunities - for example, providing a competitive advantage over those institutions not yet ICT-integrated. In view of the global discussions, universities have no option but to integrate ICTs in their teaching and learning processes.

3.5.2 Continental factors

In order to encourage the use of ICTs in all institutions including universities there was a need to show political will at the highest level of governance on the African continent. The African Union (2010) documented a declaration by Africa's Heads of State, expressing their political will to use ICTs for Africa's global competitiveness. Following the declaration governments were prompted to increase ICT investments in their national institutions including universities. This was not only to boost their economic activities but also to support education as a whole.

Isaacs and Hollow (2012) introduced the *eLearning Africa 2012 Report* in order for it to generate leadership and impact policy and practice in the use of ICTs in teaching and learning. The *eLearning Africa 2012 Survey*, completed by 447 participants from 41 of the 54 African countries, was motivated by the need to review experiences of e-learning in Africa over a period of the previous five years. It also reviewed the key trends in the following five years and their implications for the continent's increased access and connectivity. The expected outcome was to provide

> "*comprehensive, consistent and coherent documentation on eLearning practices in Africa*" (Isaacs and Hollow, 2012, p10).

The results of the survey concluded that the number one factor motivating the eLearning Africa 2012 survey participants to respond to the survey was to improve the quality of teaching. This suggests that Africa is adopting ICTs in its universities and other educational institutions under the impact of globalisation. All the 447 respondents presented on page 13 of the report agreed with Sife et al. (2007) that ICTs are tools for providing better teaching and learning. With this African interest in integrating ICTs as tools for improving teaching and learning, it is clear that the universities in Africa are also moving towards integrating ICTs.

Sife et al. (2007), in discussing the example of Tanzania, concluded that ICTs had not been integrated in many higher education institutions in most developing countries due to a number of factors. This study concluded that the

studied universities have the basic ICT infrastructure to support e-learning. However, it identified the following challenges:

→ *Lack of systematic approach to ICT implementation* - There is need for proper institutional policy and strategic planning before ICT implementation;

→ *Awareness and attitudes towards ICTs* - There is a need for lecturers to be aware of the existence of ICT resources and their role in supporting teaching processes;

→ *Administrative support* – ICT implementation requires transformational leadership. Lecturers get motivated when leadership shows commitment:

→ *Technical support* – Technical support for the installation and trouble-shooting is not available to support lecturers;

→ *Transforming higher education:* Focus on technology instead of pedagogy results in lecturers performing their traditional methods of teaching with the help of ICTs instead of adopting ICT-supported learning systems;

→ *Staff development* - Need for staff development to develop new skills in ICT usage but also in instructional design;

→ *Lack of ownership*: There is need for all, including lecturers, to be involved in the development of the institutional policy and strategy otherwise they do not feel part of it;

→ *Inadequate funds*: Freeware and open sources, diversification of sources of funds and requesting for more funding is recommended.

Although the above discussed paper, with more than four hundred citations, was written more than ten years ago and some ICT scenarios might have changed, I believe it provides the best account of HEIs' ICT environments in

Africa against which the Zambian environment and my research could be compared.

The paper presented to the Association of African Universities by Ajayi (2001) declared that while African universities should spearhead Africa's participation in the ICT revolution, they cannot do so because they are not ready to lead the change due to the poor ICT infrastructure in the respective African universities.

The Hennessy, Harrison and Wamakote (2010) paper entitled "Teacher factors influencing classroom use of ICT in Sub-Saharan Africa," reporting on research conducted in sub-Saharan Africa, advises that teachers should be key players in knowledge production rather than consumers and therefore should not only have general knowledge but should be skilled in using technology in pedagogy. It concluded that if ICTs are integrated in the learning system, they could revolutionise subject teaching and learning quality. It also highlights the criticality of the role of a teacher and recommends the integration of ICTs in the teaching and learning process using the latest best practices in pedagogy.

Czerniewicz and Brown (2009) conducted research in South Africa, which was inspired by McNay (1995), to find out the relationship between ICT integration and e-learning policy implementation, shown in **Figure 6** below. They also identified details about the relationship between the ICT integration and the organisational types whose description is also inspired by McNay (1995).

	Structured e-learning policy	**Unstructured e-learning policy**
Senior-level formal support	Policy document	No policy document
E-learning structures	Centralised support unit	No formal support unit (possible fragmentary or ad hoc support)
Institution-wide system	Institutionally supported online learning management system (LMS)	No (or ad hoc) online learning management system (LMS)

Figure 6: Institutional e-Learning Policy, adapted from Czerniewicz and Brown (2009)

3.5.3 National and local factors

Chapter 2 of this research paper presented Zambia's ICT vision and how policy makers hoped that HEIs would support the national ambitions for human capacity development to meet economic and social growth. The policies put in place clearly emphasised the need to use ICTs to support the rise in the university populations and enhance learning outcomes through the transformation from teacher-centred to learner-centred learning. In response to these strategies and policies, the Zambian Government provided the relevant regulatory and the legal frameworks to govern the implementation of ICTs.

Despite the political will expressed through the policies discussed above and action of defining policy, regulatory and legal frameworks for integrating ICTs, the World Economic Forum Global Information Report of 2015 (Dutta et al., 2015) places Zambia as number 114 out of the 143 countries surveyed in the Network Readiness Index. This index measures factors, policies and institutions that facilitate the country's inclination to use ICTs to improve its competitiveness and well-being. The World Economic Forum Global Information Report Network Readiness Index does not measure individual countries over a period but compares the performance of countries all over the world at a particular time. The purpose of discussing the position of Zambia in the Network Readiness index was to show the level Zambia finds itself at in this international index. It tells policy makers that despite efforts implemented so far, the country is not performing well as compared to other countries globally. It would seem valuable for the policy makers and university leadership, who have invested money in putting in the ICT infrastructure, to know whether ICTs are integrated in Zambian HEIs; whether ICTs are used in the classroom to support learning; and whether they will be able to enhance teaching and learning through their integration.

3.5.4 Conclusion on the importance of ICT integration in HEIs

The literature reviewed for this study confirms that HEIs are under massive pressure to integrate ICT in their teaching and learning processes. This will

help them meet their primary mandate, confront global pressures, face the competition and adopt new teaching and learning paradigms.

3.6 Factors influencing the integration of ICTs

3.6.1 Enablers of ICT integration

In reviewing the factors that encourage the integration of ICT in the learning process, I decided to present them in a matrix form, showing the enablers in the left-hand column and the references in the columns on the right. I have drawn the matrix of enablers from Muhametjanova and Cagiltay (2016) who conducted research in a public university in Kyrgyzstan, Cubukcuoglu(2013) who studied Turkish Cypriot teachers, Kozma & Johnston (1991) who discussed the technological revolution coming to the classroom and Goktas et al. (2009), who conducted a study of pre-service teachers' education in Turkey.

I have also included reference to Ellaway et al. (2006), Fox and Summer (2014) and Mitchell et al. (2017) who assert that the learning technologist function is mandatory for the successful integration of ICTs in pedagogy because these personnel support learning technologies and social media technologies mainly in the HE institutions and provide support for the lecturers in how to imbed these technologies in their specialised disciplines.

Figure 7: Enabling Factors for ICT Integration in Education matrix

Enabling Factors	References								
	Muhametjanova, et al. 2016)	Cubukcuoglu (2013)	Kozma, et al. (1991)	Goktas, et al.(2009)	Ellaway et al. (2006)	Fox, et al. (2014)	Mitchell, et al. (2017)	Mutanga et al.(2018)	Alemu, (2015)
External (extrinsic)									
1. Increased financial investments in ICTs	√		√	√					
2. National ICT policy encouraging faculty to integrate ICT in teaching		√							
3. A general institutional policy and support on the use of ICT		√	√						
4. Incentive payment as motivation for faculty members who integrate ICT	√			√					
5. Availability of Technology implementing plans for ICT integration	√			√					
6. Availability of peer support to specific units and faculty	√			√					
7. Easy access to technology rooms and equipment by faculty	√	√							
8. Redesigned course content to take into account ICT	√			√					
9. Faculty owning laptops and easy access to computers		√							
10. Availability of ICT technical support / technical assistance		√	√						
11. Access to ICT tools (educational software, content resources, and others) facilitate ICT-integrated pedagogy		√							
12. Improved faculty training on ICT tools in teaching in quality and quantity	√	√		√					√
13. Provide faculty training on improving pedagogical ways to use ICT in teaching		√		√					
14. HOD's positive attitude towards ICT integration in education. Administrator support for institutional needs		√	√						
15. Existence of champions/innovators/pioneers with conviction and resourcefulness			√						
16. Expressed need matches with innovator interests. Institutional support matched with personal commitment			√						
17. When products of research and productivity can be applied in classroom improvement then adoption comes faster			√						
18. Faculty allowed more time to ICT integration			√	√					

19. Learning technologist function is mandatory for the successful integration of ICTs in pedagogy					√	√	√		
Intrinsic/Internal									
20. .Faculty's positive attitude towards and interest in technology		√	√					√	√
21. Faculty confidence and skills in using ICT		√						√	
22. Awareness of the educational benefits of using ICT for students and teachers		√	√						
23. Faculty's willingness, experience, motivation, and the perceived usefulness of ICT integration		√	√					√	
24. Pedagogical skills for faculty to integrate ICT appropriately in the teaching and Learning process		√			√	√	√	√	
25. Faculty desire for career advancement			√						
26. Faculty interest in a particular teaching ICT tools			√						

The factors enabling ICT integration are categorised as either extrinsic, those which are external to the lecturer or teacher, or intrinsic, referring to those internal to the lecturer or teacher.

From the literature reviewed for this research, it appears that the most popular enablers (mentioned by five or four researchers), which are likely to be relevant to my study are:

- Pedagogical skills for faculty to integrate ICT appropriately in the teaching and Learning process.
- Learning technologist function is mandatory for the successful integration of ICTs in pedagogy;
- Improved faculty training on ICT tools in teaching in quality and quantity;
- Faculty's positive attitude towards and interest in technology;

The other popular enabler mentioned by three researchers and are likely to be relevant for my study include:

- Increased financial investments in ICTs;

The enablers mentioned by at least two researchers reviewed are as follows:

- A general institutional policy and support on the use of ICT;
- Incentive payment as motivation for faculty members who integrate ICT;
- Availability of Technology implementing plans for ICT integration**;**

- Availability of peer support to specific units and faculty**;**
- Easy access to technology rooms and equipment by faculty**;**
- Redesigned course content to take into account ICT**;**
- Availability of ICT technical support / technical assistance**;**
- Provide faculty training on improving pedagogical ways to use ICT in teaching**;**
- HOD's positive attitude towards ICT integration in education. Administrator support for institutional needs;
- Faculty allowed more time to ICT integration;
- Awareness of the educational benefits of using ICT for students and teachers;
- Faculty's willingness, experience, motivation, and the perceived usefulness of ICT integration.

In analysing the finding from my research, I will use these identified enablers to explain the ICT integration status in the Zambian HEIs studied.

3.6.2 Barriers to ICT integration

Ertmer (1999) distinguished between first-order and second-order barriers to ICT integration, where the first-order barriers are extrinsic or external to the teacher and second-order barriers are intrinsic or internal. First-order barriers include: lack of access to the appropriate ICT technology for teaching and learning; lack of teacher training in the use of the ICT technology; and lack of institutional support in the use of required ICTs. Second-order barriers are the teacher's beliefs regarding student roles, the teaching methods, classroom organisational and management styles and student assessment procedures. This model was arrived at empirically following several school-based research studies conducted by Ertmer (1999). She explains that the presence of any of the barriers can hinder the integration of ICTs in the teaching and learning process.

Olusola and Alaba (2011), Tsai and Chai (2012), and Lai (2011) include the lack of time for teachers within the list of first-order barriers. They suggest that

because lecturers or teachers already spend so much time doing their normal academic work and research within tight schedules, they are left with little time to learn or experiment with the new technology in the classroom. Tsai and Chai (2012) add the “third”-order barrier to include lack of technological pedagogical content knowledge (TPACK), by which they mean that since the nature of the classroom context and the students change regularly, the lecturer’s inability to adapt their learning materials and activities accordingly using ICT technology becomes a barrier.

Although Lai’s (2011) study concerning online learning was conducted in New Zealand, he uses references from all over the world to obtain the global view from Collis and van der Wende (2002), Yelland, Tsembas and Hall (2008), Balasubramanian et al.(2009), Bates (2010), Ehlers and Schaffert (2010) and Schneckenberg (2010), to assert that limited lecturer knowledge of how to integrate ICTs in pedagogy contributes to hindering ICT integration. He explains that most lecturers do not receive regular professional development, and as a result they are not familiar with developments in ICT integration into pedagogy. This supports Mishra and Koehler (2008) TPACK model, which proposes the type of knowledge lecturers require to integrate ICT in pedagogy.,

Olusola and Alaba (2011), who addressed the issue in the Nigerian context which is similar to most of sub-Saharan Africa, included among the barriers to ICT integration the non-availability of ICTs, cost of ICTs and lack of ICT knowledge.

The issue of ICT support has become even more critical in the environment of integrating ICTs in learning because not only should support be available in how to manipulate the technology but also in how to use technology to support the learning process. Green and Gilbert (1995) suggest that institutions are unable to estimate the real cost of user/technical support and thereby provide insufficient service to users of ICTs in the classroom.

Figure 8: Barriers to ICT Integration in Education matrix

Barriers				References					
	Ertmer (1999)	Olusola et al. (2011)	Alemu, (2015)	Tsai et al. (2012)	Goktas et al.(2009)	Chipembele, et al. (2016)	Lai (2012)	Gilbert et al.(1995)	Sife et al. (2007)
1) Lack of access or Non-availability of appropriate ICT technology for teaching (software / hardware)	√	√	√	√		√			
2) Lack of teacher/lecturer training in the use of the ICT technology	√		√		√				√
3) Lack of institutional support in the use of required ICTs	√								
4) Lack of time for teachers		√		√	√		√		
5) Lack of technological pedagogical content knowledge or 6) Limited lecturer knowledge of how to integrate ICT in Pedagogy (inadequate professional development)				√	√		√		
7) Lack of ICT knowledge		√			√	√			
8) Cost of ICTs/ Insufficient funds		√							√
9) Lack of ICT technology support and pedagogy support			√		√			√	√
10) Lack of strategy and an ICT implementation plan						√			√
11) Lack of administrative or transformational leadership					√				√
12) Too much focus on technology not pedagogy									√
13) Lack of appropriate course content and instructional programs					√				
14) Crowded classrooms					√				
15) Inadequate number of ICT-related courses					√				
16) Lack of computer laboratories for use during free time					√				
17) Lack of ICT implementation plans					√				
18) Lack of role models for prospective educators					√				
19)									
Intrinsic/Internal									
20) Negative teachers' beliefs regarding student roles	√								
21) Uncertain teachers' beliefs about teaching methods	√								
22) Negative teachers' beliefs in the classroom organisation and management styles	√								
23) Teachers roles about students' assessment procedures	√								

24) Lecturer awareness and attitude towards ICTs						√			√
25) Lack of motivation of educators as regards the use of ICTs in the classroom					√				
26) Lack of motivation of prospective educators concerning the use of ICTs in their courses					√				

I have also identified barriers to the integration of ICT into the learning process from the reviewed literature, and presented them below.

The most popular barrier mentioned by five or four researchers are:

- Lack of access or Non-availability of appropriate ICT technology for teaching (software / hardware)
- Lack of teacher/lecturer training in the use of the ICT technology;
- Lack of ICT technology support and pedagogy support
- Lack of time for teachers;

The barriers, which are mentioned by three researchers and are likely to be relevant to this research include the following:

- Lack of technological pedagogical and content knowledge or Limited lecturer knowledge of how to integrate ICT in Pedagogy;
- Lack of knowledge

The barriers mentioned by at least two researchers reviewed are as follows:

- Non-availability of ICTs / Lack of appropriate software / Lack of hardware);
- Cost of ICTs/ Insufficient funds;
- Lack of strategy and an ICT implementation plan
- Lecturer awareness and attitude towards ICTs
- Lack of administrative or transformational leadership

3.7 Technology and Innovation Adoption models

Agarwal and Prasad (1998, p.205) state that

> "*several models have been developed in the literature to facilitate understanding of the process by which new information technologies are adopted*."

Besides Rodgers' (2005) Diffusion of Innovation model (DOI), there are also Davis, Bagozzi, and Warshaw's (1989) Technology Acceptance Model (TAM); Agarwal and Prasad's (1998) Personal Innovativeness in Information Technology (PIIT) and Davis and Venkatesh's (2000) Technology Acceptance Model 2 (TAM2).

Rodgers (2005) says that any innovation is assimilated by a community through the process of diffusion, which is a communication through certain channels over time among the community members. According to this theory, innovations will be adopted more rapidly than other innovations if they fulfil five characteristics according to the perceptions of those who might wish to use the innovation. They should have:

i. Greater **relative advantage**;
ii. **Compatibility**;
iii. **Trialability**;
iv. **Observability**; and
v. Less **complexity**.

The theory proposes that for every 100 prospective users, the diffusion of the innovation over time will occur following a normal curve with 2% innovators; 16% early adopters; 32% early majority; 32% late majority; 16 laggards and 2% resistors.

However, Rosen (2005) states that while the DOI model measured adoption of technology after an innovation has been adopted, it is not good for prediction of the innovation adoption as it happens. Flynn and Goldsmith (1993) suggest that Rodger's DOI theory is based on a time span of adoption from when the

technology is first introduced to when an individual has completed adopting it. They also indicated that the DOI theory was concerned with

> *"global innovativeness rather than domain-specific innovativeness."* (Flynn and Goldsmith, 1993, p.1105)

They define global or general innovativeness as characteristics that cut across disciplines, while the domain-specific innovativeness is confined to specific disciplines.

I am of the view that the DOI model cannot be used in this study because my research is not looking at the global innovativeness but is concerned about a domain-specific innovation in HEIs. In addition, the DOI model does not qualify to be applied in this study because it measures adoption of technology over a period from the begin to end of adoption, while my research assesses the level of technology integration at a specified time.

Davis, Bagozzi and Warshaw's (1989) Technology Acceptance Model (TAM) states that usage of information technology is determined by behavioural intention to use, which is formed jointly by the person's attitude toward ease of use of the system and perceived usefulness. This Model was derived from a study to understand end user systems resistance by managers and professionals.

Davis and Venkatesh (2000) came up with Technology Adaption Model 2 (TAM2) by identifying social factors and cognitive factors that influence perceived usefulness of the technology. TAM2 extends TAM by also showing that a subjective norm exerts a significant direct effect on usage intentions over and above perceived usefulness and perceived ease of use. Davis and Venkatesh (2000, p.189) add that

> "*When one perceives that an important referent thinks one should use a system, one incorporates the referent's belief into one's own belief structure.*"

Wu et al. (2016, p.535) discuss another extended technology adaption model (TAM), adapted from Davis et al. (1989):

> *"The focus is to look at teachers' perception of usefulness, easy-to-use, and motivation to use of ICT,…"*

The three versions of TAM, by Davis, Bagozzi and Warshaw's (1989), Davis and Venkatesh (2000) and Wu et al. (2016) can be represented diagrammatically as shown below:

Figure 9: Relationship between the three reviewed versions of TAM

Reference	Conditions influencing the intention to use technology			
Davis, Bagozzi and Warshaw's (1989) TAM	Ease of use	Perceived usefulness		
Davis and Venkatesh (2000) TAM 2	Ease of use	Perceived usefulness	*Perception that a supervisor or peer expects one to use the ICT*	
Wu et al. (2016)	Ease of use	Perceived usefulness		Motivation to use ICT

My view is that some enablers presented in **Figure 7** reflect some conditions influencing intentions to use technology as presented in the different versions of TAM discussed and represented in **Figure 9.** Therefore, the different versions of TAM presented in Figure 9 will be used to interpret the findings related to ICT adaption or integration in this study.

Agarwal and Prasad (1998) who concur with Flynn and Goldsmith (1993) about the importance of conceptually and operationally separating global innovativeness from domain specific innovativeness, introduce another construct of personal innovativeness in the domain of Information Technology (PIIT), defined as

> "*the willingness of an individual to try out any new information technology*" (Flynn and Goldsmith 1993, p.206).

Rosen (2005) refers to Kirton (1976), who created the Kirton Adaption-Innovation Inventory (KAI) to determine individuals' PIIT. He further explains that the KAI inventory classified characteristics of adopters and innovators in a similar manner to those referred to in the work of Rodgers and Shoemaker (1971).

Flynn and Goldsmith (1993) also claim that in practical terms PIIT is a tool for identifying the profile of the individuals who are supposed to adopt the information technology, in terms of innovators and early adopters as opposed to laggards and resistors. They show that individual perceptions have an influence on an individual's willingness to adopt a new information technology. Personal innovativeness helps identify individuals who are likely to adopt information technology innovations earlier than others and it can be measured through self-report.

After reviewing the factors influencing ICT integration in section 3.6, I note that the PIIT construct discussed by Flynn and Goldsmith (1993) and Agarwal and Prasad (1998) for determining an individual's willingness to use ICT, has a direct link to the intrinsic factors. I will therefore use the PIIT construct to determine the innovativeness of the respondents in this study.

3.8 Conclusion

The findings from the research will be interpreted using some of the following models and constructs summarised below:

In determining learning process in which ICT should integrate, I used the **adapted model from Voogt and Knezek (2008) in Figure 1.** It was used to guide my research in finding out whether ICT intervened in each component of the learning process, depicted in this model. The scope of this study did not include the students' aspect due to limited research duration.

As regards assessing what ICT tools and facilities are available in each learning resource to determine ICT integration, the **ICT integration model adapted from Czerniewicz and Brown (2005) in Figure 2** has been used. This was to determine the availability of appropriate ICTs in each resource category, which include technology, content, personnel, and social resources.

I used the model called the Technology, Pedagogy, Content, and Knowledge Model (TPACK), to determine, in the Personnel Resource, the attributes, knowledge and skills the lecturers need in order to be effective integrators of ICTs.

The new Stages of ICT implementation cycle, adapted from the Green and Gilbert (1995) model in **Figure 4**, was used to recommend a cycle of ICT integration in HEIs, which is different from the business enterprises.

The Chickering and Ehrmann's (1996) model, discussed in section 3.4.1, was used to determine whether ICT supported the best practices in HEI teaching to enhance quality of learning.

I also used the Technology Adaption Model (TAM), depicted in **Figure 9**, in its different variations (Bagozzi and Warshaw, 1989; Davis and Venkatesh, 2000; Wu et al., 2016), to recognise conducive conditions for adaption of ICTs in the studied HEIs.

The PIIT construct by Agarwal and Prasad (1998) was also used to determine the individual respondent's willingness to try out ICTs in order to gauge the academic actors' levels of innovativeness.

CHAPTER FOUR: RESEARCH METHODOLOGY

4.1 General epistemological approach

Researching is an undertaking whose objective is to create knowledge. It is important to be aware of how knowledge is acquired in order to be able to identify the methods that can be used to acquire the new knowledge sought. The nature of the research questions leading to the evidence being sought guides the choice of the research design.

My choice of epistemological paradigm has been influenced by UNESCO (2002), which presents constructivism as a paradigm that assumes that individuals are active agents who are purposefully seeking and constructing knowledge within the meaning-making process and integrating it in their already existing experience.

I am also encouraged by Jones and Brader-Araje (2002, p.2), who state that,

> "*Social constructivism and educational constructivism (including theories of learning and pedagogy) have had the greatest impact on instruction and curriculum design because they seem to be the most conducive to integration into current educational approaches."*

Krauss (2005) states that a philosophical paradigm, about how knowledge is constructed, guides the study design and how it is conducted. He further states that a constructivism paradigm assumes that knowledge is constructed by humans based on what they already know and within the social context.

Another philosophical paradigm is positivism, discussed by Krauss (2005) and Mackenzie and Knipe (2006). It is regarded as a type of naturalism. Moses and Knutsen (2007) claimed that the naturalist social scientist believes that research can be carried out as though the researcher is detached from the real world out there and knowledge about it is acquired through observation and explanation. Cohen, Manion, and Morrison (2007, p.6) state that:

> *"Comte's position was to lead to a general doctrine of positivism which held that all genuine knowledge is based on sense experience and can be advanced only by means of observation and experiment".*

I tend to support Mack (2010) who challenges the suitability of using positivism in social science research. The participants, both researchers and the researched, have varied perspectives, which result in diverse interpretations of what they observe and they also draw meaning based on their exposure and knowledge.

To guide this research, I prefer a constructivism philosophy, especially social constructivism as explained by UNESCO (2002), Moses and Knutsen (2007), Kraus (2005), and Mackenzie and Knipe (2006). They state that constructivism asserts that perceptions of the world differ from one person to another, depending on the individual characteristics and social context. Therefore, the way of knowing underlying this research is through the constructing of evidence from all the participants. This is because conducting research in social sciences involves the researcher interacting with the participants within a social setting and interpreting the information provided according to the researcher's prior knowledge and background.

Besides the evidence from the research participants, constructivism recognises the researcher's interpretation of what is observed, which is influenced by the contextual setting and social environment (Moses and Knutsen, 2007).

After reviewing the philosophical paradigms presented, this chapter discusses the research design, data collection techniques, research tools and their piloting and the adjustments made before employing them in the field, and the sample. It also highlights some access issues and how they were abated. The conducting of the data collection section presents a step by step data collection process. This chapter also covers the issues of ethics issues and validity. The final section of this chapter is the data management and analysis procedures undertaken.

4.2 Research design

There are two aspects that have influenced the choice of design of this research.

