INFORMATION AND COMMUNICATION TECHNOLOGY AND EDUCATIONAL SERVICES MANAGEMENT AT A UGANDAN UNIVERSITY

by

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Declaration

I hereby certify that this material which I now submit for assessment on the programme of study entitled “Information and Communication Technology(ICT) and Educational Services Management at a Ugandan University” leading to the award of Doctor of Education (DEd) is entirely my own work. I have exercised reasonable care to ensure that the work is original and does not, to the best of my knowledge, breach any law of copyright and has not been taken from the work of others save to the extent that such work has been cited and acknowledged within the context of my work.

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Approval

This dissertation has been submitted for examination with our approval as academic supervisors.

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Dedication

I dedicate this work to my wife, Naome and my children, Dickson and Treasure.

Acknowledgements

First and foremost, I would like to thank the Almighty God for enabling me to accomplish this daunting task.

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List of Abbreviations

ABE	Agricultural and BioSystems Engineering
ACOT	Apple Classrooms for Tomorrow
ARIS	Academic Records Information System
AST	Adaptive Structuration Theory
BCom	Bachelor of Commerce
BEd	Bachelor of Education
CBAM	Concerns-Based Adoption Model
CCE	Complex Hall
CD	Compact Disc
CD-ROM	Compact Disc Read-Only Memory
CEDAT	College of Engineering, Design, Art and Technology
CEES	College of Education and External Studies
CGPA	Cumulative Grade Point Average
CHS	College of Health Sciences
CHUSS	College of Humanities and Social Sciences
CML	Computer Managed Learning
CoAES	College of Agricultural and Environmental Sciences
CoBAMS	College of Business and Management Studies
COBERS	Community-Based Education Research and Service
CoCIS	College of Computing and Information Science
CoEES	College of Education and External Studies
CPU	Central Processing Unit
CVI	Content Validity Index
DC	Data Communication
DICTS	Directorate of Information and Communication Technologies

DNS	Domain Name Service
DVG	Deputy Vice-Chancellor
EASLIS	East African School of Library and Information Science
EASSY	East African Submarine System
EBR	Educational Broadcasting Review
E-CaD	Enhanced Curriculum and Delivery Model
EDDS	Electronic Document Delivery Service
EIS	Executive Information Systems
EPSS	Electronic Performance Support Software
FINIS	Financial Information System
GDP	Gross Domestic Product
GIS	Geographical Information System
GPA	Grade Point Average
GPS	Global Positioning System
HEI	Higher Education Institution
HP	Hewlett-Packard
HURIS	Human Resource Information System
IBM	International Business Management
IC	Innovation Configuration
ICT	Information Communication Technology
ICTS	Information and Communication Technologies Support
IS	Information System
ISP	Internet Service Provider
IT	Information Technology
IUIU	Islamic University in Uganda
KMO	Kaiser-Meyer-Olkin

KOHA	Maori-New Zealand for Gift or Donation (Open Source Library System)
LAN	Local Area Network
LCDs	Liquid Crystal Displays
LGs	Local Governments
LIBIS	Library Information System
LoTi	Levels of Technology Implementation
LoU	Levels of Use
MDAs	Ministries, Departments and Agencies
MIS	Management Information System
MoICT	Ugandan Minister of Information and Communication Technology
MP	Multi-Player
MS	Microsoft
NETS	National Educational Technology Standards For Teachers
NISR	UNU Institute of Social Research
NORAD	Norwegian Agency for Development
NUARIK	UNU University Agricultural Research Institute, Kabanyolo
NUBS	UNU University Business School
NUELE	UNU University E-Learning Environment
NUKLA	UNU University Kampala Network
ODeL	Open and Distance e-Learning
PCA	Principal Component Analysis
PDA	Personal Digital Assistant
SCORM	Shareable Content Object Reference Model
SDL	Self-Directed Learning
SIDA	Swedish International Corporation Agency

SoC	Stage of Concern
SoL	School of Law
SPIDER	Swedish Programme for ICT in Developing Regions
SPSS	Statistical Package for Social Scientists
TAM	Technology Acceptance Model
TMM	Technology Maturity Model
UNESCO	The United Nations Educational, Scientific and Cultural Organisation
UNIDO	United Nations Industrial Development Organization
UNISA	University of South Africa
UPE	Universal Primary Education
URL	Universal Resource Locators
USAID	The United States Agency for International Development
USE	Universal Secondary Education
WAN	Wireless Area Network