Firstly, the choice of a research design is influenced by how well it provides answers to the research question (Algozzine & Hancock, 2016; Taylor, 2014; Al-Hinai, 2011). In my case, the research design I selected seemed likely to provide the answers to the following research question:

"To what extent has ICT been integrated in the four Zambian Universities and has it improved quality in the teaching and learning process?"

Secondly, as presented earlier (4.1 paragraph 5), and as a researcher in social science, my epistemological perspective is social constructivism. In accordance with the claims by Taylor (2014) that the researcher's epistemological paradigm also influences the choice of the research design, researching under this perspective takes into account the researcher and contextual dispositions. My own experience and contextual awareness influenced this research as follows:

a) Having actively participated in the ICT regulation policy formulation, I am aware that Government policy under the Republic of Zambia (2009) ICT Act No.15 encourages HEIs to integrate ICTs in higher education to improve the quality of learning. This prompted me to wonder why the ICT implementation in HEIs was not yielding the expected outcomes as outlined in the National Implementation Framework (NIF III), (Ministry of Education, 2010);

b) As a Vice Chancellor leading the integration of ICTs in my own HEI, I have experienced the fact that business ICT applications become operational much faster than the learning management systems. This prompted me to wonder about the kind of faculty knowledge required to integrate ICTs in the learning process;

c) My experience in implementing different types of business applications in different organisations prompted me to start thinking of the differences between implementing business applications and the LMS. I realised that, while business applications are designed and implemented with the process owners, the LMSs are implemented by content experts, the lecturers. I therefore recognise the need for an implementation model like the TPACK model presented by Mishra and Koehler (2006), which will equip faculty, not only with content expertise but also the knowledge of ICT for learning as well as pedagogy or the process of learning.

My constructivist perspective recognises that my study of local universities had to be viewed through the above contextual and social lens, when compared with similar research conducted by researchers in other countries (Siminyu, 2017; Taylor, 2014; Prescot, 2013)

Taking into account the two aspects discussed above, I opted to use the case study research design, in particular the multiple cases or collective case study (Algozzine & Hancock, 2016; Yin, 2009; Zainal, 2007). Zainal (2007) posits that case study enables the researcher to understand the phenomenon from the respondents' views and enables close examination of the phenomenon in its own context. I therefore opted to use the case study design because it is dependent on the knowledge of the respondents rather than demanding large sample sizes.

I conducted a case study of four universities, replicating the same research design, thus covering similar contextual conditions resulting in expanding generalizability (Yin, 2009). This is because I am studying four different universities in Zambia, which are separate entities while forming the same case study. Multiple cases increase the coverage of the study, allow coverage of more than one research site, permit analysis across cases and facilitate more convincing conclusions as Yin (2009) and Zainal (2007) assert.

As a social constructivist doing research in education, I am oriented towards a research design which is common in the educational discipline. Besides case

studies having been used widely in education research (Zainal, 2007; Algozzine & Hancock, 2016), the method also provides examples of case studies that have been used to determine attainment of government policy implementation objectives (Zainal, 2007).

In terms of the sequencing, it was necessary to first acquire details of the perspectives of the lecturers, prior to getting opinions and explanations for the findings from the management staff through interviews. I sequenced it in this order, so that I would not be limited to just getting findings from the questionnaires, but to obtain explanations from management interviewees for some of the findings from the questionnaires. Starting with questionnaires with closed questions quantified the extent of the problem. This was to produce meaningful knowledge and provide triangulation of questionnaire outcomes with the explanations from the semi-structured interviews.

I decided to follow the example of researchers such as Mutanga et al. (2018), Siminyu (2017), Muhametjanova and Cagiltay (2016) and Alemu (2015) as regards the order of data collection, starting with questionnaires followed by interviews as data collection techniques.

4.3 Data Collection techniques

Yin (2009) and Zainal (2007) suggest that, to strengthen case study evidence, both quantitative and qualitative data through questionnaires and interviews respectively should be gathered. Both researchers also intimate that the collection of both quantitative and qualitative evidence facilitates triangulation.

The choice of the research method is the responsibility of the researcher, and that choice is influenced by the type of data required, in order to respond to the research questions (Bhattacherjee, 2012). The Table 4.1 below presents the data types required by each research question.

Table 4.1 Determining the research data type needs from the data sources

Research Question	Source of data			Type of data needed	
	Documents	Managers	Lecturers	Sample size	Data type
1. What are the trends of ICT investments in Zambian HEIs over a period between 2011 and 2013?	Yes	Yes	No	2 to 5 Managers	ICT Budget amounts or trends descriptions gathered through interviews from Finance.
2. What ICT products, infrastructure and resources have been installed?	No	Yes	Yes	2 to 5 Managers and 25-30 lecturers	Installed ICT devices and software inventory from ICT manager or Finance through interview or responding to the questionnaire.
3. In terms of academic staff, are they using ICT in the classroom? What are barriers and enablers impacting on the use of ICTs in teaching and learning?	No	Yes	Yes	2-5 Managers who also lecture and 25-30 lecturers	By responding to interview questions or responding to the questionnaire.
4. Are the ICTs integrated in the learning process?	No	Yes	Yes	2-5 Managers who also lecture and 25-30 lecturers	By responding to interview questions or responding to the questionnaire.
5. What ICT resources are being used in implementing principles of best practice in higher education teaching and learning?	No	Yes	Yes	2-5 Managers who also lecture and 25-30 lecturers	By responding to interview questions or ticking the resources listed on a questionnaire.

Based on the data type requirements by the research questions indicated in **Table 4.1**, it was deemed necessary to collect both quantitative and qualitative data. Therefore, I decided to collect quantitative data using a questionnaire, while to collect qualitative data I used interviews. Documents, especially the ICT strategies, were retrieved from the HEIs websites and used in this research. When the data needed was quantitative and needed to be gathered from several participants, I used survey questionnaires. A survey method using questionnaires is adopted when the research involves the collecting and manipulation of quantitative data. The data collection tool most appropriate to gather large volumes of data from a large sample is a questionnaire. Questionnaires are best used at collecting relatively factual information, not collecting opinions and individual experiences. Information may be biased by respondents' views on what the researcher wants to hear and what will make the university/ department look good. I used survey questionnaires to find out from those involved in the teaching process whether they use ICTs in the learning process and to what extent. This provided quantitative data.

In this research, when the data required was qualitative from management and supervisory staff, I used interviews. The management had to provide explanations in a qualitative form, to help understand the quantitative outcomes through interviews.

Where I could find standard institutional data from the websites, I used documentation.

4.3.1 Sequence of Data collection

The research data collection was undertaken in three parts as follows:

The first part was the collection of data from academic staff through a questionnaire, covering the availability and awareness of the ICT strategy, availability of technology and levels of performance within their university, levels of usage of the technology and the purpose for which it is used,

academic staff attitudes and beliefs towards the technology, and existence of ICT training and the ICT support.

The second part was the conducting of interviews with management and key decision makers to collect information on the ICT strategies, budget trends, procurement decisions and their impact on the ICT prioritisation. I finally sought clarification of the responses from the academic staff.

The last part was the collection of information from the respective websites when some information was not available from the two sources above.

4.3.2 Designing the data collection tools

To help with design of the data collection tools, **Table 4.1** was prepared to provide a high-level view of the data requirements of each research question, which would guide the discussions of the choices made.

Both questionnaires and interviews contained both open and closed questions, as suggested by Yin (2009). This research required primary data from the actors themselves, that is, the lecturers and some management staff, such as those heading the university academic departments, those responsible for managing ICTs, some managing the ICT budgeting and investments. In situations where the custodian of key documents, such as the ICT strategy, was not obvious in the respective universities, I opted to retrieve them from the institutions' websites.

4.3.3. The questionnaire design

It was decided to use questionnaires to collect data from faculty and academic support staff because the research is about the use of ICT in the learning process. To avoid any ambiguity, after the questionnaire was designed, it was tested among a few lecturers not involved in the research. Any potential ambiguities were corrected in the final questionnaire. The revised final questionnaires used to collect data is shown in **Appendix II** of this thesis.

The actual formulation of the questions of the questionnaire was guided by the Network (2009) report and Smith et al.'s (2009) research elaborated below. To design the questionnaire, I decided to take into account the following strategies:

a) Consider the information needs to satisfy each of the five major research questions;
b) In doing so keep focus on the major research variables, that is, teaching/learning process, ICT integration and enhancement of quality of teaching and learning, as defined in the literature review;
c) Seek examples of questions from internationally accepted studies that would ensure clarity of information sought.

Information needs to satisfy each of the five major research questions

Each question was designed around data, where the data would be most likely available and the method for collection.

For the first research question, "What are the trends of ICT investments in Zambian HEIs over a period between 2011 and 2013?", information concerning investments would be more likely to be provided by the senior management staff than the individual lecturers, and therefore the question concerning this information was confined to the interview protocol only.

The second research question is "What ICT products, infrastructure and resources have been installed?" This question seeks information on all the ICT technological resources that are in the respective universities, whether they are installed, available and used, which are the technology resources: including connectivity infrastructure, hardware devices and software. Included also are the content resources, which facilitate access to all reservoirs of data and information, and whether they are being exploited by the participants or not. Further it seeks to know whether all these resources operate within the correct institutional policy framework. Most of the questionnaire questions expected the respondents to answer "Yes," "No" or "Don't know." For some

questions the respondents were expected to tick their response from multiple choices. This kind of question responds to two factors that make questionnaire data higher quality, that is, questions where the answers are not likely to be affected by the respondent's perception and unambiguous questions. This type of formulation of questions reduces ambiguity and improves the quality of data. It avoids misunderstanding of what is required and reduces data errors. The information sought by the second question could be provided by both the lecturers through the questionnaires, and management staff through interviews.

The third research question is "In terms of academic staff, are they using the ICTs in the classroom? If not why not? What are the barriers which are impacting the use of ICTs in teaching and learning?" I started by investigating the use of devices and software supporting the learning process, then the respondents' technology adoptive tendencies and finally looked at the respondents' personal resources: for example, in relation to the lecturers, whether they had the appropriate ICT knowledge and skills and whether they had the conducive perceptions, attitudes and interest to enable them use ICTs in the teaching and learning. To address the issue of barriers, the questionnaire included questions regarding the existence or not of both intrinsic and extrinsic barriers. Since the management staff also teach in the classroom, the information required in the third question were included in both the questionnaire and the interview protocol.

The fourth research question is "Are the ICTs integrated in the learning process? If not why not?" This is the core of this research and it will be answered when the model of ICT integration discussed in chapter three is assessed. This implies that responses to the previous questions, that is research questions 1, 2 and 3, should be known before a conclusion can be reached as to whether or not ICTs are integrated. ICT integration is the main variable discussed in chapter three. Responding to this question on whether ICTs were integrated could only be provided as the conclusion of this research.

The fifth question “What ICT resources are being used in implementing principles of best practice in higher education teaching and learning?” seeks to know whether the ICT resources are actually used in helping institutions implement principles of best practices in teaching and learning. These principles of best practice include encouraging contacts between students and faculty; developing reciprocity and cooperation among students; using active learning techniques; giving prompt feedback; communicating high expectations; and respecting diverse talents and ways of learning. Chickering and Ehrmann (1996) model, which is used to determine best practices to ensure quality in a higher education teaching and learning environment, give a guide as to what technology supports the principles of best practice in higher education. Section 3.4.1 explains in detail how this model is used. Since both management staff are involved in lecturing as well as the lecturers, the questions concerning ICT resources usage in the principles of best practice in higher education would be included in the questionnaire as well as the interview protocol.

Seeking examples of questions from internationally accepted studies

The design of the questionnaire and the formulation of the questions were guided by the Network (2009) report and Smith et al.’s (2009) research. They were chosen because each brings both an international and African relevance to this research study. The Network (2009) report carried out an E-Readiness Survey of East African universities conducted in 2008, of which the objective was to assess the preparedness of forty-nine East African universities to use ICTs for teaching, learning, research and management. This research was limited to lecturers only and it measured network access, networked campus, networked learning, networked society and institutional ICT strategy. It used the Networked Readiness Index (NRI) introduced by the World Economic Forum, which was in turn derived from Harvard University’s Centre for International Development (CID).

Even though the E-Readiness report does not contain a copy of the questionnaire used, however the authors explain that *the framework contained 17 indicators grouped into the following five categories:*

(i) Network access (4 indicators–information infrastructure, Internet availability, Internet affordability, network speed and quality)

(ii) Networked campus (2 indicators–network environment, e-campus)

(iii) Networked learning (4 indicators–enhancing education with ICTs, developing the ICT workforce, ICT research and innovation, ICTs in libraries)

(iv) Networked society (4 indicators–people and organizations online, locally relevant content, ICTs in everyday life, ICTs in the workplace)

(v) Institutional ICT strategy (3 indicators–ICT strategy, ICT financing, ICT human capacity) (Network 2009, p.9).

I adapted their framework for use with my questionnaire design, as shown in **Figure 10**.

Figure 10: Questions formulated from the Network (2009) Report indicators

Indicator from Network (2009)	My study Question No.	Question
Information infrastructure	Q,10	Has your University School installed the following?
Internet availability	Q.20	If you have on-campus access to internet, how do you rate its availability?
	Q.21	How do you rate your institution's internet system speed?
	Q.22	If you have a dedicated institution's e-mail system, how do you rate its availability?
Network speed and quality	Q.16	Does the University have a local area network (LAN)? Are the computers connected to each other and have a server within your School?
	Q.17	Is your University connected to the outside through a wide area network (WAN)?
	Q.18	If so, is it connected through, Leased line ( ) Fibre Optic cables ( ) Satellite ( ) Wireless ( ) wireless ( ) Do not Know ( )
	Q.19	Are you able to access your University network from home and/or from anywhere?
Enhancing education with ICTs	Q.14	Do you use mobile devices such as iPads, Smart Phones, tablets, Podcasts, etc for storing, accessing and transmitting course materials?
	Q.15	For what purpose do you use the computer device(s)? (Tick all that is relevant)
	Q.24	During the academic year 2013/2014, how frequently have you used the following Learning, teaching and research tools?
Developing the ICT workforce	Q.31	Do the School provide the following: ICT Training Type
ICT research and innovation	Q.24	Used: Educational web-based videos or audios, Library databases, Social media (Facebook, MySpace Twitter, Blogs, wikis, etc) and Podcasts or webcasts
ICTs in libraries	Q.24	Used: Library databases
ICTs in the workplace	Q.11	Which computer device do you use mainly? (Tick all devices you use)
	Q.13	For each computer device you ticked in item 11, under each indicate by ticking where you usually access it
Institution. ICT strategy	Q.6	Does your University have an Information and Communications Technology strategy?
ICT human capacity	Q.7	Have you received any training on how to use any information technology?
	Q.8	If yes, specify all the products you have been trained in
	Q.25	What is your skill level for the following?
	Q.28	What is your skill level for the following? (software)

Q = Question

The Smith et al. (2009) research is an EDUCAUSE Centre of Applied Research (ECAR) study. Even though it studied undergraduate students and information, their questionnaire contained some questions that could be asked of the lecturers as well. **Figure 11** below shows how the some of the questions have been adapted for this research.

Figure 11: Questions borrowed and adjusted accordingly from the ECAR Study

ECAR Question No.	The Initial Question	My Study Question Number	The Research Revised Question	Comments
Q.1	How old are you?	Q.2	Same	
Q5	How often do you do the following for school, work or recreation?	Q.24	During the academic year 2013/2014, how frequently have you used the following learning, teaching and research tools?	
Q.7	Do you own a handheld device that is capable of accessing Internet?	Q.14	Do you use mobile devices such as iPads, Smart phones, tablets, for accessing and transmitting course materials?	Focussing the question to accessing content for teaching and learning.
Q.9	Which of these activities do you do from your handheld device?	Q.15	For what purpose do you use the computer device(s)? (Tick all that is relevant)	To focus on all ICT devices.
Q.11	What is your skill level for the following?	Q.25 Q.28	What is your skill level for the following? If you use the software what is your skill level? (software)	
Q.12	Are you using any of these for any of your courses this quarter/semester?	Q.27	Do you use the software resources available	They both provide lists of software. It is similar to Q.24 but different products
Q.16 – Q.20	These questions cover Learning Management Systems (LMS)	Parts of Q.26 & Q.27	Questions about availability and usage of LMS	For this research it was sufficient to know about availability and usage.
Q.22	Which of the following best describes you?	Q.9	Same	

Q.24	How often do you use social networking websites….	Part of Q.24	During the academic year 2013/2014, how frequently have you used the following: Social media (Facebook, MySpace, Twitter, Blogs, etc)	
Q.30	What is your Gender?	Q.1	Same	
Q.32	What is your classification?	Q.5	What is your highest academic qualification	Relevant to lecturers.

Green and Gilbert (1995) explain that higher education institutions underestimate the costs of ICT user support. Therefore question 30 was included to determine the performance of the ICT user support.

4.3.4 The piloting of the questionnaire

*Q*uestionnaires were tested on a pilot basis, within the School of ICT at a different university than those selected for the research, before being used for data collection on the actual respondents.

The questionnaire was distributed to five respondents to test its validity and completeness and only three of them responded. The following problems existed and adjustments to the questionnaire were needed:

a) the scope of the questions was too wide, in that they covered the targeted research population from institutional policy makers, the faculty and students. In consultation with my supervisor the aspect of validation of the enhancement of learning from the students was removed. Any reference to students in the questionnaire, for example Questions 3 and 4, was removed.
b) The process of returning the questionnaire was changed following the experience on the ground, where I had no access to the academic staff. Therefore, it was decided that the completed questionnaires, enclosed in an envelope, would be returned to the respective university contact person instead of me, as originally planned.
c) There was some key information required to respond to the research questions. Question 5 on the level of education of the respondents was included, to be able to compare the academic levels of the faculty.
d) Considering the definition of “ICT integration” I realised that there were some questions missing concerning some aspects of ICT integration. Therefore question 10 on the availability of ICT devices, question 12 on the ownership of ICT devices, question 14 on the use of mobile devices, question 16, 17 and 18 on

availability of networks infrastructure, question 29 on academic staff attitudes and beliefs and question 31 on availability of ICT training for faculty, end users, general ICT literacy and instructional technology, were included. Al-Majeeni's (2004) dissertation provided a table of teachers' attitudes for Question 29 to determine the lectures' views regarding ICTs.

e) Some questions had to be amended to bring clarity and limit misunderstanding of the meaning. Included in those questions amended is question 15 to find out whether faculty use ICT devices to support best practices in the learning process, question 23 on the rating of the university website, and question 24 on the frequency of ICT products usage over a period 2013/2014.

4.3.5 The Interview Protocol Design

The second method of data collection in this research was the use of semi-structured interviews. While interviews types range from structured to unstructured interviews, it was decided to use semi-structured interviews to allow for standardised questions as well as permitting respondents to elaborate their responses and provide their opinions.

An interview protocol, guided by Hannan (2007), was developed to collect data from management and senior administrative staff using pre-set questions to help guide the conversation. Hannan (2007) posits that opinions, attitudes and perspectives can be obtained through interviews and that an interview is an appropriate tool to gain insights. Some of the lessons drawn from Hannan (2007), include the following:

- Interviews, being time-intensive data collection instrument, I should consider using it on a limited number of respondents, chosen because they can expose best insights, leading into purposeful sampling;
- In order to gain the initial access, the interviewee should get assurances of anonymity, confidentiality and those ethics requirements in the research protocol;

- In order to determine the questions to be asked, I should have purpose and rationale.

It was important to include the question regarding the ICT contribution to the expansion of education access in the interview protocol. The interview protocol contained open questions that were unique to the interview and also questions requesting similar information to that sought through questionnaires. The information sought only through interviews could only be provided by senior staff, while information sought through questionnaires and interviews permitted me to validate information provided by lecturers through the questionnaires.

The interview question asked the senior staff to explain instead of responding with a simple “Yes,” “No” or “Don’t know.” The interviewees were advised at the start of the interview to explain and describe when answering questions.

An example of a question that invited qualitative answers is question 8 and 9 of the interview protocol, which could be obtained by asking for the trends of the budget amounts over the period sought, or by asking a qualitative question seeking to know whether budgets have increased or not. It was decided to have two questions, one requesting for the trends in the amounts and the other describing the trends in words.

4.3.6 The piloting of the interview protocol

Only one respondent, a dean of school, was interviewed on a test basis, so that his responses could be compared with those of the lecturers to determine whether the lecturer responses from the questionnaires tallied with his management view. Responses from the interview also provided information concerning policy decisions and overall institutional ICT decisions. After the interview was completed it was found that some adjustments were required to validate the data collected through questionnaires as follows:

i. A new Question 11 regarding the availability of hardware devices which were overlooked was added.
ii. Question 16 concerning ownership of an ICT device was included.
iii. Included also was question 22 on the type of internet connectivity to the rest of the world.
iv. Question 30 regarding the ICT training of faculty, ICT users, ICT support and the training on instructional technology was included.
v. Besides the additions, three questions were amended to make them clearer. These included question 15 asking about personal ICT innovativeness, question 17 on the allocation of ICT devices and question 18 on the types of devices being used.

After all these corrections to the interview protocol, the instrument was ready to be used to collect data. An Olympus digital voice recorder was tried to record the test interview but the respondent seemed to be uncomfortable because he kept looking at the device. Upon enquiring why, he was watchful of the device, he admitted that he was not at ease with it. It was decided to leave it out and use the writing of the answers even though it slowed the interview process. The adjusted interview protocol after the piloting is attached in **Appendix III** of this thesis.

4.4. The sample

This research is interested in finding out whether ICTs are being used in teaching and learning processes. The goal of the research is to identify factors, both enablers and barriers, impacting on lecturers' integration of ICT into their teaching. Therefore, the sample for this research should be drawn from those involved in the HEI academic activities and in particular those who have started the process of integrating ICTs in teaching and learning. They should be users of ICTS, who are also using ICTs in the learning process. Sife et al. (2007) and Mishra and Koehler (2006) explain that knowledge of using ICT does not necessarily mean knowledge in integrating ICTs in pedagogy. It was important that the proposed sampling strategy included a way to determine different levels of ICT knowledge.

4.4.1. The context

According to the Zambian Higher Education Authority website, as at the end of 31st December 2015, Zambia had 6 public universities and 33 private universities of which 14 were religious institutions, making a total of 39 institutions altogether. All these universities are required to use ICTs in their different operations in accordance to the Higher Education Act of 2013.

The characteristics of universities in Zambia are shown below:

i. Public universities: These range from the oldest university opened more than fifty years ago, one university which opened in the eighties and a new university which has been in operation for over five years. There are also three old colleges that were converted to universities in 2013.

ii. Religious universities: These are universities owned by religious organisations and some of them are modelled on universities outside the country. Most of these institutions were established after 2005 and are dependent on their parent organisations.

iii. Private universities: These include those established by private companies or individuals or they are satellites of universities outside Zambia. Most of them started operating after 2006 and the student bodies are not beyond five thousand.

4.4.2 The selection of universities:

Initially, the criteria used in determining the universities to be included as case studies were: those which have started the trials of implementing the usage of ICT in the learning; and those having a large number of faculty to provide an adequate sample of respondents (Cohen et al., 2011). Thus, one criterion to select the universities was size of faculty. Another was the length of time of establishment of the university. A third was that trials using ICT for learning had started.

Although my objective was to have four cases, I contacted six universities A, B, C, D, E and F. This was to ensure that I would not be blocked if one or two universities were not accessible or might not get enough respondents. University D could not be accessed due to a force *majeur* and for University F, the contact person withdrew and it therefore became difficult for me to access respondents. I finally selected university A as case 1, university B as case 2, university C as case 3, and university E as case 4. This gave me two public universities, one private university

and one religious university. The study therefore covers institutions that have been operating for over fifty years with very well-established systems and procedures as well as relatively young institutions, established within the last ten years.

The selected universities were allocated codes A, B, C and E to ensure anonymity. Those selected are shown in the **Table 4.2** below:

Table 4.2 Universities selected showing their populations

	University Code	Type of the University	Student Population	Year Founded
1	A	Public	28,000	1966
2	B	Private	3,000 and plus	2007
3	C	Public	5,000	2008
4	E	Religious	Approx. 1,500	2007

Sources: Respective websites and data from the interviews

4.4.3 The selection of school or department:

Each university selected was asked in the authorisation letter, sent to each Vice Chancellor, to indicate schools/departments most representative in terms of usage ICTs. I deliberately emphasized the need to choose departments with experience in trying to use ICTs in the learning environment, because I needed to know both what encouraged and what inhibited ICT technology in learning. In determining the school or department to be selected in each university, it was found that in certain universities more than one school or department were users of ICTs in the learning process. It was also found that the number of available participants in one school or department which might mean I would not get a significant number of respondents.

In discussing the access issues in section 4.5, I explain the process of access to each university. Based on this situation on the ground, the following decisions were made for each of the universities:

University A: I was advised that there was a fatigue among lecturers concerning responding to surveys and answering questionnaires. If the selection of schools or departments had been limited to one, it would have been difficult to collect enough responses. The contact person advised that the organisation units which had commenced integrating ICTs in learning were: the Library and Information Management Department; the Engineering School; the Computer Studies Department of the School of Natural Sciences; the Mathematics Department of the School of Education; and the Central ICT Centre. I decided to distribute questionnaires in all these organisational units to have representative views. In each organisation unit selected, the Dean or Department Head was approached to be interviewed. Three of them agreed and they were interviewed.

University B: This is a relatively new university with a total population of 40 full time lecturers. In this case, the schools and departments are small and I was informed by the contact person that the majority of lecturers were encouraged to integrate ICT in learning. I therefore requested that all faculty be surveyed, rather than concentrate on one department or school. Unfortunately, due to pressure of work none of the supervisors could be interviewed. The contact person was advised to invite volunteers for the survey from all the full-time lecturers.

University C: This University had smaller schools in terms of numbers of lecturers and students, as compared to A. The contact person, who was the then Dean of Computer Studies, proposed three schools and one institute as those that used ICTs in learning, that is, his own School of Computer Studies, the School of Agriculture, School of Business Studies and the Institute for Distance Learning. He advised that there were not enough lecturers in any one of the mentioned organisational units and it would be better to invite all lecturers from all those schools to

volunteer. I decided to study the three schools and the Institute for Distance Learning. I asked the contact person to invite volunteers from those organisational units. In terms of the interviews the contact person became the sole interviewee.

University E: This University is regarded as the model in the country in terms of using ICTs in learning. It is one of the new universities and does not have big schools, let alone departments. The contact person advised that it would be better to distribute to the volunteers from all the lecturers instead of choosing one or a few organisation units. Therefore, when the contact person proposed two schools I agreed.

4.4.4 The selection of respondents:

Cohen et al. (2011) recommend a minimum of 30 respondents, if statistical analysis has to be used on the data. They, however advise to preferably increase the number of respondents to more than the minimum proposed.

As regards the qualitative research, Cohen et al. (2011) provide sampling guidance, saying that in most cases non-probability purposive samples are taken. They further explain that qualitative research puts emphasis on the distinctiveness of the group being studied, in this case the lecturers whose university organisation units use ICTs in the learning process. Purposive sampling is intended to identify and access respondents with experience and knowhow about the phenomenon being studied (Cohen et al., 2011). While purposive sampling, which does not need large numbers of participants, provides less breadth to the study, it does provide depth to the study (Cohen et al., 2011).

Algozzine and Hancock (2016, p.39) suggest that the researcher should:

> "*Identify key participants in the situation, whose knowledge and opinions may provide important insights…*"

The quality of the information achieved is enhanced by the selection of interviewees directly (Algozzine & Hancock, 2016). Hannan (2007, p.3) proposes:

> *".. to pick out those who can provide the best insights, who represent the full range of experience and opinion, who can be said to be typical if you claim representativeness …"*

These researchers advise that it is critical to identify those who have the required information. In this study I needed some management and supervisory staff, who are usually busy, to provide the relevant information. Therefore, interviewing these very busy persons demanded appointments to catch them at suitable times. I needed to use tact and interpersonal skills to get the answers needed. For example, raising the issue of their school or department being among the pioneers in integrating ICT in the learning process in their university, during the introductory remarks of the interview, was intended to raise their ego and interest to tell how they had achieved it. Also asking for an interview appointment at the venue and time of their own choice reflected their personal status and was designed to make them feel more important. Besides that, employing open questions during the interview permitted me to seek clarifications, opinions and a vision of the way forward or the resolution of problems. The clarification and additional explanations by interviewees provided the causes and reasons for the findings during the study.

In this research sampling considerations were also influenced by Ritchie et al. (2013), because participants were deliberately selected to reflect particular features of the lecturer population being studied and therefore there was a need for purposive sampling. The participants were selected because they were within departments or schools regarded as models within their respective institutions in terms of their using ICTs in the learning process and therefore having knowledge of the research issues and the ability to contribute to information sought. According to Ritchie et al. (2013), the selection decisions of the participants should be informed by the aims and objectives of the research.

In terms of the sample size, Ritchie et al. (2013) suggest that "*qualitative samples are usually small in size*". The three reasons they have advanced for having a small sample include the following: new evidence tends to reduce after a certain point; qualitative research is not concerned with prevalence nor incidence; and the richness in detail from the qualitative research. They however advise that survey samples could act as a frame for qualitative study. In this study I used questionnaires to collect data first and then conducted interviews. The reasons cited are:

a) In the Zambian context, as described in chapter two, the ratio of lecturers in universities to the student numbers is very low, and the lecturers are extremely overburdened with the work of teaching, marking and other academic requirements. Any research involving lecturers imposes more demands on their limited time. In view of this it was decided to select a small sample rather than a large one.
b) The distribution of the selected university sites ranged from 500 to 700 kilometres away from where I reside. In view of the warning from some contact persons that there is survey fatigue and that most faculty are very busy, I concluded that if I did not follow up the questionnaires and collect them physically, the responses would be minimal. Furthermore, since the postal services are not reliable, I had to physically collect completed questionnaires. It is one of the reasons I chose to use the case study method, since it did not require a large sample at these distances, and reduced the number of trips made to the sites.
c) Teachers/lecturers need to have a combination of knowledge, including knowledge of subject, knowledge of pedagogy or methods of teaching and learning, and knowledge of technology (Mishra et al.,2008). In this context (Mishra et al.,2008) the lecturer population is homogeneous, not in terms of the disciplines they offer, but in terms of their expectations from ICTs as an enabler in the instruction, learning and research processes. Jones and Mercer (1993) stated that the role of a teacher as a communicative

participant in the learning process and that of the computer as a medium of communication between the teacher and the student. As such, the subcases will be analysed in consolidated manner, highlighting the uniqueness of any of the subcases.

Francis et al. (2010, p.3) say that,

> "*the appropriate sample size is a function of the purpose of the study and the complexity, range and distribution of experiences or views of interest, rather than of the statistical parameters.*"

They explain that an appropriate sample can be determined in qualitative research when a data saturation point is reached, that is when there are no new themes, findings, concepts or problems emerging from the data.

Based on the guidance from discussions above, it was decided to aim at a sample size of 30 respondents for each case.

The data collection using the questionnaires targeted lecturers and academic support staff. This was because one of the objectives of the research was to determine "whether ICTs have been integrated into the teaching and learning process". Therefore, questionnaires sought information from the primary actors in the process of delivering learning, to determine what ICTs were being used in this primary mandate of the universities.

While the majority of the research population were lecturers, the holders of other functions were needed to complement and validate information collected from lecturers. This was because managers might have a policy perspective and understanding of the implication of policies which the lecturers would not have.

For the first and second research questions repeated below,

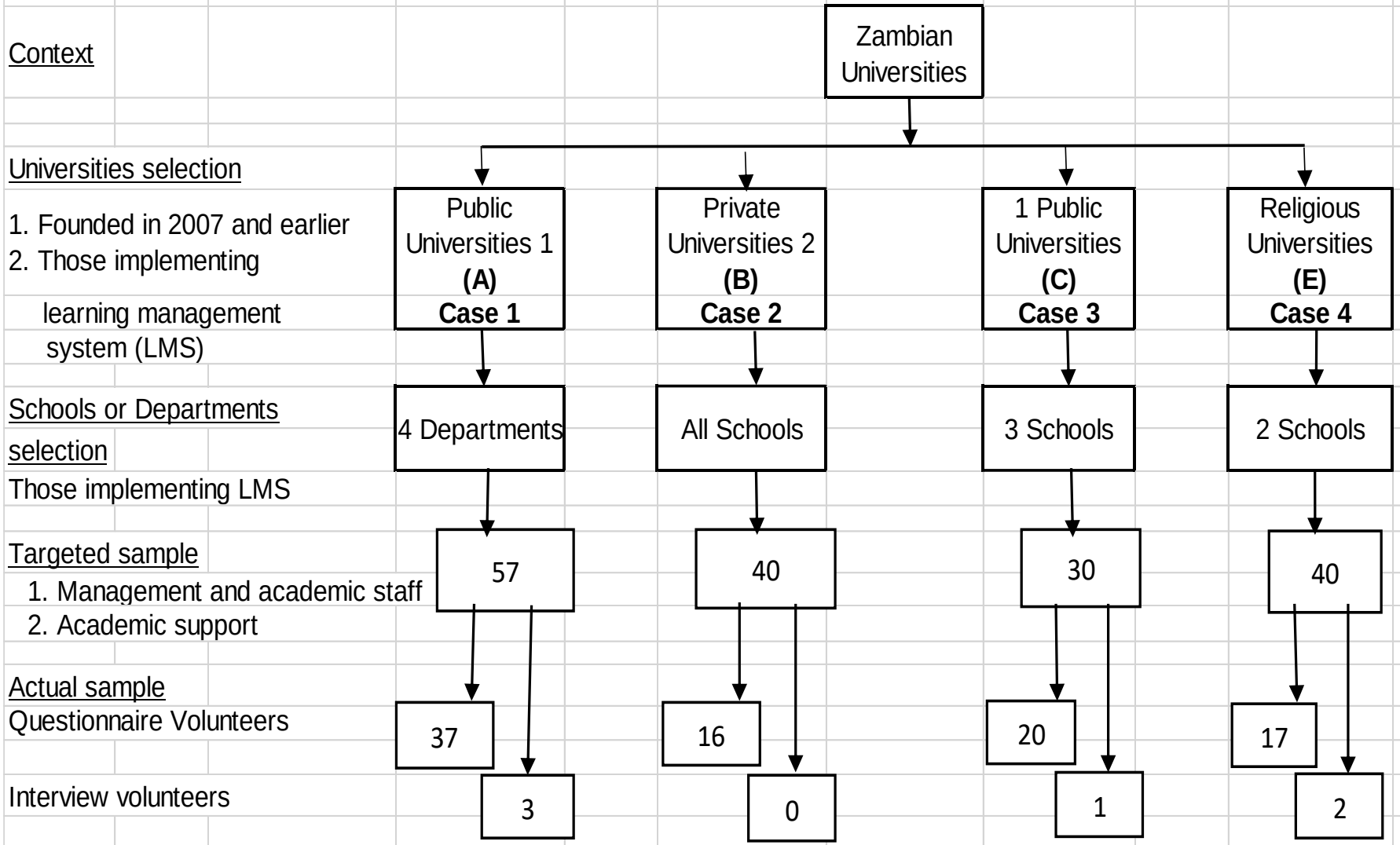
- What are the trends of ICT investments in Zambian HEIs over a period between 2011 and 2013?

- What ICT products, infrastructure and resources have been installed?

It was planned that those to be interviewed would include: a person responsible for the ICT management within the organisation unit who had information regarding the technology being acquired, installed and used in the school; a person responsible for staff development, who could provide information on the general faculty, faculty training in the usage of ICT in pedagogy and ICT support; a key person involved in overall ICT decisions; somebody who was involved in the investment planning decisions; somebody involved in the ICT allocation resources; or a person involved in finance and budgeting. These individuals could provide information on the ICT strategy, decisions regarding ICT prioritisation and acquisition and budgets. The objective to involve these respondents was to better understand the policy decisions impacting the key respondents and understand the policy context influencing some of their responses. I managed to recruit some managerial and administrative staff: 3 for University A, 0 for University B, 1 for University C and 2 for University E.

Figure 12 below shows the strategy adopted to select the sample for this research.

Figure 12: Sampling strategy for Multiple case studies



4.5 Access issues

Before accessing the selected sites to conduct the research, it was important to seek permission to be authorised to access the sites, that is, the respective selected universities. Appointments were made to meet respective vice chancellors. The letters dated 14 November 2014 were delivered to the respective vice chancellors on different dates. Since I am their peer, I decided to deliver the letters in person to each of the vice chancellors concerned from 14 November 2014 to 31 December 2014. It was easy to access them and explain the purpose of the research and the potential benefits of the study. Even though this information was available in the request for authorisation to access data at their university, it was important to explain verbally to avoid delays due to the busy schedules of their offices.

All the vice chancellors gave a verbal authorisation to access their universities to undertake the study. I had to wait to receive formal signed authorisations, which were given between November 2014 and March 2015. The respective universities' contact persons were nominated by the vice chancellors to act as liaison persons between the respondents and myself and assist in making appointments. Each university had a different way of assigning a contact person.

- In University A, a copy of the Vice Chancellor's authorisation was sent to the Director of Graduate Studies and Research, who appointed the University 'A' contact person.
- In University B, the copy of the Vice Chancellor's authorisation was sent to the Deputy Vice-Chancellor in charge of Academic Affairs as a contact person.
- In University C, the Vice Chancellor's consent was copied to the Dean of the School of Computer Studies who became the contact person.
- In University E, the Deputy Vice Chancellor of Administration, authorised the research and gave a copy of the consent to the Director of Research who was the contact person.

I was then advised to deliver the Participant Information Sheet (PIS) with the Participant Consent Form (PCF) in one envelope and a questionnaire in a

second envelope, which was sealed. At each university, the university contact person became the link between the questionnaire respondents and me.

The initial authorisation from the vice chancellors was the easiest part of access to data due to the peer relations between university vice chancellors in the Zambia. I experienced some difficulties to access and gather data that was needed for the research because some participants did not feel keen to discuss institutional information with me since I am a Vice Chancellor of another university. However, Heuser (2005) describes social capital as potential resources or benefits derived from one's association with professional and social networks. Informal and formal requests for access authorisation had to be sought through the respective university vice chancellors. I used the social network of vice chancellors and emphasized the advantages of the study to all the institutions that would be involved.

4.6 Conducting the Data collection

4.6.1 Steps taken to collect data

My case study was split into four sub-cases representing each of the four universities I was studying. For each university the steps taken were as follows:

Step 1: Surveying using questionnaires: The research at each site started with surveying the lecturers through questionnaires. Questionnaires were distributed to the academic staff and academic support in each of the selected universities through respective university contact persons. The start of the survey in each university was not done in sequence but depended on when the access authorisations were received from the institutions. The collection of data from academic staff and academic support using the questionnaire permitted me to assess the extent of ICT integration in the learning process and the barriers and enablers experienced by the actual users.

Step 2: Analysing questionnaires for each university: The evidence collected through questionnaires was compiled for each university site. Any evidence requiring further explanations was identified.

Step 3: Interviewing: When I had collected as many questionnaires as was possible from each university, and having compiled the quantitative evidence

for each university, I then asked the contact person to identify up to five management and supervisory staff in the respective schools/departments to be interviewed.

The senior managers' responses from the interviews were intended to reinforced (or not) what the lecturers said, as well as providing extra, richer information about policy. The qualitative data is interested in narratives, descriptions, opinions and other information represented in words. Instead of just counting the ICT resources (hardware and software), there was a need to collect narratives and *opinions* from the administrators and academic supervisors, so as to understand their needs and uses for the ICTs identified, and assess skills and attitudes influencing the integration.

Step 4: Analysing interview data from each university: Leaving the interviewing of managers until after the administration and analysis of questionnaires permitted me to seek additional validation and clarification on issues raised in questionnaires. For example, in the case of the question on ICT training, the lecturers might say they had not received training without explaining why, while the decision maker would either provide the priorities for training, or the rationale for giving training to one group rather than the other, or explain some budgetary constraints. Face-to-face interviews of key management and administrative staff were conducted in three of the four universities.

The other aspect taken into account in the research design was asking similar questions in both the questionnaires and during the interviews. Data collected from the two different data collection instruments could then be used for the purpose of data triangulation. Cohen et al. (2011, p.196) confirm that methodological triangulations, that is, "..*different methods on the same object of study*", give the researcher confidence in the results of the research when the different methods yield the same conclusion from the different data.

Step 5: Documentation from the official websites: Where standard documentation was not readily available, I obtained key documents, such as the ICT strategic plan, from the website of each of the concerned HEIs.

4.6.2 Collection of raw data from the field

The following process that lasted between 20 May 2015 and 21 December 2015 was used to collect data:

For Faculty:

For each University case study, after the appointment of the university contact person, the envelopes containing the PIS, the questionnaires and the consent forms were left with that contact person, for onward distribution to those lecturers who volunteered to participate in the research.

The delivery of the PIS, PCF and questionnaire to each of the four university contact persons ended in July 2015.

a. In each university, the contact person distributed the questionnaire, the PIS and PCF to volunteers within departments/schools within the particular university to explain the research objectives.

b. After the volunteers had read the PIS, they were allowed to ask for further clarifications and were allowed up to 14 days to ask questions. The majority of volunteers did not want to wait for days for fear of misplacing the questionnaire.

c. After the volunteers were satisfied with the explanation given, they completed the consent form and had an option to sign it and return it to me through the respective university contact person.

d. After completing the questionnaire, the participant sealed it in an envelope provided and returned it to the university contact person.

e. The duration for completing the questionnaire was on average 30 minutes.

f. I visited each case study site to collect completed questionnaires. This had to be repeated several times. I persisted and continued visiting the university sites to collect a few completed questionnaires until sufficient questionnaires were collected.

For School/Department Management and Administrative Management

To fulfil the requirements mentioned in the design, the university contact persons proposed names and contacts of those that fell under the categories to be interviewed, including personnel from central university planning, the Dean of the School or the Head of Department, the person responsible for finance and budgeting, or the person responsible for the ICT management within the organisation unit. Interviews permitted the collection of data not available to all lecturers. I contacted most of them and requested for appointments for interviews.

As regards the interviews conducted the following were the interviewees:

- For University A: The Dean of the Computer Studies Department of the School of Natural Sciences; a Senior Lecturer in the Department of the Mathematics Department of the School of Education; and Director for the Central ICT Centre
- For University C: Dean of the School of Computer Studies was interviewed.
- For University E: Deputy Vice Chancellor of Administration and Dean of Students/former Dean of Computer Science were interviewed.

Through the assistance of the university contact person, I made individual appointments for a date, time and venue of the participant's choice for the interview. The duration for completing the interview was on average an hour. I took handwritten notes instead of recording the interviews.

4.7 Ethical issues

Some of the potential ethical challenges that could be encountered at the stage of data collection concerned privacy, confidentiality and anonymity. In designing the research, an important consideration was to ensure that confidentiality would be maintained by not disclosing the names of the participating universities and participants. To guarantee anonymity for the participating institutions they were identified with a single letter, A, B, C and E, and the respondents were identified by a letter and two digits, for example A01 for a respondent from university A and C20 for a respondent from university C.

For interviewees, they were coded as CM2, representing a management interviewee from university C and EM1 representing a management interviewee from university E.

Williams (2009) says that a practitioner-researcher faces more ethical challenges than other researchers. This is because of the personal impact of research on individuals. In addition, fulfilling the ethics requirements one has to be more cautious about research participant impact. The confidential information revealed during the research has to be handled with caution. This research faced the challenge of maintaining confidentiality in the local context where institutional populations are small and universities are not many. The other challenge is that of the multiple role of a researcher and an HEI leader. Disclosure of confidential information could be a challenge.

The ethics authorization requirements from the University of Liverpool, which included the targeted institutional site consent, PIS and PCF were followed. To ensure that the survey and interview questions were professionally correct, the questionnaire and the interview protocol suggested above were submitted to the research supervisor and the University of Liverpool Ethics Committee. At data collection and analysis anonymity for participants and confidentiality for the organisation was maintained.

4.8 Validity

The soundness of this research or its credibility is determined by the validity of its research design and research methods. It is critical that the data collected is actually relevant to answering the research questions asked and provides appropriate evidence. There is therefore, a need to demonstrate that this research is credible by presenting procedures used to establish validity. It is suggested that two lenses should guide the choice of validity procedures, that is, the lens (the researcher, participants and reviewers/readers views) validating the researcher's study and researcher's epistemological paradigm choice (Creswell and Miller, 2000). They propose the framework presented in **Figure 13** to help choose the validity procedures.

Figure 13: Validity Procedures Within Qualitative Lens and Paradigm Assumptions (Creswell and Miller, 2000)

Paradigm assumption/ Lens	**Postpositivist or Systematic Paradigm**	**Constructivism Paradigm**	**Critical Paradigm**
Lens of the researcher	Triangulation	Disconfirming evidence	Researcher reflexivity
Lens of the participants	Member checking	Prolonged engagement in the field	Collaboration
Lens of the people external to the study (reviewers, readers)	The audit trail	Thick, rich description	Peer debriefing

However, I found that in accordance to my paradigm, which is the constructivism, the validity procedures appropriate for my study is represented by this adjusted framework as shown in **Figure 14** below.

Figure 14: Validity Procedures Within Qualitative Lens and Paradigm Assumptions adapted from (Creswell and Miller, 2000)

Lens/Views	**Constructivism Paradigm**	
The researcher	Researcher reflexivity	Triangulation
The participants	Member checking	
The people external to the study (reviewers, readers)		

In section 1.4 of chapter one of my research, I presented my position in this research context, to disclose my experience, beliefs, biases and assumptions that have influenced my research interpretation, derived from my social, cultural, and professional forces influencing my interpretation. This is in line with the concept of the researcher reflexivity.

In presenting the descriptive validity below, I have presented the validity procedure of allowing “member checking” or allowing the participants to review the transcribed interview notes to ensure accuracy of reporting and avoids misinterpretation of the participants meaning.

Under the interpretive validity outlined below, the concept of triangulation has been described as it was used in this research to collect data using two different instruments to confirm conclusions.

Thomson (2011, p.78) identifies five validity categories in qualitative research including:

> *"descriptive validity, interpretive validity, theoretical validity, generalizability, and evaluative validity in the qualitative research,"*

Descriptive validity measures the accuracy and objectivity of the respondents' information or statements (Kirk, Miller and Miller,1986). As regards my study, the interview data collected during the interview was sent to respective interviewees for accuracy validation after it had been entered into Word documents. It is only after interviewee validation that it was analysed.

Interpretive validity is about the meaning attributed to the participant's behaviour or opinion (Interpretive validity, n.d.). Validity is enhanced when data collected using different tools provides similar conclusions. In this research the multi-methods triangulation, (Yin, 2009; Zainal, 2007), validated data collected through the questionnaires from the lecturers with the data collected through interviews covering the same information being sought. What should be noted is that most of the management staff in all the universities are also lecturers and therefore some questions were asked both in the questionnaire and the interviews. During the interviews I had the opportunity to seek more clarification to ensure that I understood what the respondent meant by their answer.

Concerning the questions from the questionnaire, I asked several questions in different forms to ensure that the respondent understands what information is being sought. In the questionnaire I asked questions concerning the connectivity by making one lead into the other. If a respondent answered negatively on an earlier question, it was not be possible to respond positively to the following ones.

Theoretical validity seeks to match the theory derived from the study with the data from the study of the phenomena.

> *"…seeks to evaluate is the validity of the researcher's concepts and the theorized relationships among the concepts in context with the phenomena." (Thomson, 2011, p.79)*

Generalizability is the ability to apply the theory derived from the study globally. In using the multi case study research method has been used in this research to increase the possibility of generalising the findings of the research.

Evaluative validity challenge occurs when the researcher encounters a problem in evaluating the data received leading to provoking questions from other researchers.

4.9 Data Management and Analysis

4.9.1 Quantitative data analysis procedures

The completed questionnaires were kept in box files in a lockable cabinet after being collected from the site, for each case study, before data entry and analysis. Data entry can be accomplished in a variety of ways and increasingly, data is keyed directly into the computer (Babbie and Mouton, 2005). Dey (2003) asserts the importance of recording and entering data accurately and fully, to avoid any errors and make it reliable. He advises that data stored should be in a format that facilitates analysis. Thus, data was edited and coded before it was entered. Quite often, editing occurs during and after data collection, especially during coding (Singleton and Straits, 2004). During editing, I checked if the questionnaires were completed and ensured that they were free of errors and omissions. Each questionnaire was checked to determine if there were vague answers, multiple responses to single items and response inconsistencies.

I further ensured that codes were assigned to all possible responses to all questions on a questionnaire through the process known as coding. According to Cole (1996) coding is a process of assigning numbers (numerical codes) to all possible responses to all questions on a questionnaire. In addition, each completed questionnaire was assigned a unique code known as the questionnaire identity number (QID) in order to avoid duplication.

After coding, the data was entered into Excel spreadsheets for each University (representing each case). **Figure 15** below shows the standard approach I used for entering data in Excel. It is important to note that questions 3, 4, 8, 9, 13 and 32 were qualitative in nature, thus entered and analysed separately as described under section 4.8.2 “Qualitative data analysis procedures.” After

data entry, all electronic data in password protected files was stored on my password protected computer.

Figure 15: Example of how quantitative data from the questionnaire was entered in excel

QID	Q1. Gender of respondent	Q2. Age of the respondent		Q5. Highest Academic Qualification	Q6. Does your University have an ICT Strategy?	Q7. Have you received any training on how to use any information technology?	Q10
1	female	21-30		Masters	yes	yes	
2	male	21-30		Masters	yes	yes	
3	female	31-40		PhD/EdD	yes	no	
4	female	41-50		Masters	yes	yes	
5	male	21-30		Masters	yes	yes	
6	male	41-50		Masters	yes	yes	

Afterwards, the data of each case (university) was exported to Statistical Package for Social Sciences (SPSS) for analysis. Data was analysed per case. However, the outcomes for all cases were later consolidated. The data manipulation was by variable and their frequencies and percentages were presented in tables. This is the final quantitative data presentation in readiness for interpretation and conclusions.

4.9.2 Qualitative data analysis procedures

Most of the qualitative data analysis approaches (content and thematic data analysis) share a similar goal in that they seek to arrive at an understanding of a particular phenomenon from the perspective of those experiencing it. It is thus important that the researcher determine which qualitative data analysis approach can answer their research questions effectively (Speziale, Streubert and Carpenter, 2011). Holloway and Todres (2003) advise considering the inconsistency and lack of coherence that may result from the flexibility of the approach chosen. This is because the consumers of research assess the quality of evidence offered in a study by evaluating the conceptual and methodological decisions the researchers have made. Thus, the researcher

needs to make good decisions to produce evidence of the highest possible quality (Polit and Beck, 2003).

It is worth noting that both content analysis and thematic analysis share the same aim of analytically examining narratives materials from stories by breaking the text into relatively small units of content and submitting them to descriptive treatment (Sparkes, 2005). Both approaches are appropriate for answering questions such as: What reasons do people have for using or not using a service or procedure? What are the concerns of people about an event? (Ayres, 2007). However, it is important to note that the two approaches will be used differently as explained below.