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ABSTRACT

This thesis focuses explicitly on the use of Information and Communication Technology (ICT) as a strategy for delivering effective management of educational services in a cross-section of educational institutions, inclusive of universities. University of Uganda (UNU)[1], in Uganda, is taken as a case study where ICT was introduced with the primary aim of improving effectiveness in the delivery of educational services. ICT has become a tool of great importance in today's business in all spheres of life globally. From commerce to aeronautics, medicine to education, the daily use of ICT is vital to the success of the business. In the area of higher education management, ICT use is of central significance as universities of the contemporary world cannot afford to ignore the role of that ICT plays in the running of their institutions as a business and, as such, need to ensure they are not left behind by the developments. Therefore, as a matter of necessity, the universities are required to embrace ICT adoption in teaching/learning and administrative activities. This study discusses the concept of ICT, perceptions of stakeholders in the effectiveness of ICT adoption, educational services management and ICT and strategies for effective ICT use in educational services management.

[1] I make direct reference to a university in Uganda, however, for ethical considerations, use the pseudonym, University of Uganda (UNU).

CHAPTER 1
INTRODUCTION

1.1 INTRODUCTION

The purpose of this study was to analyse the contribution of Information and Communication Technology (ICT) to the effectiveness of the management of educational services at UNU University (pseudonym). This chapter presents the background to the study, problem statement, the rationale of the study, the aim of the study, specific objectives, and research questions, significance of the study as well as the limitations of the study.

1.2 BACKGROUND

Information and Communication Technology (ICT) refers to technological tools and resources used to communicate and to create, disseminate, store and manage information (Blurton, 1999). As Information and Communication Technology (ICT) continues to infiltrate every aspect of human life globally, its contribution becomes a subject of concern, predominantly when the problem-situation it is intended to address is not solved as expected. The concern becomes even more critical to educationists when the problem-situation is in the education sector generally (MacCallum, 2010; Yates 2001) and in the provision of university education in particular (Hong & Songan, 2011; Odey, 2009).

ICT in the contemporary world is used to network information technology devices such as personal computers with communication technologies such as telephones and their telecommunication networks. Scholars in the area of ICT such as Chee (2006); Kirimi (2014), Osakwe (2013) and Oviawe and Oshio (2011) define ICTs as a range of electronic technologies which are flexible, adaptable, enabling and capable of transforming organisations and redefining social relations. This transformation can also occur through these technologies in the context of a higher learning institution like a university. Personal computers and laptops, with e-mail and the Internet, provide the best example. Several modes of technology emerge every day, and

there is a strong relationship between the new technologies and what has been in the traditional media (Chee, 2006; Kirimi, 2014; Osakwe, 2013; Oviawe and Oshio, 2011). Information and Communication Technology (ICT) has infiltrated all spheres of society in different areas. WhatsApp, Instagram, fax, GPS (Global Positioning Systems), instant messaging, digital television, video-conferencing, digital radio, e-mail, broadband, network (wired and wireless mobile phones) are examples of ICT commonly used today. Other definitions of ICT are technologies installed to enhance the capture, storage, transfer, and usage of information needed. ICT has made remarkable contributions in several spheres of life from Business, Engineering, Medicine to Education and Educational Management in particular.

Scholars in the area of educational services management view ICT from different theoretical, conceptual, methodological and contextual perspectives. Their perception of the concept entails functional dimensions, processes and activities (Aguti & Fraser, 2006; Akubuilo, 2007; Amenumey, 2007; Darlan & Anani, 2006 Kasenene, 2012; Nabayego, 2011; Matovu, 2009). Several studies approach the concept of ICT from a general perspective, describing it as a process involving the dimensions of planning, implementation, and control of educational programmes (Amenumey, 2007; Duncan-Adanusah, 2009; Kreysing, 2002; Muyimbwa, 2004; Muyingo, 2004; Tam Wai-Ming, 2008).

The focus of this study is educational services management at UNU University. According to Gani (2013), ICT has made a significant contribution to the communication and consultation between students and higher education institution staff making it possible for students to contact their lecturers without necessarily meeting face-to-face. Besides enabling the completion of research projects, which are a partial requirement for degree awards, whole academic programmes leading to the award of Master's and Doctoral degrees have been enabled courtesy of the adoption of technology in the educational arena. Scardamalia and Bereiter (2003) report that students do not only use ICT to produce objects for display of information but use it to create knowledge. With ICT, students produce interpretations, histories, critiques, theories, models, proofs, problem formulations, among other scholarly works. ICT enables the creation of these conceptual tools to make sense of the

world. It, therefore, follows that ICT is highly relevant because of the varied roles it can play in supporting the process of continued knowledge advancement such as in educational services management (Bereiter & Scardamalia, 2006).