To start with, thematic analysis is the process of identifying patterns or themes within qualitative data. Braun and Clarke (2006) define thematic analysis as a method for identifying, analysing and reporting patterns or themes within data. Thematic analysis is a flexible and useful research tool that provides a rich and detailed, yet complex, account of the data (Braun and Clarke, 2006). Thematic analysis involves the search for and identification of common trends/patterns in the data that are important or interesting, and uses these themes to address the research or say something about an issue (DeSantis and Noel Ugarriza, 2000). To this effect, thematic data analysis approach will be used to analyse qualitative data.

When analysing qualitative data thematically, a common mistake often made is to use the main interview questions as the themes (Clarke and Braun, 2013). This reflects the fact that the data has been summarised and organised, rather than analysed. There is much more than simply summarising the data; a good thematic analysis interprets and makes sense of it. Thus, for this study, the major themes per variable/question were identified, presented and then interpreted in order to make sense out of the themes.

Organising and presentation of the qualitative data

a) Qualitative data from the questionnaires

There are many different ways to approach thematic analysis (Alhojailan, 2012; Zarea, 2016). Braun and Clarke (2006) distinguish between two levels of themes: semantic and latent. Semantic themes are simply the shallow

meaning of the data: that is to say the analyst is not looking for anything beyond what a participant has said or what has been written (Clarke, 2016). Therefore, in order to easily and comprehensively identify semantic themes in the responses on each question, all the qualitative data from the questionnaires was entered per respondent into an Excel spreadsheet in a descriptive manner. This allowed for sorting by respondents and comparisons within questions. The questionnaire contained five open-ended questions, that is, questions 3, 4, 8, 13 and 32. The procedure is shown in **Figure 16** below.

Figure 16: Example of how open-ended questions in the questionnaire were entered in Excel.

	Questions				
Participants	Q3. What is your role in your University	Q4. What discipline are you lecturing in	Q8. If yes to Q7, specify all the products you have been trained in	Q13. If you do not use any computer device please explain why	Q32. Any additional Comments
B01					
B02					
B03					
B04					

No participant responded to Question 13 which wanted to know the reason some participants did not use any of the ICT devices because all participants used some ICT device. All the comments from Question 32 were listed and common themes were identified and the number of times they occurred noted. The information was later presented in a table showing the question, the coded themes of the question, and the number of times the themes appeared as shown in **Figure 17** below.

Figure 17: Distribution of questions by question, themes of the question and the number of times the themes appeared.

Questions	The themes of the question	The number of times the themes appeared.
Q3. What is your role in your University	1. 2. 3. 4.	1. 2. 3. 4.
Q4. What discipline are you lecturing in?	1. 2. 3.	1. 2. 3.
Q8. If yes to Q7, specify all the products you have been trained in	1. 2. 3.	1 2 3
Q32. Any additional Comments	1 2	1 2

This data was later entered in Excel, analysed using Pivot tables and later presented in frequency tables in Chapter five. At this stage, a latent level of thematic analysis was employed. The latent level looks beyond what has been said or reported by the participants and goes a step further into identification or examination of the underlying ideas, assumptions, and conceptualisations (Clarke and Braun, 2016). Thus, I went a step further into examining the themes as presented in frequency tables and conceptualized them.

b) Qualitative information presentation from the interviews

The interview notes were typed into Microsoft Word documents on the computer in form of tables. The data from the interviews was organized by research question. To begin with, all the questions were put in the second column on the left and then the responses from each interviewee were written in the third column against the appropriate interview question as shown in **Figure 18**. All the typed interview notes were sent to each interviewee to validate. Out of the six participants only one made some minor corrections. All the six participants confirmed that the interview notes were an accurate reflection of what was said during the interview.

Figure18: Example of the Interview questions, showing interviewee's responses

Ques. No.	Question	Responses
1	Gender	
2	Age range	
3	Title	
4	May you please tell me whether your University has a strategy on ICT…	
5	….	
	….	
	….	
	….	
31	….	

After validation, the interview data for each university was grouped and presented separately. Afterwards, outcomes for all the four cases were compared. I adopted Braun and Clarke's (2006) six-phase guide to analyse the validated data (Braun and Clarke, 2006). Braun and Clarke's guide proposes taking the following six steps in analysing qualitative data thematically.

- Step 1: Become familiar with the data,
- Step 2: Generate initial codes,
- Step 3: Search for themes,
- Step 4: Review themes,
- Step 5: Define themes,
- Step 6: Write-up.

Step 1: Become familiar with the data

According to Braun and Clarke (2006), this step involves reading, and re-reading the transcripts. Thus, I took time to go through the validated data from each participant in order to be very familiar with the entire body of data for all the interviewees before going any further. At this stage, I made notes and jotted down early impressions.

Step 2: Generate initial codes.

This phase involves organizing data in a meaningful and systematic way. There are different ways to code and the method will be determined by the

researcher's perspective and research questions (Braun and Clarke, 2006). Coding is very important as it reduces lots of data into small chunks of meaning. Thus, being concerned with addressing specific research questions, only the segment of data that was relevant to or captured something interesting about each research question was coded. That is to say, I did not code every piece of text. Open coding was used because I did not have pre-set codes, but developed and modified the codes during the coding process.

Step 3: Search for themes.

A theme as defined earlier is a pattern that captures something important or interesting about the research question. According to Braun and Clarke (2006), a theme is characterised by its significance. Seeing that the study had a small dataset (Six participants), there were considerable similarities between the coding stage and this stage of identifying preliminary themes. In this case, I examined the codes and some of them clearly fitted together into a theme. At the end of this step the codes were organised into broader themes that seemed to say something specific about each research question. The themes were predominately descriptive.

Step 4: Review themes

This phase involves reviewing, modifying and developing preliminary themes that were identified in Step 3. At this point, all the data relevant to each theme were gathered together. This was done by using the 'cut and paste' function in Microsoft Word as supported by Bree and Gallagher (2016). The data associated with each theme was colour-coded after thoroughly considering whether the data really did support it.

Step 5: Define themes

This is the final refinement of the themes and whose aim is to identify the 'essence' of what each theme is about (Braun and Clarke, 2006). At this stage, I identified what each theme was saying, if there were subthemes, how subthemes interacted and related to the main theme and how the themes related to each other.

Step 6: Writing-up

This is the end-point of research. It is some kind of report, often chapter five of the thesis (Braun and Clarke, 2006). At this point, the research made reporting of thematic analysis results in chapter five.

CHAPTER FIVE: RESEARCH FINDINGS AND ANALYSIS

5.1 Introduction

This chapter presents the findings of the research and the analysis of the findings. Findings and analysis are categorised together by the research question they address. The findings are presented in a consolidated form for all the four cases (Universities) in tables and narrative form. Where the same question has been asked in both questionnaires and interviews, the findings are presented side by side so that they can be interpreted together. The findings of the questions unique to the interview results are presented last. I used the appropriate models, theories and conclusions from section 3.8, which summarised the literature reviewed in Chapter 3 to interpret these findings. The research was undertaken to address the following specific research questions:

i. What are the trends in ICT investment in Zambian HEIs over a period between 2011 and 2013?
ii. What ICT products, infrastructure and resources are installed?
iii. In terms of academic staff, are they using the ICTs in the classroom? If not why not? What are the barriers which are impacting the use of ICTs in teaching and learning?
iv. Are the ICTs integrated in the learning process? If not why not?
v. To what extent are the ICT resources being used in implementing principles of best practice in higher education teaching and learning? If not why not?

5.2 Background characteristics of the research participants

5.2.1. Response rate

Section 4.4.2 provides the universities selected for this research and section 4.4.3 describes the departments included in this research.

Table 5.1 below shows the distribution of the 90 questionnaire respondents and 6 interviewees. The highest responses were from University A and University C at 70%. University B had the lowest response rate at 40% of the targeted sample. Originally, I planned to have a sample of 25 respondents from each university, however taking into consideration the comparative sizes of the universities, I decided that the larger university should provide more participants in order to be more representative of the population of its lecturers. The last two columns show the total number returned from organisation units studied and the percent of the sample to the total.

Table 5.1: Overall response rate

University	University total number of lecturers	Number of lecturers in the units selected	Returned			% of lecturers within the units selected
			Questionnaire	Interviews	Total	
University A	900	57	37	3	40	70%
University B	40	40	16	0	16	40%
University C	100	30 (assumed)	20	1	21	70%
University E	73	40	17	2	19	48%
Total	**1,113**	**167**	**90**	**6**	**96**	**% of return response rate of lectures = 57%**

Note: Most of the data on the University total number of lecturers and the number of lecturers in the units selected were found on the websites, http://www.mu.ac.zm, http://www.unilus.ac.zm, http://www.unza.zm/

It is important to note that after more than four long trips made to the sites and several telephone calls made to different possible participants, it became apparent that no more participants were willing to be interviewed other than those indicated in **Table 5.1** above.

Nulty (2008) compared the response rates of research which administered surveys by paper and they averaged 56%. Since a paper-administered questionnaire and face-to-face interview were used in this research, the response rate definition derived from the same literature is the number of responses with completed questions over the targeted population, which is

80%. Even if the targeted population is replaced as a denominator with the selected organisation units' population, the response rate is 57%, which would still be above 56%. Therefore, I felt that this research's response rate was sufficient to be considered representative of the targeted population.

I will begin by presenting the background characteristics of the respondents. Then it will be followed by the five sections below, which are based on the ICT integration model in **Figure 2**:

- **Section I:** ICT financial investments trends in the in HEIs from 2011 to 2013;
- **Section II:** social resources supporting ICT integration;
- **Section III:** the availability and general usage of Technology resources in the universities;
- **Section IV:** academic staff usage of ICT in the classroom, and any barriers;
- **Section V**: ICT resources used in the implementation of principles of best practices in higher education teaching and learning.

5.2.2 The research participants' demographic data

This section establishes the personal and professional characteristics of the respondents to the questionnaire and interviewees from all the cases studied. A total number of 90 respondents participated in the study from the four universities. The data confirms that each participant actually belongs to the targeted population.

Table 5.2: Background Characteristics of Respondents

Characteristics	Questionnaire		Interviews	
	Frequency	Percentage	Frequency	Percentage
Sex				
Male	64	71	6	100
Female	26	29	0	0
Total	90	100	6	100
Age				
18 - 20 years	1	1	0	0
21 -30 years	25	28	1	17
31-40 years	33	37	1	17
41-50 years	16	18	1	17
>50 years	15	17	3	50
Total	**90**	**100**	6	100
Highest academic qualification				
PhD/EdD/Other Doctorate	14	16	5	83
Masters degree	56	61	1	17
Undergraduate degree	14	16	0	0
Diploma	5	6	0	0
Other	1	1	0	0
Total	**90**	**100**	6	100

Table 5.2 above shows the distribution of participants by gender, age and highest academic qualification.

Gender: Regarding the gender attributes of the participants from the studied universities, the sample from the questionnaires and interviews show that the majority of the respondents were male.

Age range: The age ranges from the questionnaire and interview participants show that the age ranges of 31-40 and 21-30 respectively represented the highest number of the participants. This means that, out of the 90 questionnaire participants, 66% were aged below 40 years and 50% of the interviewees were aged above 50 years old.

Academic qualification- In terms of the qualifications of the respondents, the findings revealed that most of the questionnaire respondents hold Masters qualifications (61%). On the other hand, majority of the interviewees had doctorate (83%). This means that, the majority of the respondents had post-graduate qualifications as required by the Higher Education Authority.

Respondents' functions or participants' role in the university- The respondents' functions are also shown in **Table 5.3**. As can be seen, out of the 90 participants, 60% clearly stated that they are lecturers and others were explicit about combining other functions with lecturing. I found out that with the majority of respondents from ICT departments, though designated according to the technical jobs in which they are specialists, such as network engineer, systems analyst, database administrator and others, they also provide lectures in those specialised subjects. Similarly, the Librarian and her deputy also are lecturers in library studies. The few who do not lecture but work within the academic organisation units assist lecturers or students during or outside the lecturing process. This satisfies the specification that all the research participants should be familiar with using the ICTs in the learning process.

As I analysed the data on the functions cited by the respondents, I reflected on the literature by Ellaway et al. (2006), Fox and Summer (2014) and Mitchell et al. (2017), in which they concur that the learning technologist function is mandatory for the successful integration of ICTs in pedagogy. I noticed the absence of the learning technologist in the cited functions. Literature reiterates that it is a key function to support ICT integration in the teaching and learning process. I therefore called one of the interviewees already interviewed from university A. I found that there was only one learning technologist in University A, with a total of 900 lecturers, while other universities interviewees confirmed that the function of a learning technologist did not exist in the respective HEIs.

Interestingly the "*Lack of ICT technology support and pedagogy support"* is cited as one of the major barriers to ICT integration (Green et al.,1995; Sife et al., 2007; Goktas et al., 2009; Alemu, 2015).

Furthermore, *the "…learning technologist function is mandatory for the successful integration of ICTs in pedagogy"* according to Ellaway et al. (2006), Fox and Summer (2014), and Mitchell et al. (2017)

Table 5.3: Distribution of participants by function performed in the University

Functions	**Frequency**	**Percent**
Librarian	1	1
Deputy University Librarian	1	1
Managing website	1	1
Systems Analyst	3	3
IT Practitioner	1	1
Network Engineer	1	1
Lecturer	54	60
Lecturer/Assistant Dean Undergraduate	2	2
Lecturer/Assistant Dean Natural Science	1	1
Lecturer/Researcher	3	3
Dean of Students/Ass. Lecturer	1	1
Assistant Registrar/Administration/Admin.Officer/Acad.manager/Program Adm	7	8
Professor/Ass. Professor	3	3
Lecturing/Research/Consulting	1	1
IT Support	4	4
Computer Lab. Assistant	1	1
Database Administrator	1	1
Programmer	1	1
Lecturer/Programme Coordinator	1	1
Student Support/Counsellor	2	2
Total	**90**	**100**

***The Table** below presents the functions of the management staff interviewed.*

Table 5.4: Distribution of interview participants functions in the University

Respondent	Title
AM1	Head of Department - Computer Science
AM2	Director - Centre for Central ICT Support Centre for Information Communication Technologies
AM3	Senior Lecturer, Education Mathematics
CM1	Dean - ICT
EM1	Deputy Vice Chancellor - Administration
EM2	Dean of Students/ Recently Former Director ICT

Table 5.5 Distribution of Questionnaire participants by Discipline taught

Serial Number	Courses taught by participants	Frequency	Percent
1	Library & Information Studies	5	6
2	Computer Science	9	10
3	Programming	1	1
4	ICTs	6	7
5	Electronics /Instrumentation	1	1
6	Civil Engineering	2	2
7	Physics	2	2
8	Electrical Engineering	1	1
9	Electronic/Electronic Engineering	1	1
10	Databases	1	1
11	Academic Support	16	18
12	Biology	2	2
13	Commerce	1	1
14	Social work	1	1
15	Business Administration	1	1
16	Management Studies	1	1
17	International Relations	3	3
18	Foreign Language - French	3	3
19	Psychology	2	2
20	Mathematics/Statistics	2	2
21	Development Studies	1	1
22	Economics and Finance	3	3
23	Accounting and Finance	1	1
24	Social Sciences	2	2
25	Public Health Courses	1	1
26	Marketing	2	2
27	Business Mathematics and Statistics	1	1

28	Environmental Chemistry and Climate Change	2	2
29	Engineering Management	1	1
30	Software Engineering	1	1
31	Soil Science	3	3
32	Public Finance	1	1
33	Rural Urban Economics	1	1
34	Communication	2	2
35	Entrepreneurship	1	1
36	Natural Resources	1	1
37	Unspecified	1	1
38	Education Administration	2	2
39	Information Management	1	1
40	Geography (Qualitative Tech)/Environmental Education	1	1
	Total	90	100

Table 5.5 above shows the distribution of the participants from the questionnaire by the course taught. Findings show that most of the respondents taught in computer science (22), Science and technical (18), business & financial (17), academic support related disciplines (16), Academic support (16), as well as library & information studies (5).

Since the research requested permission to conduct the study in those departments using ICTs and representative of the models of ICT usage, it is apparent that university management regarded ICT usage to be more dominant in scientific and technological disciplines followed by business and financial studies.

Another finding from responses on this question is that the majority of lecturers are content experts but not teaching methods experts and therefore are more concerned about imparting the discipline knowledge but not about effective teaching methods of imparting the knowledge.

"*Limited lecturer knowledge of how to integrate ICT in Pedagogy"* is cited as one of the major barriers to ICT in integration (Tsai et al., 2012; Lai, 2012; Goktas et al., 2009).

Table 5.6: ICT Products in which the Participants were trained

#	Products Trained in	Number trained	Number not trained	Total
1	Internet browsing	9	81	90
2	Database Design	2	88	90
3	Microsoft/ MS Office	11	79	90
4	ICDL	4	86	90
5	Computer Studies	2	88	90
6	CCNA	2	88	90
7	CCNP	2	88	90
8	MCSE	2	88	90
9	Course Design	2	88	90
10	Adding Contents	9	81	90
11	Adding Students	4	86	90
12	Social Media	2	88	90
13	Moodle	23	67	90
14	Programming	3	87	90
15	Modelling	2	88	90
16	Enterprise Resource Package (SAP)	2	88	90
17	Virtual labs/ Virtual education	2	88	90
18	Self-learning	3	87	90
19	PCs/ Laptops	5	85	90
20	LCD Projector	6	84	90
21	CD/DVD access	3	87	90
22	Software design	3	87	90
23	CADCAM	5	85	90
24	.NET Programming Platform	2	88	90
25	Windows Linux	3	87	90
26	Netbeans	4	86	90
27	PowerPoint	2	88	90

Table 5.6 shows the ICT products in which the participants were trained. The table shows the number of participants trained and not trained in each product out of the 90 participants. To start with, it is evident that the universities lack adequate expertise trained in each product under study. This is because most of the products had less than 10 trained participants out of the 90 who participated in the study. Only Moodle (23) and Microsoft Office (11) had more than 10 trained staff. Out of the 27 courses listed in **Table 5.6**, only 7 of them are concerned with ICT tools to support teaching and learning. The rest are about ICT technology. The responses to this questionnaire explain why it is challenging to effectively use ICT in the studied universities. This outcome confirms the assertion by other researchers as quoted below.

- "*Lack of lecturer training in the use of the ICT technology*" is one of the major barriers to ICT integration (Ertmer, 1999; Sife et al., 2007; Goktas et al., 2009; Alemu, 2015);
- "*Improved faculty training on ICT tools in teaching in quality and quantity"* has been identified as a major enabling factor to ICT integration in education institutions as mentioned by Goktas, et al., (2009); Cubukcuoglu, (2013); Alemu, 2015; Muhametjanova, et al. 2016).

SECTION I: ICT INVESTMENT TRENDS IN HEIs FROM 2011 TO 2013

5.3 The trends of ICT investments in the Zambian HEIs

The first research question asked is:

"What are the trends of ICTs investments in the Zambian HEIs over a period between 2011 and 2013?"

Table 5.7: Amounts invested annually (in Kwacha) in the acquisition of ICT resources during each of the three years

Year	Responses per respondent					
	AM1	AM2	AM3	CM1	EM1	EM2
2011	N	6.5m	N	N	N	N
2012	N	8.45m	N	10%	N	N
2013	N	12.2m	N	15%	N	N
Note: N=did not want to disclose amounts.						

Table 5.7 presents the responses of the management interviewees, identified by interviewee identity codes. This is in relation to investments over the specified period from universities A, C and E. It is worth noting that two of the three respondents interviewed did not want to disclose the actual amounts invested over the three years because they regarded it as confidential information. One interviewee (AM2) from University A, claimed that ICT investments increased from K6.5 million to K8.45 million between 2011 and 2012 and from K8.45 million to K12.2 million between 2012 and 2013. The interviewee from University C claimed a 10% increase in ICT investments from 2011 to 2012 and 15% increment, from 2012 to 2013.

Table 5.8: Trends of investment in ICT resources over the period 2011, 2012, and 2013

Would you say that it:	Frequency	Percent
Increased greatly?	5	83
Increased modestly?	1	17
Remained the same?	0	0
Reduced modestly?	0	0
Greatly reduced?	0	0
Total	**6**	**100**

As can be seen in **Table 5.8** above, the trend of investment in ICT resources over the period 2011 to 2013 was described as "*increased greatly*" by 5 of the 6 interviewees and only 1 interviewee indicated that it had *"increased modestly*. This indicates that investments in the acquisition of ICT resources within universities had continued to increase between 2011 and 2013.

Another indication of increased investment in ICT comes from the fact that the Government of Zambia founded the Zambia Research and Education Network (ZAMREN) in 2011 to provide ICT access and services to education and research institutions. Its operating costs grew from ZMK 2 million to slightly above ZMK 6 million between 2012 and 2013 (ZAMREN, 2014).

"Increased financial investments in ICTs" is one of the major enablers of ICT integration in education as discussed by Kozma, et al. (1991), Goktas, et al. (2009), and Muhametjanova, et al. (2016). Meanwhile, Olusola, et al. (2011) and Sife, et al. (2007) cite "Insufficient funds" as a barrier to ICT integration.

SECTION II: SOCIAL RESOURCES SUPPORTING THE ICT INTEGRATION

In this section, I used **Figure 1**, the learning process adapted from Voogt and Knezek (2008), covering the social context as the society, and **Figure 2**, the ICT integration model adapted from Czerniewicz and Brown (2005), showing the social resources supporting the integration of ICT. These include the national ICT policies; national ICT regulation; institutional ICT strategies and ICT implementation plans. This is important because these social resources have a direct impact on the acquisition, availability and usage of the ICTs in institutions of higher learning.

5.4 Social resources supporting the integration of ICTs

In Chapter II section 2.4, I covered the Zambian national policy and the National ICT regulatory framework, which are both enabling to the ICT integration into university teaching and learning. The institutional ICT strategies will be presented below.

5.4.1 Information and Communications Technology Strategy.

Table 5.9: Participants' knowledge about the existence ICT strategy.

Responses	Questionnaire		Interviews	
	Frequency	Percent	Frequency	Percent
Yes	68	76	6	100
No	8	9	0	0
Don't Know	14	16	0	0
Total	**90**	**100**	**6**	**100**

The objective for this question was to establish whether respondents were aware of their respective university ICT strategies. I opted to collect information concerning ICT strategies through both the questionnaire and the interviews. The reason for my decision was because there was no defined ICT strategy custodians. I wanted to find out whether the strategies' contents were known by lecturers, especially by the respective institutional leadership. The results as indicated in **Table 5.9** above demonstrate that 76% of the participants from the questionnaires and all the interviewees confirmed that they were aware of their respective universities' ICT strategies. Thus, it can be concluded that the

studied universities had ICT strategies and the participants were aware of the existence of ICT strategy in their respective universities.

5.4.2 Specific strategic goals of the ICT Strategies from the HEIs

Information was sought from the interviewees to identify the priorities of the ICT strategies in the universities. The following strategic goals were included among priorities in at least one of the three universities:

- Improving the computer labs to meet international standard by including multimedia tools which include audio and video equipment;
- To use ICTs in the core business of the University, that is: teaching learning and research;
- The usage of ICTs in other functions of the university to make them more effective and efficient;
- The emphasis on training lecturers in using different ICTs in teaching;
- The encouragement of lecturers to be trained in Moodle or any other Learning Management System (LMS).
- To provide online learning anywhere and anytime by next academic year.
- To introduce new ICT programmes including Cloud, HPC, Healthy informatics and robotics
- To help in the efficient use of resources
- To encourage the whole university community to be computer literate.
- To promote connectivity
- Offers courses using PowerPoint, Moodle, Distance Education

The strategic goals identified as a priority in all the three universities include the following;

- The institutional strategic goals encourage the acquisition and use of ICTs in the teaching and learning process, and
- The training of lecturers in the use of ICTs in general and in the LMS in particular.

As regards the ICT implementation frameworks to integrate ICTs in teaching and learning, I received the following comments from two of the three universities where I obtained interviewees:

- “University lacks a strategy of e-learning/using ICT in the classroom.”
- “Need for implementation of ICT into the business processes.”
- “The effective use of ICTs will require implementation policies.”
- “Although our university has an ICT policy, the policy lacks implementation.”
- “Our University includes ICTs in Strategic plan, there is no policy to support it.”

These comments indicate that while the respondents were unanimous about the availability of the ICT strategic plans, there is some discontent about the lack of clear direction on how the ICT strategy should be implemented in the particular schools and departments.

While the universities’ strategies are specific about training lecturers in ICTs and LMS, there is no strategic goal concerning training lecturers in the pedagogy (teaching methodology) using ICTs, to achieve the TPACK model for training teachers/lecturers by Mishra and Koehler (2006).

5.4.3 ICT resources procurement procedures

I wanted to know the decision-making levels for the procurement of ICT resources, in order to determine levels of ICT products procurement decisions. If the decisions are made at the bottom then it is more likely to be relevant to the teaching and learning process than if decisions are made centrally or at the top of the institution.

Table 5.10 shows that 4 out of the 6 interviewees indicated that the selected universities’ procedure for ICT resources procurement start from the staff in the departments and the approvals filter through the hierarchy to the top management (bottom-up). The respondents stated that the users within the departments submit procurement requirements to the department Head, who consolidates them for his/her department and escalates them to the Dean of School or Deputy Vice Chancellor for Administration. Then a Finance Committee reviews, prioritises and approves the procurement. The procurement is made centrally and the ICT resources, once procured, are distributed to the requesting users within the department. Only in one university are the procurements guided by the strategic plan and the budget.

Table 5.10: The procedure for acquiring ICT resources

Code	Steps explained by respondents	Yes	No	Total
	Planning Phase			
ST-Plan	Starts with the Strategic plan	3	3	**6**
Budget	Budgeting by department	3	3	**6**
	Procurements of ICT Resources			
User-needs	ICT Procurement requirements from the users within a Department	4	2	**6**
Dept.-needs	ICT Procurement requirements are submitted to the Department	2	4	**6**
Sch-needs	ICT Procurement needs submitted by Departments are consolidated by School/Deputy VC Administration	4	2	**6**
Com-Approval	A Finance Committee consisting of Assistant Deans and Heads of Departments reviews the procurements and prioritises and approve procurements requests.	5	1	**6**
Com-needs	ICT requirements determined by the Finance Committee	1	5	**6**
Acq-centrally	ICT resources are acquired centrally	5	1	**6**
Dist-centre	Distributed by the ICT Central Department to users	3	3	**6**

In university C, however, the process of procurement proceeds from the top management down to staff in departments (top-down), implying that the procurement requirements are determined by the Finance Committee, the ICT resources are procured centrally and then distributed to the departments, who in turn distribute them to the users.

Procurement policy provides information on where the decisions to procure ICT products lie. It has an influence on the prioritisation of the products to be acquired, whether they support general management systems or support teaching and learning. Table 5.8 shows that the majority of interviewees confirmed that the procurement requirements originated from the lecturers within the departments and the approval process is through their respective

department heads, through the Dean of School and the final approval is by the financial committee. This process where the top has to approve the procurement is quite important and makes sense when the university has to acquire a product requiring a site licence, for example major software such as the LMS. It wouldn't make sense for decisions about systems which affect the whole institution to be made at the lecturer level.

Table 5.10 shows that there is a degree of difference about the process. This is expected especially because the interviewees are from different universities. Since all the universities have said they have an ICT strategy, one expects that it should guide the prioritisation of the ICT acquisitions, not only the user needs. On the other hand, if both the faculty and its leadership have been involved in the formulation of the ICT strategy and the budget, then one would assume that the user procurement requirements would be similar to those in the strategy and budget. The interpretation of the apparent difference could be that in the process starting with lecturers, it is assumed that, since in the strategy the needs would not be detailed, the end users are given the opportunity to provide detailed and technical specifications of the products needed and the financial committee would be guided by the strategy to prioritise the procurements. In the case of the process starting from top management, it is assumed that the strategy and the budget could guide the finance committee to go ahead and make procurements on behalf of the users.

5.4.4 Advantages and disadvantages of the 'bottom-up' process

In terms of the advantages of the bottom-up process of ICT procurements, the interviewees cited the provision of opportunity to the users to request the ICT resources they actually need, the involvement of all stakeholders in different levels in the ICT resources approval process, and the idea that the ICT resources are not imposed but originate from those who will use them.

The interviewees further stated that the advantage of this decision-making process is that the ICT goods acquired are relevant to the users, who are the lecturers, and thus they are acquiring ICT products that may support the lecturer function of teaching and learning. Other advantages included the use

of the ICT resources optimally; it gives knowledge of where the ICT resources are and also gives the ability to meet major ICT resources priorities.

On the other hand, two major disadvantages of the bottom-up approach were cited. That is, some priorities for specific faculties might be missed and that the process allows the central adjustments of requirements which may cause acquisition of substandard ICT.

5.4.5 Advantages and Disadvantages of the 'top-down' process

Taking acquisition decisions at the Central Committee level allows the identification of new opportunities, permits operating within the budget, gives knowledge of whereabouts of ICT resources, gives ability to meet major ICT resource priorities as well as the optimal usage of ICT resources. Other advantages spelt out include the following;

- It provides opportunity to acquire resources for common usage, such as for lecture theatres;
- Priorities for specific faculties are not missed.

However, central adjustments of acquisition requirements result in acquisition of substandard ICT.

5.4.6 Conclusion on social resources for ICT integration-enabling environment

The adapted learning process model shown in **Figure 1** and discussed in Chapter III was used to understand the discussions about social resources as follows:

- "Society" in the in **Figure 1** is represented by the national policy, the national ICT regulation and legal framework. The availability and application of the said national instruments influence and impact the university ICT adoption;

- "University environment" shown in **Figure 1** is represented by the university strategy or policy and the ICT implementation plan which drive the ICT integration efforts.

SECTION III: AVAILABILITY AND GENERAL USAGE OF TECHNOLOGY

5.5 Technology Resources

The second research question is

"*What ICT products, infrastructure and resources are installed?"*

Responding to this question provides a technological overview of the studied universities. The adapted model of ICT integration according to Czerniewicz and Brown (2005), which is reflected in **Figure 2** and discussed in Chapter III was used to interpret the findings concerning the technology resources found in the studied universities. The data collected concerned the availability, adequacy, usage and reliability of the following:

- Hardware devices
- Software products
- Communications infrastructure and software

5.5.1 Hardware Devices availability and sufficiency by participants

Table 5.11: Availability of ICT devices installed in the universities

ICT Equipment	Questionnaire				Interviews			
	Yes	No	I do not know	**Total**	Yes	No	I do not know	**Total**
Servers	73	7	10	90	6	0	0	6
Computers	87	2	1	90	4	2	0	6
Printers	82	7	1	90	6	0	0	6
Smart Boards	48	29	13	90	2	3	1	6
Projectors	70	17	3	90	6	0	0	6
Scanners	75	10	5	90	6	0	0	6

Table 5.11 shows that the majority of the participants confirmed the installation of ICT devices under study in the studied universities. However, the findings indicate that smart boards are not common in the universities. This was also confirmed by the interviewees who said that smart boards are only available in selected areas.

5.5.2 Availability and sufficiency of hardware devices by interviewees

The research attempted to get confirmation from the management staff interviewed of the numbers of devices and whether or not the numbers were sufficient. **Tables 5.12, 5.13 and 5.14** show their responses.

Table 5.12: The number of desktop computers, laptops or tablets available in the School/Department

Interviewee	ICT Equipment				
	Desktop	Laptops	Tablets	Individual owned Laptops	Individual owned Tablets
AM1	70	2	Not available	Yes	Yes
AM2	1800	Not available	Not available	Yes	No
AM3	All lecturers	Not available	Not available	Yes	Yes
CM1	All staff	Not available	Not available	More popular	No
EM1	350	Not available	Not available	Yes	Yes
EM2	450	Not available	Not available	Yes	Yes

As depicted in **Table 5.12,** in University A, AM1 presented the number of the devices in his department, AM2 gave the university desktop population of 1,800 and AM3 indicates that all lecturers have desktops. University C interviewee indicated that all the staff have a desktop computer while university E has 350 to 450 desktops. All the universities do not allocate laptops and tablets to their staff, but the staff own their own laptops and tablets. However, interviewee AM1 reported his department having allocated 2 laptops.

Table 5.13: Sufficiency of the desktops or laptops for lecturers

Interviewee	Responses	
	Sufficient	Insufficient
AM1		1
AM2	1	
AM3	1	
CM1	1	
EM1		1
EM2	1	
Total	**4**	**2**
Total %	**67%**	**33%**

The results shown in **Table 5.13** indicate that there are sufficient desktops/laptops.

Table 5.14: Proposed suggestions to ensure that lecturers and students have access to computer devices, if computers are not sufficient

Interviewee	Responses		
	Encouraged to buy their own	Budget increase	Not applicable
AM1		1	
AM2			1
AM3			1
CM1	1		
EM1	1		
EM2	1		
Total	**3**	**1**	**2**

In **Table 5.14** three interviewees propose to encourage staff to buy their own computer devices where the computers are not sufficient and one interviewee proposes to increase the budget.

The interviews revealed that only desktop computers are distributed to lecturers within the universities. However, when asked which devices they used most of the time, both questionnaire respondents and interviewees indicated that they mostly used laptops.

Table 5.15: Computer Devices ownership

Computer device	Questionnaire			Interviews		
	Yes	No	Total	Yes	No	Total
Desktop computer	36	54	90	1	5	6
Laptop computer	85	5	90	6	0	6
Tablet	28	62	90	4	2	6
Mobile phone	76	14	90	4	2	6

Table 5.15 shows that the highest number of participants had laptops and mobile phones. Desktop computers and tablets were least owned by the participants.

Table 5.16: Computer Devices location of usage

Computer Devices	Usage site					Total
	Any where	Home	Work place	Campus	Internet café	
Desktop	16	22	39	11	2	90
Laptop	42	21	20	5	2	90
Tablets	34	35	9	9	3	90
Mobile Phones	67	16	5	1	1	90

Respondents were also required to state where they usually access computer devices when the devices at the university and those owned are not sufficient for the lecturers and whether they have alternative locations where they could find different digital devices. Wherever a respondent chose “anywhere,” the other options were ignored because “anywhere” covers all locations. **Table 5.16** shows that in addition to the use of desktops by the majority at the workplace/campus, a large number of respondents also use laptops and mobile phones anywhere. 67 respondents use mobile phones anywhere and 42 use laptops anywhere. However, the majority of the respondents use desktops at their workplace. Lastly, it is important to note that tablets are not used as much as the other devices at the workplace.

5.5.3 Usage of hardware devices

Table 5.17: Computer devices usage by all participants

Computer device	Use	Do not use	Total
Desktop computer	76	20	96
Laptop	90	6	96
Tablet	31	65	96
mobile phone	78	18	96

Table 5.17 shows the frequency of using different computing devices by all the research participants. The most popular device used by the respondents is the laptop, followed by mobile phone, desktop computer and the least used is the tablet.

Table 5.18 Usage of mobile devices such as iPads, smart phones, tablets, etc for storing, accessing and transmitting course materials

Responses	Questionnaire		Interview	
	Frequency	Percent	Frequency	Percent
Yes	57	63	5	83
No	33	37	1	17
Total	**90**	**100**	**6**	**100**

I was curious to find out whether mobile learning is being introduced in the Zambian universities. I expected the lecturers to venture into using mobile devices in the teaching and learning process, since the ITU ICT Facts and Figures for 2016 (Sanou, 2017) show that Africa, in terms of number of mobile telephone subscriptions, has overtaken Europe and represents 70% of the USA subscriptions. However, when it comes to active mobile-broadband subscriptions, Africa's usage represents 36% of America subscriptions and 65% of the European subscriptions. Thus, as depicted in **Table 5.18** above, findings of the study show that most of the respondents use mobile devices such as iPads, smartphones, and tablets among others for storing, accessing and transmitting course materials.

Table 5.19: Other ICT hardware usage from the questionnaire respondents

Other ICT hardware	**Frequency of Use**					
	Often	Sometimes	Rarely	Never	No response	Total
Overhead Projector	39	18	12	9	12	90
Video camera	2	11	20	42	15	90
Scanner	28	22	12	14	14	90
Printer	68	11	2	1	8	90
Photocopier	55	21	4	1	9	90
White/ Black board	58	9	4	6	13	90

Table 5.19 shows that the most used ICT device is the printer, followed by white/black board and photocopier. Video camera is the least used device. However, what is interesting in the survey is that about 15 and 14 of the respondents did not respond to the question regarding the usage of video camera and scanner respectively. This is a big number and my suspicion is that these respondents did not know what the items were, and they preferred not to respond.

Table 5.20: Availability and usage of video cameras, photocopiers, printers, scanners, projectors, smart boards and video conference equipment

Interviewee	Video cameras	Photocopiers	Printers	Scanners	Overhead projector	Smart boards	video conference
AM1	√	√	√	√	√	x	x
AM2	√	√	√	√	√	Selected	x
AM3	√	√	√	√	√	Some	x
CM1	Limited	√	√	√	√	x	x
EM1	√	√	√	√	√	√	√
EM2	√	√	√	√	√	√	√
Total (√)	5	6	6	6	6	3	2
Total % (√)	83	100	100	100	100	50	33

√**=**Available X=Not Available

All the 6 interviewees claimed that their universities have printers, scanners, photocopiers and projectors (**Table 5.20**). Five of them claimed to have video cameras and video equipment. The results show that smartboards are still uncommon in most universities. Two interviewees from two universities confirm that they also have smart boards, while the other two stated that smart boards are found only in some or selected places. Lastly, only one university claimed to have video conference equipment, permitting tele-conferences from different sites.

5.6 Software Resources

The study questions related to software resources helped me to determine whether more financial resources are concentrated on acquiring administrative software resources or those that support pedagogy. It also provided information on the respondents' awareness of the existence of software resources that could improve the operations of the university.

To have a clear picture of the software installed in the universities under study, the findings of some parts of questions 24, 26 and 27 were grouped together for analysis. **Tables 5.21, 5.22, 5.23, 5.24 and 5.25** below show the software installed.

5.6. 1 Software availability

Table 5.21: Availability of software to support the administration

Software resources	Yes	No	Don't know	**Total**
Database Management Systems	60	10	20	90
Data Warehousing	28	22	40	90
Entreprise Resource Package (ERP)	22	24	44	90
Accounting Package	58	10	22	90
Document Management System (DMS)	36	22	32	90
Planning tools	44	12	34	90
Programming Software	53	22	15	90

Table 5.21 shows that only the database management systems, the accounting package and the programming software are used by more than 50

respondents. There are 40 and more respondents who indicated “don’t know” or “no response” where there is very low usage of the software.

Table 5.22: Availability of software to support the teaching and learning

Software resources	Yes	No	Don't know	**Total**
Students Records System	70	11	9	90
Time Table Management System	51	24	15	90
Learning Management System (LMS)	41	17	32	90
Document Management System (DMS)	36	22	32	90
Library Management Software	47	19	24	90
Course Design Software	36	25	29	90
Library database subscription	35	20	35	90
Statistics Package	69	7	14	90
Design tools	39	17	34	90

Table 22 shows that the most widely available software to support academic activities is the students’ records system, followed by the statistics package, the timetable system and the library management system.

The least available are library database subscription, course design software, document management system, design tools, the learning management system. Another aspect to note in **Table 5.22** is that in the case of the least available software, the majority responded “Don’t know.” Those who do not know are the highest in relation to the software that is least available, which implies lack of awareness of the existence of the software.

The lack of awareness by lecturers is confirmed by the interviewees’ responses in **Table 5.23** in which all the 6 interviewees confirm the availability of the learning management system, 5 of them confirm availability of the library management system and 3 of them confirm availability of students records system and the course design software.

Table 5.23: Availability of software to support teaching and learning responses from interviewees.

Product Description	Yes	No	Don't know	No response	Total
Students Records Systems (SRS)	4	0	0	2	6
Time Table Management System (TTS)	3	0	2	1	6
Learning Management System (LMS)	6	0	0	0	6
Library Management Software (LibMS)	5	0	0	1	6
Library database subscriptions (LibSub)	4	0	0	2	6
Course Design Software (CDS)	3	0	0	3	6
Statistics Packages	0	0	0	6	6
Design Tools	0	0	0	6	6

5.6.2 Software resource usage in the selected universities

The research sought to find out whether the software is used. The 'provide reasons for not doing so' response was only offered if the participant chose 'no,'

Table 5.24: Usage of software to support the administration

Product Description	Yes	No	Don't know	No response	Total
Database management Systems (DBMS)	41	36	1	12	90
Data Warehousing (DW)	13	54	2	21	90
Enterprise Resource Package (ERP)	9	60	0	21	90
Accounting Package	17	52	0	21	90
Document Management Software	13	52	0	25	90
Programming Software	40	34	0	24	90
Planning Tool	20	46	0	24	90

Table 5.24 shows that all the software to support administrative activities is underutilised since the users represent less than half of the total research participants. At least database management systems and programming

software are used by 41 and 40 participants out of the 90, which is nearer 50% of the total participants.

Table 5.25: Participants' identified Barriers to using software to support the administration

Product Description	Barriers				Total
	Unavailability	Irrelevance	Un-trained	Un-aware	
Database management Systems (DBMS)	23	43	8	16	90
Data Warehousing (DW)	30	39	6	15	90
Enterprise Resource Package (ERP)	22	40	12	16	90
Accounting Package	25	45	11	8	89
Document Management Software	16	35	16	23	90
Programming Software	17	28	28	17	90
Planning Tools	25	29	16	20	90

The major reason advanced by the majority of the respondents who did not use the software to support administrative activities was the belief that the software was irrelevant to their job (**Table 5.25**). A combination of unavailability and unawareness of the existence of the software also represents a major reason for non-usage.

Table 5.26: Usage of software to support teaching and learning

Product Description	Yes	No	Don't know	No response	Total
Students Records Systems (SRS)	56	24	0	10	90
Time Table Management System (TTS)	31	42	1	16	90
Learning Management System (LMS)	28	43	0	19	90
Library Management Software (LibMS)	30	45	0	15	90
Library database subscriptions (LibSub)	25	42	0	23	90
Course Design Software (CDS)	18	50	1	21	90
Statistics Packages	52	26	0	12	90
Design Tools	23	45	0	22	90

The data presented in **Table 5.26** show that only the students' records system and the statistics package are used by the majority of participants, while the rest of the software is used by less than 50% of the participants. I also observed the high prevalence of "non -response" where the usage rate was low.

Table 5.27: Participants' identified Barriers in using software to support teaching and learning

Product Description	Barriers				Total
	Unavailability	Irrelevance	Untrained	Unaware	
Students Records Systems (SRS)	42	30	18	0	90
Time Table Management System (TTS)	20	45	15	10	90
Learning Management System (LMS)	19	24	19	28	90
Library Management Software (LibMS)	20	33	16	20	89
Library database subscriptions (LibSub)	25	32	14	18	89
Course Design Software (CDS)	30	25	20	15	90
Statistics Packages	30	23	29	8	90
Design Tools	23	36	17	14	90

Table 5.27 shows that the common barrier advanced for not using the products is the belief that their function is irrelevant to the respondent. It also reveals that a combination of unavailability and the belief that the functions of certain products are irrelevant are major barriers to the usage of time table management, course design software, and learning management system. It is equally significant to note that a good number of respondents indicated unawareness of the existence of products such as design tools and library database subscription as their major barrier to using the products.

Other barriers identified by the respondents included high cost of software and lack of ICT knowledge regarding the use of technology to support the learning process. Lack of teacher training in the use of the ICT technology was also identified as the major barrier. Most of the respondents indicated having the

zeal to use the software. However, the challenge is that they do not know how to use the product due to lack of institutional support. Lastly, the other concern raised was lack of adequate time to learn or experiment with the new technology in the classroom.

The research further sought to determine the frequency with which the respondents had used other software tools to facilitate teaching, learning and research during the period 2013 -2014 (this was a period before the start of the research field work, which was recent enough for them to remember) The results were as shown in **Table 5.28** below.

Table 5.28: Frequency of usage of other learning, teaching and research tools.

Tools	Often	Sometimes	Rarely	Never	Total
Instant messages	38	25	9	18	90
Educational web-based videos or audios	33	26	10	21	90
Library databases	32	28	25	5	90
Spreadsheets	51	24	10	5	90
Word processing	70	11	7	2	90
Presentation software	52	21	10	7	90
Teleconferencing	13	9	23	45	90
Overhead projector	53	18	8	11	90
Computer based assignments	36	17	25	12	90
Internet for extra teaching/learning materials	46	23	12	9	90
Video camera	9	16	28	37	90
Scanner	36	31	16	7	90
Printer	63	11	9	7	90
Photocopier	54	27	6	3	90
White/blackboard	64	12	9	5	90
Graphic software	15	35	20	20	90
Social media (Facebook, MySpace, Twitter, Blogs, wikis, etc)	34	24	16	16	90
Podcasts or webcasts	10	16	24	40	90
Skype	20	20	19	31	90
Teaching games	14	15	17	44	90

Table 5.28 highlights the learning, teaching and research tools used by the majority of lecturers, starting with the most used as word processing, printer,

presentation software, spreadsheets, photocopier, white/blackboard, overhead projector, and the internet for extra teaching/learning materials. The rest are used by a minority of the lecturers. On the other hand, most of the participants indicated to having never used computer teaching games, podcasts or webcasts, video camera and teleconferencing in their classrooms.

Table 5.29: Purpose of usage for the computer devices from the questionnaire respondents

Uses of the computer device	Yes	No	Total
Collaborate with your students in performing their assignments	59	31	90
Guiding students in their problem-solving projects to discover solutions	51	39	90
Accessing online training materials, such as videos, computer assisted learning materials	62	28	90
Accessing internet for information access	72	18	90
Accessing instructional software	61	29	90
Sending and receiving e-mail	64	26	90
Learning, teaching and research	65	25	90
Lecturer/student communication	73	17	90
Courses materials preparation	77	13	90
Classroom course administration	62	28	90
Accessing a Library System or e-Library databases	62	28	90
Searching information by topic or key words	59	31	90
General administration	66	24	90
Student records management	77	13	90

I was keen to find out the uses of the computer devices by the respondents. The findings were as depicted in **Table 5.29** above. As can be seen, computer devices are used for all the above suggested uses in the selected universities. However, the common uses include, student records management, courses materials preparation; accessing internet for information access; lecturer/student communication; classroom course administration; learning, teaching and research and collaborating with students in performing their assignments.

5.7. Availability and reliability of the communication infrastructure and systems

This section of the findings of the research assess accessibility, availability and reliability of networks and communication facilities, to permit access to the internet, network access speeds, e-mail systems and the university websites.

Table 5.30: Communications facility availability

Responses	Availability on the campus				Availability from anywhere	
	LAN		WAN		LAN	
	Frequency	Percent	Frequency	Percent	Frequency	Percent
Yes	82	91	73	81	35	39
No	4	4	7	8	46	51
Do not know	4	4	10	11	9	10
Total	**90**	**100**	**90**	**100**	**90**	**100**

The responses in **Table 5.30** above show that a local area network (LAN) is available in the institutions. However, although the majority (91%) of the participants confirm the existence of a local area network in their respective departments and that the network is reliable, 51% of them alleged that the local area network cannot be accessed from anywhere outside the campus.

As regards the wide area network (WAN), the six interviewees confirm that all the universities studied are connected to the world using fibre optic cable which provides broadband connections. This implies that the studied universities have the state-of-the-art infrastructure to access large volumes of information at fast speeds, however these cannot be accessed outside the campus. 81% of the participants from the questionnaires confirmed that their respective departments are connected to the WAN.

Table 5.31: The Internet and E-mail availability rating

Internet Availability	Internet		E-mail	
	Frequency	Percent	Frequency	Percent
Always works	21	23	24	27
Works most times	44	49	37	41
Works sometimes	23	26	21	23
Hardly works	2	2	8	9
Total	**90**	**100**	**90**	**100**

The majority of the participants claimed that internet and e-mail systems always work or work most of the time as shown in **Table 5.31.** This implies that communications through email are available whenever the lecturers want to use it for the teaching and learning process.

Table 5.32: The Internet performance/speed rating

Internet Performance Rating	Frequency	Percent
Very fast	20	22
Average	48	53
Slow	18	20
Frustrating	4	4
Total	**90**	**100**

The internet speeds in the universities are rated average by the majority (53%) of participants **(Table 5.32**). It is therefore confirmed by the majority that access to large reservoirs of information through the internet is available to the lecturers. This was also confirmed by the interviewees who reported that the internet is very fast and reliable.

Table 5.33: Information availability and quality of the university website

Internet Performance Rating	Frequency	Percent
More than satisfied	12	13
Fully satisfied	24	27
Satisfied	46	51
Unsatisfied at times	6	7
Completely unsatisfied	2	2
Total	**90**	**100**

University related information normally resides on the university website. The effectiveness of the website depends on information availability, interactivity of the website and currency of information thereof. It appears in **Table 5.33** that half (51%) of the research participants are satisfied with the content availability on the university website, the interactivity of the website and the regularity of the information update on their website. Interactivity determines whether those who visit the university website can interact with its content in some way, by either commenting, blogging, completing forms, etc. This is an indication that the lecturers in the universities are satisfied with the availability and

accessibility of their respective university repository of information on the website.

Table 5.34: Do you think that social media, such as Facebook, Skype, wikis, Twitter, blogs, etc. have a role to play in the process of teaching and learning?

Examples of Social Media	Yes	No	Total
Facebook	1	5	6
Skype	2	4	6
Wikis	2	4	6
Twitter	1	5	6
Blogs	1	5	6
WhatsApp	2	4	6
Messenger	1	5	6

The majority of the interviewees do not believe that social media has a role to play in the processes of teaching and learning as shown in **Table 5.34**. It appears that the majority of them have not undergone training in using these ICT tools in teaching and learning.

Another aspect of communication resource includes instant messaging, tele-conferencing, and Skype, discussed earlier in the chapter. The majority of the respondents use instant messaging. There is a potential for the researched universities to explore these new communication tools in the teaching and learning processes.

"Lack of access or non-availability of appropriate ICT technology for teaching (software / hardware)" is cited in different forms, as a major barrier to integration of ICTs in education by Ertmer (1999), Goktas et al.(2009), Olusola et al. (2011), Tsai et al. (2012), Alemu, (2015) and Chipembele, et al. (2016). This barrier has been found as regards the software to support teaching and learning. Though the software is available, it is not accessible to the majority of lecturers because they are not aware of its existence and not trained in its usage.

However, the study results seem to show that:

- respondents have sufficient hardware although portable hardware is not provided by institutions;

- the communications infrastructure's availability and performance appear to satisfy the respondents.

The third research question is:

> "*In terms of academic staff, are they using the ICTs in the classroom? If not why not? What are the barriers which are impacting the use of ICTs in teaching and learning?"*

Tables 5.11 to 5.20 present the responses concerning usage of hardware resources. **Tables 5.21 to 5.27** give the situation concerning the respondents' usage of the software resources and any barriers to usage. **Tables 5.28 and 5.29 and 5.34** to discuss uses of other ICT facilities. **Tables 5.30 to 5.33** cover the usage of communication facilities. **Table 5.29** outlines the teaching purposes used for particular ICT resources.

SECTION IV: ACADEMIC STAFF USAGE OF ICTS IN THE CLASSROOM

This section continues to respond to the third research question presented above. This section analyses the lecturers' interests, attitudes, perceptions, beliefs, skills and knowledge to determine their disposition and ability to use ICTs in the classroom. To address the subject of personnel resources (Czerniewicz and Brown, 2005), the research examined the findings relating to personal innovativeness to determine the technology adoption capacity of the lecturers due to their personal traits. It then identified possible barriers to ICT integration.

5.7 Personal Innovativeness in Information Technology (PIIT)

To determine the innovativeness of the research participants, their perceptions concerning the adoption of ICT technologies were assessed using the questionnaire and the interviews and the results were captured in **Table 5.35**.

Agarwal and Prasad (1998, p 207) show the relationships between PIIT and other Technology Acceptance theories, particularly the Diffusion of Innovation (DOI) model (Rodgers, 2005). The DOI model classifies ICT users as innovators, early adopters, early majority, late majority adopters (for the purpose of this study the early and late majority were grouped together as majority adopters), laggards and resistors. This relationship between PIIT and the DOI was mapped in **Table 5.35**. However, for the sample here of near a hundred, it was found that the curve is very high on innovators and early adopters and very low on the laggards and resisters. This could be due to the fact that the assessment was done at only one particular instance and not over a period of time.

Table 5.35: Respondents' Personal Innovativeness in Information Technology Assessment

#	**Personal Innovativeness in ICT**	Adapted Rodgers' classification	Frequency			**Total %**
			Questionnaire	Interview	Total	
1.	Skeptical of new technologies and use them only when I have to	Resistors	4	0	4	4%
2.	Usually one of the last people I know to use new technologies	Laggards	3	0	3	3%
3.	Usually use new technology when most people I know do	Majority Adopters	20	1	21	22%
4.	Like new technologies and use them before most people I know	Early Adopters	24	0	24	25%
5.	Love new technologies and am among the first to experiment with and use them	Innovators	33	5	38	40%
	Non response		6	0	6	6%
	Total		90	6	96	100%

The information in **Table 5.35** indicates that

- 40% of respondents claimed to "*love new technologies and are among the first to experiment with and use them*," meaning that they are innovators;
- 25% claimed to "*like new technologies and use them before most people I know*" implying that they are early adopters, and
- 22% claimed to "*Usually use new technology when most people I know do*," implying that they are majority adopters.

This implies that 86% of the research participants have generally a positive attitude towards adopting technology. What is to be noted also is that all the academic and administrative management claim to be innovators.

This analysis reveals that the lecturers' interests and perceptions towards technology are generally conducive to adoption of technology. Agarwal and

Prasad (1998) proposed that innovators and adopters have the interest to adopt new technology. It therefore appears that the majority in this study have the potential to adopt ICT technology. It is important to note that Table 5.5 show that the majority of the respondents in this research are from scientific and technical disciplines. It might explain their positive interests and perceptions to ICT adoption.

"*Faculty's positive attitude towards and interest in technology*" is also cited as an enabler to ICT integration by Kozma, et al. (1991), Cubukcuoglu (2013), Alemu, (2015), Mutanga et al. (2018).

5.8 Possible extrinsic barriers to usage of ICT in teaching and learning

I was guided by the researchers' discussion in section 3.6.2 of the literature review, in the task of identifying barriers and challenges to ICT integration identified in the findings of this research.

5.8.1 Lack of systematic approach to ICT implementation

As depicted in **Table 5.9** above, the research found that ICT strategies within the universities existed. In addition, most of the lecturers are aware of their existence, and that the general universities' environments support the integration of ICTs in teaching and learning through the goals set in their respective strategies. However, the research did not find implementation guidelines for using ICTs in the classroom within the ICT strategies. As a consequence, some participants wrote in the general comments that there was a need for ICT implementation guidelines to assist individual lecturers to use ICTs in the classroom. Lack of a systematic approach to implementing ICT in HEIs can be categorised among the extrinsic barriers to integrating ICTs. Three researchers have covered the issue of lack of an ICT Implementation plan as a barrier to ICT integration in education (**Figure 8**), that is, Sife et al. (2007), Goktas, et al. (2009), and Chipembele, et al. (2016).

5.8.2 Lack of access to the appropriate ICT technology for teaching and learning

The findings in **section 5.5** indicate that there is adequate hardware and the lecturers are using the devices and resources. Concerning availability and

usage of software, the general office software is widely used by the lecturers; only two of the software packages to support administration activities are used by at least 75% of the lecturers; while three software packages to support teaching and learning in **Table 5.26** are used by less than 50% of the lecturers. Meanwhile the key software such as the LMS, the library management system, course design software and the library database subscription are used by less than 32% of the lecturers. The implication of this is that "*transforming higher education*" (Sife et al., 2007) is missed. Instead of adopting ICT-supported learning systems, which supports transforming to new teaching and learning paradigms, the lecturers continue their traditional methods of teaching with support from the ICT products.

A Learning Management System permits socio-constructivist learning as discussed in Chapter III and therefore limited knowledge about this software environment makes ICT-enabled collaborative learning much more difficult. This is in support of the challenge discussed by Sife et al. (2007) where lecturers' use of ICTs focussed on technology instead of impacting pedagogy and adopting ICT-supported learning systems.

"*Lack of access to or non-availability of appropriate ICT technology for teaching*" has been presented as a barrier by five researchers, Ertmer (1999), Olusola, et al. (2011), Tsai, et al. (2012), Alemu (2015), Chipembele, et al, (2018).

5.8.3 Lack of lecturer training in the use of the ICT technology

The issue of ICT training was addressed in a number of places in the research, including question 7 which addressed training taken by individuals, question 31 which addressed categories of training offered by the institutions and in comments made by participants and in discussing the barriers to using ICTs in the teaching and learning process. Individual participants provided individual and general comments as to why they were not using certain products.

Table 5.36: ICT Training Received by Research Participants

Responses	Questionnaire		Interview	
	Frequency	Percent	Frequency	Percent
Yes	68	76	5	83
No	22	24	1	17
Total	90	100	6	100

Table 5.36 portrays the fact that the majority of the participants have received ICT training offered by the university. This was also confirmed by all the participants from interviews. Knowing that the participants actually received ICT training assured me that they qualify to participate in the research, because they knew what they were talking about and were able to provide reliable information.

Table 5.37: Availability of training

Training Availability	Faculty (Academic staff) ICT training		User (Other staff) of ICTs Training		General ICTs Literacy		Instructional technology	
	F	%	F	%	F	%	F	%
Yes	57	59	56	58	57	59	36	40
No	23	24	19	20	20	21	28	31
Don't Know	9	9	13	14	12	13	17	19
No Response	7	7	8	8	7	7	9	10
Total	96	100	96	100	96	100	90	100

F=Frequency %= Percent

The results in **Table 5.37** show the responses concerning ICT training for different target groups. The majority of participants confirmed that general ICT literacy training, faculty ICT training and other user staff ICTs training is provided by the university. However, findings show that training in instructional technology are less provided by the university.

When asked for additional comments at the end of the questionnaire, what came out is that the effective use of ICTs will require constant training. The university needs to invest in more training of staff in ICTs. The university offers ICT programs to students but is yet to train support staff in effectively using it. Lastly, training needs to be given to all lecturers on the use of ICT. All these

comments show that there is need for more ICT training in the university owing to the fact that mostly only general ICT literacy training is provided.

The research also looked at the kind of ICT training offered. **Table 5.6** shows the actual training some respondents have undergone. The responses show that the universities trained more respondents in the learning management system (Moodle). Since the "*Adding contents*" and "*Adding students*" are both parts of the "*Moodle*" training, it brings to 36 respondents out of 90, who are trained in learning management system. It appears that this is the only course which has been offered to the highest number of respondents. Most of the other courses offered are about the ICT technology not about supporting the learning process.

5.8.4 Skill levels of the research participants

I am aware that for the software resources discussed earlier to be effectively used, the participants should have some skills in using them. Besides seeking information on ICT training, the research sought to know, through question 25 of the questionnaire, the skill levels of respondents in the use of basic ICT facilities and tools. Ability to use these facilities and tools enables them to use ICTs for basic teaching and learning functions. The respondents were given an opportunity to provide reasons for not using the respective products as well.

Table 5.38: Skill levels in using general ICT facilities

ICT Facilities	Skill level					Total
	Expert	Very skilled	Fairly skilled	Not very skilled	Not at all Skilled	
Using the University library website	21	26	24	10	9	90
Spreadsheet (Excel, etc.)	28	28	20	6	8	90
Word processing (Word, etc.)	32	37	13	4	4	90
Presentation software (PowerPoint, etc.)	40	35	8	4	3	90
Graphics software (Photoshop, etc)	23	17	27	17	6	90
Computer maintenance (security, software updates, etc.)	16	22	30	13	9	90
Using internet to effectively and efficiently search for information	31	38	16	3	2	90

In **Table 5.38,** it is assumed that participants with the skill levels 'expert' to 'fairly skilled' will not have problems using the software. The results show that participants were experts in using the university library website, spreadsheet, word processing software, presentation software and the use of the internet to effectively and efficiently search for information.

Table 5.39: Skill levels in software to support the administration

Software to support the administration	**Skill level**					
	Expert	Very skilled	Fairly skilled	Not very skilled	Not at all skilled	**Total**
Database management Systems	9	14	27	14	26	90
Data Warehousing	8	18	22	12	30	90
Enterprise Resource Package (ERP)	12	22	17	19	20	90
Accounting Package	10	22	23	14	21	90
Document Management Software	13	19	20	14	24	90
Programming Software	24	17	12	14	23	90
Planning tools	24	21	14	16	15	90

The information in **Table 5.39** indicates that half of the participants did not respond concerning data warehousing, enterprise resource packages and document management systems and more than a third of them did not respond concerning the accounting package, programming software and planning tools. I included these administrative tools because most of the departments or schools studied were supposed to be models in using ICTs in the respective universities. However, the finding is not surprising because these tools are mostly used by administrative personnel needing specialist software packages. I was motivated to include them because of knowing that some lecturers were also administrators. I was curious to find out whether these managers/lecturers used some of these packages. The information in the table above shows that those participants with skill levels 'expert', 'very skilled' and 'fairly skilled' are less than 50% of the participants.

5.40 Skill levels in software to support teaching and learning

Software to support the administration	Expert	Very skilled	Fairly skilled	Not very skilled	Not at all skilled	**Total**
Students Records Systems	15	22	28	9	16	90
Time Table Management System	14	29	18	13	16	90
Learning Management System (LMS)	9	19	20	14	28	90
Library Management Software	15	19	21	14	21	90
Course Design Software	12	15	16	15	32	90
Library database subscriptions	12	22	24	18	14	90
Statistics Packages	11	18	29	7	25	90
Design Tools	16	14	19	17	24	90

The information indicated in **Table 5.40** presents a scenario where, besides the student records system and the statistics package, more than a third of the participants did not respond to the question concerning skill levels.

The study's findings are that while the lecturers are skilled in general software, their skill levels are much lower in software to support administration (**Table 5.39)** and software to support teaching and learning (**Table 5.40)**. There is a need to increase training in the software to support teaching and learning for them to start using these ICT tools.

5.8.5 Lack of institutional support in the use of required ICTs

A necessary ingredient to the successful utilisation of the hardware, software, infrastructure and content is the availability and reliability of ICT support. The research determined the performance of the ICT support in the respective universities in solving problems referred to by Green and Gilbert (1995) as user support or technical support. According to the authors, the ICT support function is one of the critical functions to the successful implementation and integration of ICT in any institution. Thus, this research gathered data to determine what the respondents think of the respective universities' user support performance.

Table 5.41: ICT support ability to solve problems rating in the Universities

ICT Support Rating	Frequency	Percent
Excellent	13	14
Good	51	57
Poor	18	20
No Response	8	9
Total	**90**	**100**

The results as depicted in **table 5.41** above show that 71% of the respondents believe that the ICT support is excellent or good. This represents an acceptable majority and sufficient to support the installed base of the hardware, software, infrastructure and content access.

Table 5.42 ICT Support staff Training in the Universities

Respondents	Training Availability				
	Yes	No	Don't Know	No Response	Total
Questionnaire	49	21	15	5	90
Interview	4	0	0	2	6
Total	**53**	**21**	**15**	**7**	**96**

The study further wanted to know whether there was training offered for the ICT support staff. The results showed that 53 out of the total 96 respondents agreed that such training was provided. This is slightly above half of the participants. I was aware that some lecturers might not be able to know about training provided to ICT support staff. However, in view of the small populations of all but one of the universities, I felt that the lecturer numbers are small enough to be aware. Nonetheless, I posed the same question to be validated by the managers. This is why there are a few who said they did not know. It is important to have more ICT support training in order to cover all the ICT products offered.

While more than half of the respondents have said they are satisfied with the performance of the ICT support in the studied universities, some respondents have made comments in question 32 of the questionnaire and question 29 of

the interviews regarding user frustration due to non-response or slow response of user ICT support when ICTs do not perform as expected.

5.9 Intrinsic barriers to integrating ICTs in teaching and learning

5.9.1 Lecturers' attitudes and beliefs

This question's objective was to gather information on the attitudes and beliefs of the respondents who are involved in the delivery of the academic products, to determine whether or not these views have any impact on the usage of ICT.

Table 5.43: Respondents' attitudes towards ICTs

#	Attitudes	Views						
		Strongly Agree	Agree	Undecided	Disagree	Strongly Disagree	No response	**Total**
1	ICT could help me in my teaching/learning/research	67	6	2	0	5	10	90
2	The use of ICT improves teaching and learning	67	11	2	1	4	5	90
3	Need additional knowledge and skills in the use ICT in teaching and learning	35	35	4	11	1	4	90
4	ICT takes too long to master and produce too few results to be worthwhile.	5	9	11	31	30	4	90
5	I am at ease with ICT in teaching/learning	29	36	8	5	5	7	90
6	I am eager to promote the use of ICT in teaching/learning	48	27	4	3	4	4	90
7	I feel that ICT is not appropriate in teaching/learning	4	1	4	23	54	4	90
8	I am keen to use ICT in teaching/learning but I have not been trained	17	18	9	24	14	8	90
9	I want to use ICT in teaching/learning but the University does not provide the required products	16	18	13	19	17	7	90
10	ICT priorities are mainly in management and	13	12	10	26	24	5	90

	administration than in teaching and learning							
11	I am interested to use ICT in teaching/learning but do not have time.	8	20	7	31	18	6	90
12	ICT in teaching and learning motivates learners and enhances their learning experience	42	27	5	3	6	7	90
13	I feel lost in Information age	3	2	6	23	48	8	90
14	ICT encourages learners to collaborate with peers and lecturers	42	35	3	2	4	4	90
15	ICT is useful in almost all subject areas	52	26	4	1	3	4	90

The results in **Table 5.43** can help draw the following conclusions:

The first three statements are about the usefulness of ICTs to the respondents. The results show that the majority of the respondents believe that ICTs can help them in their primary functions of teaching and learning and research as well as improving teaching and learning. Therefore, the majority of lecturers believe in ICTs' usefulness.

Statement 4 also is worth noting because the majority of the respondents disagree implying that ICTs do not take long to master and have worthwhile benefits. This is an indication that the respondents believe that they can master ICTs within reasonable time and effort and recognise their benefits.

The two findings above fulfil one of the criteria for acceptance in the Davis et al. (1989) Technology Acceptance Model which states that intention to use ICTs emanates from the belief that the technology is useful and it is easy to use.

I therefore concluded that the majority of lecturers in the studied universities, majority of whom worked in technical and scientific domains, have the right attitudes to accept using ICTs in their academic functions.

Interviewees' opinions on how to describe the contribution of ICT in the enhancement of teaching and learning

I further wanted to find out the interviewees' beliefs regarding the correlation between the use of ICTs and the quality of teaching and learning. It is important to note that all respondents have positive attitudes to the integration of ICTs. They stated that, according to their opinions:

- We cannot live without ICT in the teaching and learning processes; and
- Without ICT in teaching and learning, quality education is unattainable.
- ICT has contributed greatly to the enhancement of teaching and learning.
- ICT has revolutionised the way we teach and learn.
- ICT has made the process of interactive learning, which enriches discussion. ICT contribution in teaching and learning is excellent.
- ICTs have contributed to the efficiency of teaching and learning.

The fourth research question which is:

"*Are the ICTs integrated in the learning process? If not why not?*"

will be responded to in the chapter six when I draw the conclusions from these findings.

SECTION V: ICT RESOURCES USED IN THE IMPLEMENTATION OF PRINCIPLES OF BEST PRACTICE IN HIGHER EDUCATION TEACHING AND LEARNING

The fifth research question was:

"*To what extent are the ICT resources being used in implementing principles of best practice in higher education teaching and learning? If not why not?"*

This section discusses the responses from the questionnaires and interviews providing an insight to this question.

5.10 The use of ICT to support best practice in teaching and learning

The objectives of this research were to determine whether ICT integration has enhanced the teaching and learning process in higher education institutions. Therefore, the information presented in this section was to determine the ways in which ICTs are used in the support of the principles of best practice in teaching and learning in higher education.

Table 5.44 The use of ICTs in best practice in education

Usage Category	Specific Usage	Yes	No	Total
a. Communicating with students for feedback, guidance, etc.	Collaborate with your students in performing their assignments	56	34	90
	Guiding students in their problem-solving projects to discover solutions	50	40	90
	Sending and receiving e-mail	84	6	90
	Lecturer/student communication	69	21	90
b. Accessing resources or making resources available to students	Accessing online training materials, such as videos, computer assisted learning materials	57	33	90
	Accessing internet for information access	80	10	90
	Accessing instructional software	45	45	90
	Accessing a Library System or e-Library databases	48	42	90
	Searching information by topic or key words	78	12	90
c. Supporting academic operations	Learning, teaching and research	79	11	90
	Courses materials preparation	72	18	90
	Classroom course administration	59	31	90
d. Administration	General administration	54	36	90
	Student records management	74	16	90

Table 5.44 presents what the ICT resources in the studied universities are used for, in relation to those teaching and learning tasks that contribute to best practice in higher education. What should be noted is that more than half of the participants claim to use their ICT devices for learning and teaching best practice in higher education.

Table 5.45 below presents the results of question 16 showing the links between best practice in higher education and technology usage discovered during this study.

Table 5.45 Use of ICTs in best practice in education

Best Practices in Higher Education		**Study Findings**		
Principles of best practice	**Positive Impact on teaching & learning**	**General ICT usage**	**Usage frequency**	**Frequency**
1. Frequent student-faculty contact in and out of class	A most important factor in student motivation and involvement	a. Using ICT in communicating with students for feedback, guidance, etc.	a1. Collaborate with your students in performing their assignments	56
			a2. Guiding students in their problem-solving projects to discover solutions	50
4. Giving prompt feedback	Knowing what one knows and doesn't know focuses one's learning		a3. Sending and receiving e-mail	84
6.Communicates High Expectations	ICT communicates high expectations explicitly and efficiently		a4. Lecturer/student communication	69
3. Using active learning techniques	Supports learner-centred learning	b. Accessing resources	b1. Accessing online training materials,	57

		or making resources available to students	such as videos, computer assisted learning materials	
			b2. Accessing internet for information access	80
7.Respecting diverse talents and ways of learning	ICTs can provide for different methods of learning		b3. Accessing instructional software	45
			b4. Accessing a Library System or e-Library databases	48
			b5. Searching information by topic or key words	78
5.Emphasizes Time on Task	ICTs improves time on task for students and faculty members	c. Supporting academic operations	c1. Learning, teaching and research	79
			c2. Courses materials preparation	72
			c3. Classroom course administration	59
2. Develops reciprocity & cooperation among students	This research did not include the study of the learners/students			

Drawn from Chickering, A. W. and Ehrmann, S. C. (1996) and the findings of this study.

5.10.1 ICT products to facilitate communication between lecturers and students

The technology that supports three of the seven principles of best practice in higher education presented above, that is, principles 1, 4 and 6, is also an approach that supports communication between lecturers with their students both in and outside the class. This technology is used for providing feedback, guidance in their studies and the learning expectations.

In response to the question enquiring about the technology being used for this purpose, the majority of participants claimed that they achieve this through sending and receiving e-mails. The majority of participants use other software and other ICT tools facilitating communication between lecturers and students. With regards to ICT tools, such as sending emails, using social media and

internet services, that permit lecturers to collaborate with their students in performing their assignments, these are used by a majority of participants as well. More than half of participants claim to use ICT tools permitting the guiding of students in their problem-solving projects to discover solutions. One might conclude from the data that the majority of the participants in this research actually follow the three principles 1, 4 and 6 of best practice in higher education.

However, when these findings are seen in the light of the discussion in section 5.6.3 on the usage of software, it is realised that the lecturers continue using their traditional methods of teaching. They use common ICT products to support them but this does not have a transformational impact on the learning paradigms. This could be because they do not use ICT-supported learning management tools, such as the Learning Management System, course design systems and accessing podcasts and webcasts.

5.10.2 Accessing or making resources available to students

The technology which supports two of the seven principles of best practices in higher education, 3 and 7, in **Table 5.45** above, includes tools for accessing resources or making resources available to students.

In this category of permitting access to resources, the majority of participants access the internet for information; search information by topic or key words; access online training materials; access a library system or e-library databases; and access instructional software. The findings from this research give the impression that the majority of the participants support the two principles which facilitate the students' access to resources for their own learning, with the exception of the access to library systems.

On the other hand, the discussion in section 5.8.2 on the usage of software revealed that although all the universities studied have installed LMSs, the lecturers do not use computer-supported collaborative learning. Therefore, the lecturers are not fully exploiting learning management tools to make available student-centred learning environments and do not follow Chickering and Ehrmann's (1996) principles 3 and 7 which are "Using active learning

techniques” and “Respecting diverse talents and ways of learning” which are in line with UNESCO (2002).

5.10.3 ICT technology to support academic operations

To support the fifth Chickering and Ehrmann (1996) principle of best practice in higher education, which “*Emphasizes Time on Task,*” lecturers should use ICTs supporting academic operations, such as learning, teaching and research. The outcome of the research indicates that the research participants use ICT technologies to assist them in learning, teaching and research, in course material preparation and in classroom course administration. One might conclude that the majority of research participants’ usage of ICTs is adhering to the fifth principle of best practices. However, as already discussed in section 5.8.2, the products used by the participants are merely standard ICT products to support them in their traditional methods: they do not use ICT-supported learning management tools.

5.11 Conclusion

In Chapter five I have presented the findings from the survey questionnaire and the interviews and related them to the literature presented in Chapter three. The conclusions and recommendations will be presented in Chapter six that follows.

CHAPTER SIX: RESEARCH CONCLUSIONS, RECOMMENDATIONS AND SUMMARY

6.1 Introduction

This chapter presents the research conclusions from the analysis, proposes recommendations to policy makers, HEIs leadership and HEIs ICT Managers, and suggests future research in this community of practice. It covers:

Section I: Research conclusions by research question to highlight the knowledge discovered from the findings of the research;
Section II: Recommendations proposed to enhance ICT integration in the Zambian HEIs;
Section III: Limitations of the Study and recommended future research; and
Section IV: Research Summary and Conclusion

SECTION I RESEARCH CONCLUSIONS

In presenting the conclusions I summarised the findings from the research, following the adapted Czerniewicz and Brown (2005) model (Figure 2) and backed the findings by the literature reviewed and then highlighted the conclusions.

6.2 The ICT investment trends in in Zambian HEIs between 2011 and 2013

The study found that the increase in ICT financial investments has occurred in three ways:

i. ICT Budgets greatly increased within the HEIs;
ii. Increased universal fund allocation, through ZICTA, under the ICT Act 5 of 2009 for the “last mile connectivity;”
iii. Increased through ZAMREN budget, of which the “connecting learning institutions” project was financed.

The study found that the Government and the studied institutions are all committed to increasing investments to integrate ICT in HEIs in accordance with the Government policies.

This discovery mirrors the global trends presented by contemporary researchers in the literature reviewed cited below: -

- The ICT integration in learning process demands increased financial investments (Alexander, 2001; Salmon, 2005; Lai, 2011).
- “Increased financial investments in ICTs” has been identified as one of the enabling factors to ICT integration by Kozma, et al.(1991), Goktas, et al. (2009), and Muhametjanova, et al. (2016).

Therefore, it would be in order to conclude that the Zambian studied HEIs are on the right track by increasing financial investments in order to integrate ICTs in teaching and learning.

However, other researchers, including Green and Gilbert (1995), Sife, et al. (2007), and Olusola, et al. (2011) posit that barriers to ICT integration include underestimation of ICTs costs and insufficiency of real financial investments.

The implication of this assertion means that, if ICTs are not integrated in HEIs, it could be due to the following:

a) misplaced allocation of funding to ICT resources which have minimum impact on ICT integration in teaching and learning processes, which is due to lack of prioritisation in the implementation. Therefore, the need for HEIs ICT implementation plans;
b) The financial investment allocation, though increased, could be insufficient due to possible lack of expertise in estimating ICT costs; and
c) ICT financial budgets are underestimated in the concerned HEIs.

6.3 Availability of social resources to support ICT integration

- At the societal level, the national policy, regulatory and legal frameworks to support ICT integration in HEIs, to guide the implementation of ICTs in HEIs, were found to be in place. In fact, the Zambian national policy makers have adopted, in the National Implementation Framework III of 2010 the three major global policies for adopting ICT in HEIs, recommended by UNESCO-UIS, (2009).

- At the institutional level, all the four universities have their respective ICT strategies. The awareness of the respondents from the institutional management, lecturers and administrative staff, appear to provide a very conducive environment for the promotion of a positive technological view in the selected universities. It can therefore be tentatively concluded from this analysis, that the social resources to support the integration of ICTs in teaching and learning are in place.

- However, the study did not find clear institutional implementation plans to integrate ICT in the classroom. The implication is that although the technology resources on the ICT integration adoption model was prioritised in the strategy, the impact on the teaching and learning process was not prioritised. Such a situation may result in focussing the investments on ICTs that have very little impact on ICT integration in the teaching and learning process.

This discovery in the Zambian HEIs, mirrors the global trends presented by contemporary researchers cited below: -

- Czerniewicz and Brown (2005) cite a clear institutional ICT strategy as an important organisational factor for successful ICT integration.
- Sife et al. (2007), also recommend that a clear ICT institutional policy and strategic planning is key to successful ICT implementation.
- Salmon (2005) advises to differentiate between core and subsidiary learning technologies, where the core include virtual learning environments.

My conclusion is that without clear implementation guidelines, the prioritization of core learning technologies has not been done in the Zambian HEIs, which could lead to misplaced allocation of financial investments.

6.4 Technology resources for ICT integration

6.4.1 Hardware devices

In the area of hardware, the universities in the study claim to have installed sufficient numbers of ICT devices – mainly desktop computers - and these are complemented by the lecturers and the interviewed management providing their own laptops, tablets, and smart phones. This is confirmed by the fact that the universities have sufficient desktops installed.

Besides having sufficient ICT devices, the majority of lecturers actually use the ICT devices available. The research findings show that the university lecturers have devices to permit them to access, transmit and store learning information. All participants use at least one device, most use several. The inadequacy of devices such as overhead projectors and laptops for classroom teaching was mentioned as a hindrance to using ICTs in the classroom.

The study found that the majority of lecturers possess their own laptops which they use anywhere. The most popular device used by lecturers is the laptop followed by the mobile phone. The study found that Zambian academics in the selected universities also own and are using mobile phones for accessing, transmitting and storing information. This finding indicate that the Zambian academics are trending towards using devices that permit them to use ICT resources anytime and anywhere.

The study also found that there was a contradiction, because on one hand the national policies and the universities' strategies call for the use of ICT to provide learning anywhere and anytime to support a variety of modes of distance learning, yet on the other hand the universities' practice is to give lecturers only desktop computers that are not movable from their desks. While the goal of improving the classroom in accordance with standards of ICT-supported teaching is included in the universities' strategies, this is far from being implemented in reality. In most cases, even the lecture rooms do not have the ICT equipment to support teaching and learning in the classroom.

- Sife et al., (2007) asserts that focussing on technology instead of pedagogy motivates lecturers to continue performing their traditional methods of teaching with the support of ICTs instead of integrating ICT in supported learning systems.
- Researchers found that delivery of education has changed because lifelong learning, e-learning and distance learning anytime and anywhere, require the use of ICT supported learning environments, to support asynchronous learning (Dew, 2010), (Olusola and Alaba, 2011) and (Rajasingham, 2011).

The conclusion is that, this change of paradigm in the delivery of education in HEIs demands the use of movable hardware devices such as laptops and mobile devices instead of desktops.

This research confirmed that devices such as overhead projectors, video cameras, photocopiers, printers and scanners are available to support the teaching and learning process in the universities. These ICT tools do not contribute to improving pedagogy (Sife et al., 2007). However smart boards and video conference equipment, which are used in very few places, have a role in collaborative learning.

6.4.2 Software availability and usage

According to the findings on the availability and usage of software, it appears that the studied universities have installed general office software, software to support administration functions and software to support teaching and learning. The results indicate that spreadsheet, word processing, presentation, library database, and graphics software, are being used by the majority of participants, which implies that the software is installed and available to the lecturers. As regards the software to support administrative and support functions, database management systems, accounting packages and programming software are used by 50% or more of the respondents. It appears only two of the eight identified software products to support teaching and learning are used by more than 50% of the lecturers: key software such as the learning management systems, the library management system, course design software and the library database subscription are used by less than 32% of the lecturers.

The study found out that some lecturers advanced irrelevance as a reason for not using certain software, when in actual fact the software concerned is supporting teaching and learning. A combination of unavailability and unawareness of the existence of the software also represents a major reason for non-usage. Therefore, it was deduced that some lecturers were not made aware of the functions of certain software. This state of affairs could imply that even when the software is installed, most of the participants in this study are not aware of the software's availability and its functionality. Therefore, the study concluded that there is a problem of awareness-raising or sensitisation programmes concerning the software functions and their contribution to teaching and learning. In addition, I was surprised to note that lack of training was least often cited as a barrier.

a) Ertmer (1999) classifies the lack of access to appropriate ICT, and in this case, the software supporting teaching and learning, as an extrinsic barrier to usage of ICT in teaching and learning.

b) Besides that, other researchers have cited "Lack of access to or non-availability of appropriate ICT technology for teaching" as a barrier by

Olusola, et al. (2011), Tsai, et al. (2012), Alemu (2015), Chipembele, et al, (2018)

Therefore, the research identified this external barrier to ICT integration, of lack of access to the software, as existing in the studied universities. It was found that the authority, in the domain of learning paradigm change, from teacher-centred to learner-centred, and the related theories, UNESCO (2002), has described how the learning process occur and how ICTs can be integrated to support learning and teaching process. Lack of knowledge on how ICTs can be integrated in learning might imply ignorance of the UNESCO guidelines in the vision and mission of the HEIs. It appears that there is need for familiarisation programmes on UNESCO recommendations and how they can be integrated in the HEIs vision, mission and implementation strategies.

The analysis shows that learning management systems, are used by a minority of the lecturers. HEIs management confirmed that the software to support teaching and learning is available, however it was not used as confirmed by the non-management faculty. It was found that the Technology Acceptance Model (TAM) by Davis et al. (1989) which states that an individual's intention to use a technology is driven by ease of use and perceived usefulness, could not be applied in this case. This is because faculty could not determine ease of use nor perceive usefulness of the software to support teaching and learning, which they did not know of its existence. If the lecturers are not aware of the existence of the software that support pedagogy, it is difficult for them to intend to use it.

Sife et al. (2007) and Mishra and Koehler (2006) explain that knowledge of using ICT does not necessarily mean knowledge in integrating ICTs in pedagogy.

Concerning standard software tools, they are used by the majority of lecturers. Lehtinen (2003) informs us that the built-in features of ICT standard applications tools, can facilitate interaction between the learner and the system, allow demonstration of learning tasks and simulate situations to assist a learner to understand a concept. However, he points out the limitation of the built-in features in standard software tools, and recommends to seek ICT-

supported pedagogy. It appears from the study results that most of the ICT resources in the universities studied are mainly used for manipulating standard software tools to support the communication and offices practices at the expense of the pedagogical ICT support.

Yet Mishra and Koehler (2006), advise that standard software is not meant for education and therefore cannot make teachers expert users of technology for pedagogy.

My conclusions are as follows:

- That funding has been spent in acquiring the software to support teaching and learning and it is mostly available but not necessarily used. This is due to the fact that the lecturers are not aware of the relevance of the software to their practice and its positive impact on the ICT integration. Therefore, the lecturers would have accessed it if they had known about the software availability and if they had been taught the benefit for using it.
- The difference of opinion about availability of software between the lecturers and management, confirms limited awareness by lecturers of the software programmes availability. Most of the non-management faculty is not aware of the existence of some of the software to support learning and teaching, such as the learning management system. This is confirmed further by the fact that some lecturers give “unavailable,” “irrelevance” and “unaware” as the reason for not using the software, while management has confirmed their availability.
- TAM should be used by the Zambian HEI’s as a way to foster and measure the use and acceptance of ICT. Policy makers and HEIs leaders should define what kind of ICT technology needs to be accepted by lecturers in order to integrate ICTs in pedagogy.
- The Zambian HEIs are ICTs focussed instead of technology impacting pedagogy and adopting ICT-supported learning systems (Sife et al., 2007).

6.4.3 Communications infrastructure availability, accessibility and reliability

In the area of communications infrastructure and resources, the universities studied appear to have access to reliable LANs, WANs, internet, email, university websites and other communication facilities. Implying that the studied universities have sufficient and robust communications infrastructures to support the integration of ICTs in teaching and learning.

The exception is that the local area networks are not accessible for most staff outside the campuses. The inaccessibility of the local area network resources from elsewhere limits the lecturer support to the learners to the geographical location of the department and limits the lecturers' and learners' access to the departmental resources required for the learning process. Besides it denies the lecturers to work anytime and anywhere and interact with their students

The confirmation of the majority of the management staff that they support the role of social media in the process of teaching and learning gives some assurance that the relevant communications for social media are also well supported.

6.5 The personnel resources needed for ICT integration in HEIs

6.5.1 Personal innovativeness in ICT technology

Using Agarwal and Prasad (1998) Personal Innovativeness in Information Technology tool (PIIT), the study found that 65% of respondents from the Zambian HEIs are innovators and early adapters. Therefore, the lecturers' innovativeness attitude is conducive to ICT integration. In addition, 5 of the 6 management interviewees are innovators implies that the universities studied are endowed with transformational leadership, which is conducive to ICT integration, according to Sife et al. (2007) and Stensacker et al. (2007).

Researchers like Kozma, et al. (1991), Cubukcuoglu (2013), Alemu, (2015) and Mutanga et al.(2018) have discussed "Faculty's positive attitude towards and interest in technology," as an enabler for ICT integration.

My conclusion is that the universities have the faculty with the right attributes to integrate ICTs and the leadership willing to drive the ICT integration change.

6.5.2 Lecturers ICT training

In terms of ICT training for faculty, the study has found that:

- The trained numbers in ICT are low and the training is not targeted on those courses to support teaching and learning (**Table 5.6**). While the respective university ICT strategy includes ICT training and e-learning as priority areas, there appears to have been no targets set for their attainment due to non-existence of implementation plans. As a result, although ICT training is offered to faculty, it is not targeted to those courses to support teaching and learning and numbers trained are not large enough to have an effective impact on teaching and learning.

- Although the majority of the participants have received ICT training and individual and faculty ICT training is provided by the respective universities, the ICT training provided is about technology, not about using ICTs in pedagogy to support teaching and learning. It is also found that where the relevant ICT training is provided, it does not cover all the participants, as confirmed by some reasons given for not using some software as “untrained,” and some additional comments of the need for more ICT training.

- Although the ICT strategies of the studied universities emphasize ICT training as one of the priority areas, there appears not to have been any attainment targets specified, in terms of the type of training required and also how much should be achieved. The result is that the ICT training provided appears to fall short of the lecturers’ requirements, leaving some lecturers untrained in the use of ICT to support the learning process or pedagogy.

  Further, there appears not to have been sufficient awareness-raising programmes to inform lecturers about the existence of software that supports teaching and learning processes.

6.5.3 Lecturers ICT skills

To summarise the study findings concerning lecturer skills it was found that the lecturers were skilled in general software, but were less skilled in administration software and software to support teaching and learning. Furthermore, from the subjects they taught, I deduced that they were experts in their respective disciplines not in teaching methods nor learning environment organisation. Therefore, they required support in using ICT in the pedagogy.

Sife et al. (2007) highlights the need to develop lecturers' new skills not only in ICT usage but also in instructional design.

Lai (2011) asserts that the limited lecturer knowledge on ICT integration in learning hinders ICT integration.

Mishra and Koehler (2008) in their TPACK model, which was tested by Mutanga et al. (2018), specify the kind of knowledge and skills the lecturers need, to integrate ICT in the learning process. It should include skills in the technology, pedagogy and content. Mishra and Koehler (2006) proposes skills such as creating learning videos, designing learning resources and designing online courses.

Therefore, this study reiterates what was stated above, that lecturers need training in ICTs that support pedagogy such as learning management systems. It is therefore imperative to prepare implementation plans for awareness and training programmes with specific targets and timeframes to ensure implementation.

6.5.4 Lecturers' attitudes and beliefs

- The study found that the majority of the lecturers have positive attitudes about the usefulness of ICTs to their function of lecturing, and they have the right belief about the ease of use of the technologies.

- It was concluded therefore that the participants' attitudes and beliefs are conducive to ICT adoption and do not constitute a barrier to integration.

- The study found, through the review of the lecturers' interests and perceptions towards technology, that the majority of the respondents in the studied universities have the potential to adopt technology is high.

- The study found that majority of lecturers believe in ICT's usefulness to their needs and ICT ease of use, implying that they have the right attitudes to adopt ICT integration

Davis et al. (1989), in the TAM, confirm that these two conditions are necessary conditions for the adoption of ICTs.

Davis and Venkatesh (2000) Technology Acceptance Model 2 (TAM 2), which states that intention to use ICTs is motivated by the belief, in the technology usefulness, its easiness to use and the fact that one's peers approve the technology.

Wu et al. (2016) extrapolated the TAM Model to state that the intention to use ICTs is driven by, besides the technology, ease of use and perceived usefulness, but also the motivation to use ICT.

Lai (2011) cites lack of knowledge about ICT integration in pedagogy as a barrier to using ICTs in the classroom and this leads to lecturers preferring to revert to their traditional teaching methods. This seems to be the case in the Zambian HEIs.

The study also found that some of the ICT training provided is not relevant to the support of pedagogy but is about the technology itself. Sife et al. (2007) identified such a situation focussed on technology as unlikely to impact

pedagogy and does not lead to the adoption of ICT-supported learning systems.

Mishra and Khoeler (2006) TPCK model depict that, for a teacher trained in ICT integration, they have to be taught the respective course content, the pedagogy and the ICT technology to be used to deliver the content.

This explains why my research also found that despite the availability of learning management systems in the respective universities which support pedagogy, the majority continue to use the traditional methods of teaching.

My deduction is that ICT training in the studied universities should be refocused on how to use the ICT to support pedagogy strategic goals. It is also necessary to clearly set implementation goals for ICT training, which can be monitored and evaluated regularly by university leadership. If this happened the profession of a university lecturer would not be only the subject expert, but also the ICT pedagogy integration expert as well. Furthermore, there would be refocussing of financial resource expenditure from the predominantly hardware and networking to ICT to support pedagogy.

6.5.5 ICT Support

i. The ICT technical support has been rated "*excellent*" by 14% of respondents and "*good*" by 51% of the respondents, making a total of 65%. I however noted comments of dissatisfaction with the response turnaround and ability to resolve problems. There is concern about technology knowledge and user support skills, because third of the largest university participants were dissatisfied with User support.
ii. They also raise problems faced by institutions of not being able to estimate real costs of ICT support leading to insufficient service to users of ICTs.

Green and Gilbert (1995) stated the criticality of the function of ICT support to the integration of ICT in any institution.

My conclusion is that there is not enough training for the ICT support staff and there is some dissatisfaction about the effectiveness of the ICT support.

6.5.6 Learning technologist support

The omission of the function of learning or pedagogical technologist to support lecturers in the ICT integration in the teaching and learning process, has negative effects to ICT integration in HEIs. Only one person was identified during the study of four universities.

Ellaway, et al. (2008) and Fox and Summer (2014) have highlighted the critical importance of the function of learning technology in implementing ICT integration in HEIs.

The consequence of this is that universities invest a lot of money in installing ICT technologies to support learning but very few people can exploit the benefits they should provide, resulting in underutilisation of these costly investments.

6.5.7. The awareness and use of ICT integration in HEIs to support principles of best practice

The finding of the study is that the lecturers are aware of the principles of best practice in higher education and they are using whatever ICT tools they are familiar with support these best practices. However, when the conclusions of the ICT integration are linked to this context, it was discovered that most lecturers only use standard software but not software that supports teaching and learning, then it explains why the highest usage is in the use of e-mail to communicate and internet access to search for information. These ICT products are not necessarily designed to support collaborative learning as is the case of social media and learning management systems, unless the pedagogy is designed specifically to use them. It is safe to conclude that about a third of the participants are using ICT-supported collaborative learning, resulting in very low transformation of higher education as discussed by Sife et al. (2007). The implication of very low transformation of higher education implies a low rate of enhancing higher education teaching and learning.

I wish to summarise that, until lecturers start using ICT to support collaborative learning, which supports the new teaching and learning paradigm, the huge

and growing investments in ICT resources will have very little positive impact on higher education teaching and learning.

6.6 Level of ICT integration in Zambian HEIs

To determine the level of ICT integration in the studied universities, I used the conclusions arrived at in the Social, Technology, Personnel and Content resources domains covered in 6.2, 6.3, 6.4, and 6.5 based on the ICT integration model adapted from Czerniewicz and Brown (2005) (**Figure 2)**.

6.6.1 Societal conduciveness to ICT integration

As mentioned in my conclusions, the national policies, the regulatory and the legal frameworks have been consistent in promoting ICT integration in learning and teaching. The financial investments have also greatly increased in terms of institutional budgets, financing the last mile connectivity for HEIs and connection to the broadband networks to improve communications. This suggests that the Zambian Government supports the integration of ICTs in higher education teaching and learning through its policies, regulations, legal frameworks and increased financial allocations to ICT integration.

The four universities studied had structured ICT strategies and that the majority of the lecturers are aware of its existence and they agree that the strategies in the universities support integration of ICTs in teaching and learning. The ICT strategies include the improvement of the learning environment to facilitate ICT integration in the classroom, emphasis on using ICT in teaching and learning, emphasis on training lecturers in using ICTs in the classroom, and encouraging lecturers to train in the LMSs. Therefore, the existence of structured national ICT policies is enabler to the ICT integration in teaching and learning.

Barriers identified include:

a. <u>Lack of systematic approach to ICT implementation</u>:

    i. Comments made about the need for ICT implementation guidelines, which implied a lack of a systematic approach to implementing ICTs in HEIs. There is no clear roadmap for

implementing the ICT integration specified in the HEIs' ICT strategies. The non-existence of implementation guidelines and targets to assist individual lecturers to implement ICTs in the teaching and learning process creates a barrier for ICT integration. In addition, ICT implementation plan facilitates differentiation between core and subsidiary learning ICT technology to permit focussing financial investments.

ii. There is contradiction between policy and implementation that hinders and delays the ICT integration because it affects access to portable ICT tools to transform teaching and learning in HEIs. The universities strategies of only providing desktop computers to participants do not facilitate learning anywhere and anytime and hinders and delays the ICT integration.

6.6.2 Digital Content resources

The study revealed that only internet resources are used by the majority, while a minority use videos, audios, library databases and computer-based assignments, podcasts and webcasts. Computer games are hardly used in the universities.

The barrier identified here is that

i. HEIs access to content is limited. HEIs will not be able to be competitive and maintain their relevance to the society without accessing large reservoirs of information and available electronic sources.

6.6.3 Technology Resources to support ICT integration

b. Lack of access to the appropriate ICT technologies for teaching and learning:

The barriers identified in this domain include

i. Inadequacy of ICT technologies such as overhead projectors and laptops in classrooms teaching does not promote constructivist learning environment.

ii. Having no access to the campus networks, implying no access to universities teaching and learning resources, impedes asynchronous learning and teaching anytime anywhere. It prevents regular communication and feedback between lecturers and learners.

iii. The unawareness of the majority of participants of the existence and functionality of the software that support teaching and learning, falls under the category of lack of access to appropriate ICT technologies.

iv. The majority of participants use the general office software to support traditional teaching paradigms instead of adopting ICT supported learning systems which support transformation to new teaching and learning paradigms.

6.6.4 Personnel Resources to support ICT integration

c. <u>Lack and insufficiency of lecturer ICT training targeted to using ICTs to support pedagogy.</u>

i. Insufficient ICT training because although it is a priority in the HEIs strategies, there are no implementation targets set to be achieved.

ii. Too few lecturers are trained in ICT to support pedagogy and therefore lecturers cannot integrate ICT in teaching and learning in HEIs.

iii. The majority of the ICT training offered to lecturers is about ICT technology not about how to use ICTs to enhance pedagogy.

<u>d</u>) <u>Limited lecturer skill levels in using ICTs to support pedagogy</u>

i. The lecturers' skill levels in using ICT to support pedagogy is very limited resulting in most of the lecturers using ICTs for standard and administrative functions mostly.

e) ICT Support to lecturers

There are two types of ICT support, which are critical to the successful integration of ICT in HEIs: ICT technology support, that is, how to use the technology itself; and how to integrate ICT technology in the pedagogy.

i. The ICT support's inability to resolve some problems and the slow turnaround in resolving participants' problems is a barrier to the integration of ICT in HEIs.

ii. The nonexistence of pedagogical technologist, who are familiar with the use of learning technology in pedagogy, to train and support lecturers in appropriate usage of ICTs in pedagogy in the universities, is a major barrier in integrating ICTs in teaching and learning.

Intrinsic barriers to integrating ICTs in teaching and learning, such as negative beliefs, attitudes and personal innovativeness in ICTs, are found in minority of participants.

6.6.5 Conclusion on the level of ICT integration in the studied universities

Having assessed the four views of ICT integration, that is, the social resources and the content resources, the technology resources, and the personnel resources, and have identified the barriers in each domain, I used Stages of ICT Implementation Cycle adapted from Green and Gilbert's (1995) **(Figure 4)** to determine whether or not ICTs are indeed integrated in the studied universities. On a scale that goes from stage **0** to stage **4**, I concluded that ICT integration in the Zambian universities studied has passed stages **0** and **1**. The HEIs are in stage **2** where the implementing faculty has to be introduced to the appropriate ICT technology available to support learning and be developed and trained to be effective implementors of ICT integration in pedagogy. Stage **3** has not yet reached because there is still need for additional investments to attain a full ICT integration**.** Although capacity is growing, annual investments have not yet stabilised and new functions and roles such as pedagogical

technologists have not yet developed. Zambian HEIs will attain full transformation when it reaches stage **4**.

6.7 The usage of ICT resources in principles of best practice in higher education teaching and learning and its impact on education quality

When lecturers apply the principles of best practice in higher education teaching and learning, it results in enhancing education quality. Application of ICTs in the principles of best practices, further improves quality of education. The majority lecturers indicated that they use ICTs in these best practices. However, I found that less than a third of lectures used ICTs that support pedagogy. It is therefore true that the participants mostly use standard software and their usage of pedagogy-supporting ICTs is low.

In conclusion, although the participants are aware of the principles of the best practice in higher education, the ICTs they are familiar with and which they are using do not support student-centred pedagogy, resulting in a very low transformation of higher education and negligible enhancement of quality of education. This explains why there is still concern about quality of education in higher institutions of learning, despite the rising investments in ICTs in the universities studied.

SECTION II: RESEARCH RECOMMENDATIONS

I am presenting the recommendations to address the barriers highlighted in the conclusions. They will be presented in the order the barriers appear under the resource domains, social, content, technology and personnel. The recommendations are proposed to policy makers, HEIs leaders and HEIs ICT managers.

6.8 ICT financial investments in Zambian HEIs

In view of these conclusions discussed above, I am recommending that financial investments should continue to increase in HEIs. While universities should continue acquiring new ICT technology needed by different departments, upgrade and update the ICT resources as needed, ICT investments should be refocussed in the acquisition of ICT to support pedagogy, recruit learning technologists and reskill faculty in the integrating ICT in pedagogy and encourage the needed transformation in HEIs.

6.9 ICT strategy and development of ICT implementation guidelines:

Since each school or department in the respective universities might be unique in its ICT requirements, I recommend that each organisational unit should, based on the respective university ICT strategy, outline an ICT implementation framework or a set of guidelines unique to their academic discipline to ensure pedagogical ICT support as already presented above. This Implementation Plan should have very specific targets which are monitored at a very high management level.

6.10 Improve availability of technology resources to facilitate integration of ICTs in the learning process

6.10.1 Appropriately equip learning environments to respond to the ICT integration requirements: The most strategic goals in the studied universities are improving the learning environments, such as lecture theatres, lecture rooms and ICT laboratories. The changed demands from the information age learners which is in line with a learner-centred philosophy should enable the learners to collaborate. They should therefore use ICT to support collaborative learning and problem-solving among groups. In addition, the information age

learners prefer ICTs to be used in the learning process and to be a constructive process in which they discover knowledge. Therefore, there is need to equip the facilities appropriately, including multimedia facilities which include video and audio equipment, video conferencing facilities and the installation of smartboards. Some of the proposals also include lecture room reconfiguration to facilitate collaborative and participative learning. Some of the ICT hardware budget could be spent on equipment to upgrade lecture rooms and support the learning process.

6.10.2 Provide appropriate hardware to support ICT strategy: The recommendation is to set aside a portion of that money designated to buy desktops, to go towards supporting lecturers in acquiring mobile devices such as laptops, tablets or smart phones which they use everywhere, including in the classroom, and anytime to support teaching and interaction with their students. Therefore, there is need to change the policy of emphasizing acquisition of desktops to supporting lecturers to acquire movable devices.

6.10.3 Ensure the accessibility of the ICT communications infrastructure from anywhere: If the lecturers are expected to support learners anywhere and anytime, in accordance with the policies and regulatory framework, the lecturers should have access to their university resources at all times. Therefore, I recommend the installation of appropriate network security facilities to permit lecturers to access their university resources without exposing the university infrastructure to external security violations.

6.10.4 Universities should invest, not only in LMS but also in emerging ICT resources that address HEIs' learning challenges: My recommendation is that universities should invest, not only in LMS but also in emerging ICT resources that address HEIs' learning challenges as proposed by Ahalt and Fecho (2015), such as: electronic textbooks; Massive Open Online Courses; and adopt 'flipped classroom' approach; and active learning classrooms.

6.11 Promote ICT supported learning in line with principles of best practice in higher education learning

The study concludes that while the lecturers are aware of the principles of best practice in higher education, their use of ICTs is limited to only the use of standard software but not software that supports teaching and learning. Meanwhile, standard software are not the best tools to make teachers expert users of ICTs for pedagogy. To promote student-centred learning for higher education quality enhancement, lecturers should be taught how to use emerging ICT technologies such as those proposed by Ahalt and Fecho (2015), discussed in 6.10.4, to support principles of best practice in higher education learning.

6.12 Invest more financial resources in improving ICT support within pedagogy

6.12.1 Recruitment and training of learning technologists: The lack of learning technologists in universities is a major omission, and has an adverse impact on the ICT integration in Universities. In view of the assertions by Ellaway et al. (2006) and Fox and Summer (2014) that the learning technologist function is critical to the successful integration of ICTs in HEIs learning process, it is important to introduce the function of learning technologists at the universities, through creating these specialised support staff positions or train staff to become learning technologists to support lecturers in integrating ICTs in pedagogy.

6.12.2 ICT Support Improvements: In terms of ICT support improvement, I recommend to increase ICT support training, not only to improve knowledge in ICT products but especially in using ICT to support pedagogy;

6.13 Invest in ICT lecturer training and ICT skills development

This research found that only a minority of participants possess skills to use software supporting teaching and learning, which is a challenge to the ICT integration in HE teaching and learning. Therefore, there is need for lecturers' skills development in ICT technology to support pedagogy, such as learning management systems and other identified technologies. In order to develop

the required expertise to enable lecturers integrate ICTs in the learning process, I recommend the following:

6.13.1 The universities should conduct ICT products awareness programmes such as the use of ICT in the context of the lecturers' own discipline and practice, especially the technology that supports pedagogy, online course design (linked to IT pedagogical support) and exposure of lecturers to ICT products which support collaborative learning, so that they may discover their usefulness and ease of use. This will motivate them to support the use of ICT in teaching and learning process.

6.13.2 Zambian HEIs are encouraged to adopt Mishra and Koehler (2008) TPACK model of faculty development for ICT integration. Faculty in Zambian HEIs should be skilled not only in the content of the discipling they are expert in but also in the methodology of delivering the content (pedagogy), and the relevant ICT technology. The objective would be to enhance the profession of a university lecturer into not be only the subject expert, but also an expert in the ICT pedagogy integration. This model has been tested in the African context by Mutanga et al. (2018) and was reported positive results in ICT integration.

6.13.3 Each School and/or Department should set training targets for their lecturers and specify the type of ICT training required. It is not only about learning how to use ICT products but have knowledge but methodology of teaching and how to use ICTs that support the new paradigm of teaching and learning for effective impact on the learner outcomes.

6.14 Promote remote content access and local content development and digitization

The minority participants access content through library management systems and electronic library databases and also use the course design software for local content creation in the universities studied. The global trend to digitize libraries discussed in the literature review, the electronic textbooks resource and the fact that the local university libraries find it costly to acquire the latest version of books and other academic literature, it is highly recommended to promote subscriptions and membership to remote content reservoirs and encourage academicians to develop and upload their local content, (course

materials) onto learning management systems. This gives the learner equal opportunity to access knowledge wherever it resides.

SECTION III: LIMITATIONS OF THIS STUDY AND RECOMMENDED FUTURE RESEARCH

6.15 Limitations of this study and recommended future research

At the completion of this research, I have been able to identify some of the limitations of this study, which have arisen from different aspects. It is very important to highlight them to guide future research in this field of ICT integration in higher education.

6.15.1 The omission of the learners' confirmation of the ICT integration

In designing this research, it was decided to exclude the learners' perspective of the impact of ICT integration in their respective institutions. As a practitioner researcher, it was very tempting to extend this research to the learners for validation of how they were impacted by the ICT integration in their learning. This omission was intentional because of the limited time of the study. I would therefore propose future research on how far the learners in the Zambian HEIs have been impacted by ICT integration in their institutions.

6.15.2 Limiting the research methods to questionnaires and interviews

At the time of the research design I thought the collection of data through self-reporting methods of questionnaires and interviews would suffice and the data triangulation would provide the required validity of the data. However, I would have liked to validate some of the results drawn from the responses from the research participants. This is because the findings are drawn from the self-reporting of both the respondents to the questionnaires and the interviewees. Headey (2011) cites four challenges of self-reporting: including the difficulty to test and retest reliability of the responses, the differing definitions (which I would say in another way as differing understanding) of certain ICT terms; bias caused by fears of authorities; and factors caused by the culture (which in this case was the shame or embarrassment of other colleagues or supervisors knowing that the participant was not an ICT user). After analysing the findings, I realised that it would have been of additional benefit to also observe the lecturers' use of ICTs in the classroom. This would have reduced some disadvantages of self-reporting, including validity issues, such as self-

deception and memory. Observation would have given me a greater appreciation of the usage of the ICTs and the actual challenges they face. It would also have given me information on the type of ICTs installed in the classrooms. I therefore recommend that another research study be conducted to provide knowledge regarding the gaps existing in equipping classrooms and propose improvements required to ensure ICT integration. It was not possible to include this aspect in this study because the long distance between the different research sites would have had a negative impact on the research time and financial expenditure.

6.15.3 Importance of electronic content to effective learning outcomes

Another limitation identified for ICT integration in learning is availability of relevant content to both lecturers and learners. This research has not investigated the type of content available to both lecturers and students and how it can be accessed by them. This includes the course material prepared by the lecturers locally and external content, such as, information libraries, Open Education Resources, webcasts, podcasts. All the content prepared by lecturers in universities should be harnessed, digitised and stored on the ICT systems to permit access by other lecturers and students. There is a need to conduct another research study on content creation; especially availability of content in specific disciplines, their storage and access in universities using ICTs. I also propose that it would be beneficial for the universities to find out how much local content in terms of the course materials and research prepared by lecturers is being digitised and is available to the rest of the academic community.

6.15.4 Omission to find out about lecturer knowledge of pedagogy

Another aspect that could have given a complete picture to this research would have been to find out the extent of the lecturer knowledge of pedagogy or teaching methodology in ICTs integration. While the list of courses offered in **Table 5.6** shows the absence of such training, it would have been better to ask a question for each respondent to indicate whether or not they have such knowledge or skill.

SECTION IV: RESEARCH SUMMARY AND CONCLUSION

6.16 Research Summary and conclusion

To conclude the research, the responses to the research questions posed in the introduction chapter of this research are summarised.

In terms of the trend of ICT financial investments between 2011 to 2013, I found that they greatly increased during that period of study. This is the global trend whenever HEIs embark on integrating ICTs in the primary mandate of HEIs. The Zambian HEIs need to continue increasing investments in ICT integration until ICT integration achieves transformation through achieving high levels of effectiveness and efficiency.

Regarding the ICT products installed in the Zambian HEIs, I found that:

- HEIs allocates desktops instead of laptops, that do not support learning anywhere and anytime;
- The HEI networks are not accessible from outside the campus limiting access to university resources and also limiting communications between lecturers and learners;
- The majority of lecture halls and rooms are not equipped to support constructivist mode of learning; and
- Software to support pedagogy, though installed, is not made aware to most participants and therefore is used by minority of participants
- While the HEIs seemed to be familiar with LMS, there was no clear evident of electronic textbooks; Massive Open Online Courses; use of a ‘flipped classroom’ approach; and active learning classrooms.

The academic staff in the Zambian HEIs have attitudes and beliefs conducive to ICT adoption and the level of Personnel Innovativeness in ICT is very high resulting in the majority of them to use the internet and standard office software. However, the majority do not use the ICT to support ICT integration in teaching and learning process. The barriers include unawareness of the existence of the software to support pedagogy, not enough relevant ICT training and not skilled in the ICT integration tools.

On the proposed scale in **Figure 4**, that goes from stage **0** to stage **4**, the HEIs are in stage **2** where the academics have to be trained in ICT integration tools and develop skills in ICT integration pedagogy. The Zambians HEIs need to overcome the barriers identified through continued financial investments, install additional recommended technology to support pedagogy and employ pedagogical technologist to support faculty. Zambian HEIs will realise the expected transformation when full ICT integration is achieved in stage 3.

The standard software does not support student-centred pedagogy and has very little impact on the transformation of higher education, meaning that it has very little impact in enhancing quality of higher education.

A detailed inventory of barriers has been prepared and recommendations proposed to hasten the ICT integration to impact positively on the quality of higher education, have been presented.

This research, the first of its kind in Zambia, is of great value to policy makers, HEIs leadership and all the HEIs academia because it will enable them to make informed decisions in their quest to integrate ICTs in the HEIs learning process. The findings and recommendations of this research will: -

6.16.1 facilitate the domestication of the global goals for ICT integration in the Zambian HEIs

6.16.2 enable the policy makers and HEIs leadership to refocus the priorities of the ICT integration strategies within the respective institutions to gain a positive impact on the learning outcomes.

6.16.3 enable the policy makers, the HEIs leadership and respective Schools and department heads to have a global view of ICT integration, identify the aspects of focus to ensure ICT integration that enhance quality of learning and teaching.

6.16.4 provides enough information for the HEIs leadership to refocus resources to provide financial investments in those areas of ICT resources that have positive impact on teaching and learning outcomes that promote the new teaching and learning paradigms.

6.16.5 open local and international research opportunities in the domain of exploiting ICTs to respond to the challenges that HEIs are confronted with in the changing demands of the new generation of learners.

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Appendix I Ethical Clearance Certificate (UOL VPREC) Approval

UNIVERSITY OF LIVERPOOL | ONLINE PROGRAMMES

Dear Gertrude,

I am pleased to inform you that the EdD. Virtual Programme Research Ethics Committee (VPREC) has approved your application for ethical approval for your study. Details and conditions of the approval can be found below.

Sub-Committee:	EdD. Virtual Programme Research Ethics Committee (VPREC)
Review type:	Expedited
PI:	
School:	Lifelong Learning
Title:	
First Reviewer:	Prof. Morag A. Gray
Second Reviewer:	Dr. Baaska Anderson
Other members of the Committee	Dr. Peter Khan; Dr Lucilla Crosta

Date of Approval: 7th October 2014

The application was APPROVED subject to the following conditions:

Conditions

1	Mandatory	M: All serious adverse events must be reported to the VPREC within 24 hours of their occurrence, via the EdD Thesis Primary Supervisor.

This approval applies for the duration of the research. If it is proposed to extend the duration of the study as specified in the application form, the Sub-Committee should be notified. If it is proposed to make an amendment to the research, you should notify the Sub-Committee by following the Notice of Amendment procedure outlined at http://www.liv.ac.uk/media/livacuk/researchethics/notice%20of%20amendment.doc.

Where your research includes elements that are not conducted in the UK, approval to proceed is further conditional upon a thorough risk assessment of the site and local permission to carry out the research, including, where such a body exists, local research ethics committee approval. No documentation of local permission is required (a) if the researcher will simply be asking organizations to distribute research invitations on the researcher's behalf, or (b) if the researcher is using only public means to identify/contact participants. When medical, educational, or business records are analysed or used to identify potential research participants, the site needs to explicitly approve access to data for research purposes (even if the researcher normally has access to that data to perform his or her job).

Please note that the approval to proceed depends also on research proposal approval.

Kind regards,

Morag Gray

Chair, EdD. VPREC

Appendix II The Revised and Final questionnaire

QUESTIONNAIRE

Research Project Title:

Integrating Information and Communications Technology in the Zambian Universities for the Enhancement of Higher Education Teaching and Learning.

Researcher name and Contacts:

Gertrude Mwangala Akapelwa

Cell Number: +260 977892460 or +260 955892460
E-mail address: gakapelwa@gmail.com

Participants:
Academic Staff (Participation is voluntary)

Rationale for research
The research is to determine the Information and Communications Technology (ICT) resources invested over the last three years in your university, identify the types of ICT resources available, find out what ICTs products are used for in your University administration as well as those dedicated to teaching and learning. The research is identifying any barriers, if any, in the use of ICTs in teaching and learning. It also seeks to obtain data on the available knowledge and skill levels of ICTs in your University.

The important of responding to the questionnaire
Your responses are very necessary because they will help your University leadership in planning the ICT investments and integration in your institution. The results of the study will also inform policy makers regarding how to prioritize ICT investments in universities for enhancement of academic quality.

Duration to complete the questionnaire
This questionnaire will take only 30 minutes of your time to complete.

How and when the questionnaire will be returned
The questionnaire should be completed and returned to the researcher within twenty-four (24) hours after getting it from the researcher. After completion the questionnaire, put it in the provided envelope, which is completely anonymous and give it to your University contact person.

Note: Participant's responses will be treated confidentially by ensuring the respondent anonymity. Participants are not required to write theirs names on this questionnaire nor on the envelope and the University identity will remain anonymous. Furthermore, all paper questionnaires will be kept in lockable cabinets and the software files will only accessed by the researcher using a secret password.

Research Questions:

1. What is your gender? Male ( ) Female ( )

2. How old are you? 18 - 20 years ( ) 20 -30 years ( ) 31-40 years ( )
41-50 years ( ) >50 years ( )

3. What is your role in your University? ……..

4. What discipline are you lecturing? ……..

5. What is your highest academic qualification?

PhD/EdD/Other Doctorate ( ) Masters degree ( ) Undergraduate degree ( )
Postgraduate diploma ( )

6. Does your University have an Information and Communications Technology (E-Learning) strategy?

Yes ( ) No ( ) Don't Know ( )

7. Have you received any training on how to use any information technology? Yes ( ) No ( )

8. If yes, specify all the products you have been trained in

……
……

9. Which of the following best describes you?
I am skeptical of new technologies and use them only when I have to. ( )
I am usually one of the last people I know to use new technologies. ( )
I usually use new technologies when most people I know do. ( )
I like new technologies and use them before most people I know. ( )
I love new technologies and am among the first to experiment with and use them. ( )

10. Has your University School installed the following?

ICT Equipment	**Yes**	**How Many**	**No**	**I do not know**
Servers				
…..Computers(Desktops & Laptops				
Printers				
Smart Boards				
Projectors				
Scanners				
Others (Specify)				

11. Which computer device do you use mainly? (Tick all devices you use)
Desktop computer ( ) Laptop ( ) Tablet ( ) mobile phone ( ) None ( )

12. If you do not use any computer device please explain why

……
……

13. For each computer device you ticked in item 11, under each indicate by ticking where you usually access it.

Desktop computer ( )	**Laptop ( )**	**Tablet ( )**	**mobile phone ( )**
It is mine ( )	It is mine ( )	It is mine ( )	It is mine ( )
Home ( )	Home ( )	Home ( )	Home ( )
Workplace ( )	Workplace ( )	Workplace ( )	Workplace ( )
Campus ( )	Campus ( )	Campus ( )	Campus ( )
Internet cafe ( )	Internet café ( )	Internet café ( )	Internet café ( )
For a friend ( )	For a friend ( )	For a friend ( )	For a friend ( )

14. Do you use mobile devices such as iPads, Smart Phones, tablets, Podcasts, etc for storing, accessing and transmitting course materials?
Yes ( ) **No** ( )

15. For what purpose do you use the computer device(s)? (Tick all that is relevant)

Collaborate with your students in performing their assignments……..….. ( )
Guiding students in their problem solving projects to discover solutions……..….. ( )
Accessing online training materials, such as videos, computer assisted learning materials ( )
Accessing internet for information access…… ( )
Accessing instructional software…….. ( )
Sending and receiving e-mail……... ( )
Learning, teaching and research……... ( )
Lecturer/student communication……. ( )
Courses materials preparation…….. ( )
Classroom course administration……. ( )
Accessing a Library System or e-Library databases…… ( )
Searching information by topic or key words…….. ( )
General administration……. ( )
Student records management…… ( )
Other…… ( ) Specify…… ( )

16. Does the University have a local area network (LAN)? Are the computers connected to each other and have a server within your School?
Yes ( ) No ( ) Do not know ( ).

17. Is your University connected to the outside through a wide area network (WAN)?
Yes ( ) No ( ) Do not know ( ).

18. If so, is it connected through **Leased line ( ) Fibre Optic cables ( ) Satellite ( ) Wireless ( ) Do not know ( ).**

19. Are you able to access your University network from home and/or from anywhere?
Yes ( ) No ( ) Do not know ( )

20. If you have on-campus access to internet, how do you rate its availability?
Always works ( ) Works most times ( ) Works sometimes ( ) Hardly works ( )

21. How do you rate your institution's internet system speed?
Very fast ( ) Average ( ) Slow ( ) Frustrating ( )

22. If you have a dedicated institution's e-mail system, how do you rate its availability?
Always works ( ) Works most times ( ) Works sometimes ( ) Hardly works ( )

23. How do you rate your university's website?
Has all information needed ( ) It is interactive ( ) Not updated regularly ( )

24. During the academic year 2013/2014, how frequently have you used the following Learning, teaching and research tools?

	Often	Sometimes	Rarely	Never
Instant messages				
Educational web-based videos or audios				
Library databases				
Spreadsheets				
Word processing				
Presentation software				
Teleconferencing				
Overhead projector				
Computer based assignments				
Internet for extra teaching/learning materials				
Video camera				
Scanner				
Printer				
Photocopier				
White/blackboard				
Graphic software				
Social media (Facebook, MySpace, Twitter, Blogs, wikis, etc)				
Podcasts or webcasts				
Skype				
Teaching games				

25. What is your skill level for the following?

	Expert	Very skilled	Fairly skilled	Not very skilled	Not at all Skilled
Using the University library website					
Spreadsheet (Excel, etc.)					
Word processing (Word, etc.)					
Presentation software (PowerPoint, etc.)					
Graphics software (Photoshop, etc)					
Computer maintenance (security, software updates, etc.)					
Using internet to effectively and efficiently search for information					

26. Indicate the Software resources available in your University?

Product Description	Yes	No	Don't know	If yes, specify the product Name
Database management Systems				
Data Warehousing				
Enterprise Resource Package (ERP)				
Accounting Package				
Students Records Systems				
Time Table Management System				
Learning Management System (LMS)				
Document Management Software				
Library Management Software				
Course Design Software				
Library database subscriptions				
Statistics Packages				
Design Tools				
Planning tools				
Programming Software				
Others please specify				

27. Do you use the software resources available?

Product Description	Yes	No	If no, why
Database management Systems			
Data Warehousing			
Enterprise Resource Package (ERP)			
Accounting Package			
Students Records Systems			
Time Table Management System			
Learning Management System (LMS)			
Document Management Software			
Library Management Software			
Course Design Software			
Library database subscriptions			
Statistics Packages			
Design Tools			
Planning tools			
Programming Software			
Others please specify			

28. If you use the software what is your skill level?

	Expert	Very skilled	Fairly skilled	Not very skilled	Not at all skilled
Database management Systems					
Data Warehousing					
Enterprise Resource Package (ERP)					
Accounting Package					
Students Records Systems					
Time Table Management System					
Learning Management System (LMS)					
Document Management Software					
Library Management Software					
Course Design Software					
Library database subscriptions					
Statistics Packages					
Design Tools					
Planning tools					
Programming Software					
Others please specify					

29. Please indicate your view regarding the use of information and communications technology in the statements listed below:
SA = Strongly agree, A = Agree, U = Undecided, D = Disagree, SD = Strongly Disagree

No	Statements	SD	D	U	A	SA
1.	Information and Communications Technology could help me in my teaching/learning/research					
2	The use of Information and Communications Technology improves teaching and learning					
3	I need additional knowledge and skills in the use of Information and Communications Technology in teaching and learning					
4	Information and Communications Technology takes too long to master and produce too few results to be worthwhile.					
5	I am at ease with Information and Communications Technology in teaching/learning					
6	I am eager to promote the use of Information and Communications Technology in teaching/learning					
7	I feel that Information and Communications Technology is not appropriate in teaching/learning					
8	I am keen to use Information and Communications Technology in teaching/learning but I have not been trained					
9	I want to use Information and Communications Technology in teaching/learning but the University does not provide the required products					
10	Information and Communications Technology priorities are mainly in management and administration than in teaching and learning					
11	I am interested to use Information and Communications Technology in teaching/learning but do not have time.					
12	Information and Communications Technology in teaching and learning motivates learners and enhances their learning experience					
13	I feel lost in Information age					
14	Information and Communications Technology encourages learners to collaborate with peers and lecturers					
15	Information and Communications Technology is useful in almost all subject areas					

30. How do you rate the information technology support in resolving problems?
Excellent ( ) Good ( ) Poor ( )

31. Do the School provide the following?

Training Type	**Yes**	**No**	**Do not know**
Faculty Training in how to use ICT in teaching			
User of ICTs training			
General ICTs literacy			
ICT Support training			
Instructional technology training			

32. Any additional Comments.

……
……
……

Thank you very much for completing this questionnaire.

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Al-Majeeni, A. O. (2004). *The integration of information and communication technology into basic education schools in Oman: a study of teachers' use of ICT and the influence of related factors* (Doctoral dissertation, University of Hull).

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Appendix III Revised and Final interview protocol

INTERVIEW PROTOCOL

Research Project Title:

Integrating Information and Communications Technology in the Zambian Universities for the Enhancement of Higher Education Teaching and Learning (IICTZU).

Researcher name and Contacts:

Gertrude Mwangala Akapelwa
Cell Number: +260 977892460, E-mail address: gertrude.akapelwa@online.liverpool.ac.uk

Participants:
Administrative and Academic Management (Participation is voluntary)

Rationale for research
The research is to determine the Information and Communications Technology (ICT) resources invested over the last three years in your university, identify the types of ICT resources available, find out what ICTs products are used for in your University administration as well as those dedicated to teaching and learning. The research is identifying any barriers, if any, in the use of ICTs in teaching and learning. It also seeks to obtain data on the available knowledge and skill levels of ICTs in your University.

The importance of responding to the Interview questions
Your responses are very necessary because they will help your University leadership in planning the ICT investments and integration in your institution. The results of the study will also inform policy makers regarding how to prioritize ICT investments in universities for enhancement of academic quality.

Duration to complete the Interview
This interview will take a maximum of an hour of your time to complete.

1. Gender: ..……..

2. Age range: **1**8 - 20 years, 20 -30 years, 31-40 years, 41-50 years or >50 years**?** ……

3. Title: ..…….……..

---

4. May you please tell me whether your University has a strategy on integrating Information technology in teaching and learning?

5. May you briefly explain what the strategy briefly includes?

6. Regarding the ICT resources acquisition decisions, I would like to know the procedure of acquiring ICT resources (computer hardware, software and applications) in your University, especially the decision makers in the process.

7. Are there any advantage and disadvantages of taking ICT acquisition decisions at the levels you mentioned?

8. How much has been invested annually (in Kwacha) in the acquisition of ICT resources during each of the last three years?
2011……. 2012……
2013…….

9. How would you describe the trend of investment in ICT resources over the period 2011, 2012 and 2013? Would you say that it
increased greatly, increased modestly, remained the same, reduced modestly or greatly reduced?

10 May you give me an idea of the populations of this School or Department, that is, the number of students, lecturers, management staff and others?

11. Do you have servers, smart boards, and peripherals, such as, printers, scanners, photocopiers, projectors, cameras and videos?

12. How many desktop computers, laptops or tablets are there in the School/Department?

13. Do you think the desktop, laptops or tablets are sufficient for the lecturers and students?

14. If the computers are not sufficient, what suggestions would you propose to ensure that lecturers and students have access to computer devices?

15. How would you describe yourself in terms of technology adaptation? Would you say that:-

- you are skeptical of new technologies and use them only when you have to;
- usually one of the last people to use new technologies;
- usually use new technologies when most people you know do;
- you like new technologies and use them before most people you know; or
- you love new technologies and you are among the first to experiment with and use them. Do you use personal ICT device?

16. Have you been allocated a desktop computer, laptop or tablet to use for University work?

17.Which type of computer devices do you use most of the time?

18. Have you received any information technology training or you taught yourself how to use computers?

19. Is the University Schools and departments connected locally through a computer network? Is the University network reliable?

20. Does your School/Department have access to the internet? If so how reliable is the connection? How would you rate its speed?

21. Do you know how your School/Department is connected to the rest of the world through Internet? Is it by Leased line, Fibre Optic cables, satellite or by wireless?

22. To what purpose do you use the information and communication technologies, such as your computer device, the internet, the e-mail, your university's website and other sites?

23. What information and communications technology equipment is available to facilitate teaching and learning in the University?

24. Has your university acquired information and communications technology tools that support teaching and learning, such as, open source, authoring tools, a Learning Management System (LMS), Library Management Software or Library database subscription, Course Design Software, Students Records Systems, Time Table Management System, etc.

25. Do you think that social media, such as, Facebook, Skype, Wikis, Twitter, Blogs, etc. have a role to play in the processes of teaching and learning?

26. Are you aware whether mobile devices such as iPads, Smart Phones, tablets, Podcasts, etc are used in your University for storing, accessing and transmitting course materials?

27. In your opinion, how would you describe the contribution of information and communications technology (ICT) to the enhancement of teaching and learning? Would you say it has not contributed to the enhancement of teaching and learning, that is has contributed somewhat or it is contributed greatly to the enhancement of teaching and learning?

28. If ICT has not contributed to the enhancement of teaching and learning, what do you think is the reason for this situation? What in your opinion could be done to enhance the contribution of ICTs in the teaching and learning processes?

29. Do you provide training to your faculty, ICT users, ICT support staff, and do you provide general ICT literacy courses and instructional technology training?

30. Do you have any additional comments?

References:

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