In Uganda, ICT continues to be adopted for various business and other purposes, one of which is to serve as a management enhancement tool for ensuring that the country's *Vision 2025* is efficiently and effectively pursued in all sectors of the economy (Ministry of Works, Housing & Communications, 2003). In this vision, education is envisaged as a sector responsible for unlocking and developing the human capacity needed to accelerate Uganda's socio-economic, cultural, moral and technological transformation (Ministry of Education & Sports, 2012). Education is mainly expected to contribute to the skilled capacity needed to realise Uganda's main aspirations, which include job creation, poverty alleviation, disease prevention, and improved quality of life (Ministry of Finance, Planning & Economic Development, 2012). In 1996, the Government of the Republic of Uganda introduced Universal Primary Education (UPE) and the Universal Secondary Education (USE) in 2007 in an attempt to raise the literacy and numeracy levels of the population and to prepare them for productive adult lives. As such, to facilitate the effective management of Education, ICT usage has been introduced (Farrell, 2007; Ministry of Education & Sports, 2012).

1.2.1 Background to the Institution

UNU University, where this study was conducted, is one of the public universities in Uganda that has introduced ICT in the management of its educational services (Aguti & Fraser, 2006; Baryamureeba, 2010; Kasenene, 2012; Kayongo, 2007; Matovu, 2009; Muyimbwa, 2004; Muyingo, 2004;Nabwire, 2008; Nabayego, 2011). UNU University is the oldest university in the East African region, which comprises the following countries: Burundi, Kenya, Tanzania, Rwanda and Uganda. The University started as a technical school in 1922 (Kasozi, 2003) and has since developed into one of the largest universities and centres of research in Eastern and Central Africa (Baryamureeba, 2010).

The University previously offered the curriculum of the University of London as Uganda was a British Protectorate between 1894 and 1962. It later became a University College then the University of East Africa and eventually an independent university. UNU University remained the only university in Uganda until 1988 when the Islamic University in Uganda (IUIU) was opened (Ssengendo, 2012). UNU University has 20 faculties, institutes, and schools grouped into eight colleges that design and offer different day, evening and external educational programmes to more than 30,000 privately and government-sponsored undergraduates and 3,000 privately sponsored postgraduates (Tabaire & Okao, 2010). The day programmes start at 7.00 or 8.00 a.m., with the evening programmes starting at 5.00 p.m. and ending at 10.00 p.m. The midnight programme, which starts at midnight and runs to 6.00 a.m. is a reserve of the College of Computing and Information Science (CoCIS). The University also runs the weekend programmes on both Saturdays and Sunday. Finally yet importantly, are the distance education programmes which are run by the College of Education and External Studies (CoEES) and College of Business and Management Studies (CoBAMS) for Bachelor of Education (BEd) and Bachelor of Commerce (BCom) respectively. In these two programmes, the students primarily study at home or their places of work using modules developed from their programmes, only going to university campuses or study centres periodically for face-to-face sessions or to sit examinations.

The designed programmes cover various educational disciplines in Arts, Business Administration, Commerce, Economics and Statistics, Education, Humanities (Social Sciences), Science (Natural Sciences), Sports, Technology, Medicine, and others (Kasenene, 2011). This University fondly referred to as the Ivory Tower, the Harvard of Africa, developed into a revered institution of higher education, a respected centre of academic excellence (Kasozi, 2003), where the management of its educational services was effective (Baryamureeba, 2007). The University stakeholders were highly satisfied with the educational services it provided, evidenced as students met stakeholder expectations when graduating with the productive, competitive, and employable competencies needed in Uganda and beyond.

However, the situation started changing from the onset of the 1970s. The University was plagued by the misrule meted out to the country where insecurity of the lecturers and indeed the academic elite of the country became the target of the political regime. Many senior academic staff left the country, not only for better remuneration but also for personal security. One of the Vice Chancellors of the University was murdered at that time. The regime, in an attempt to stem the severe shortage of skilled workforce, imported teaching staff from Asian countries but their capability to effectively handle the academic tasks was inadequate (Kasenene, 2012). The hitherto acclaimed centre of academic excellence began to degenerate (Muyimbwa, 2004). The manual management of the university's educational services deteriorated as a result of the general macro-economic mismanagement and embezzlement of public funds that hit Uganda's economy from 1971 to 1985 (Kasozi, 2003). The country did not recover from the effect of political dictatorship until 1986 when the killings and wars had largely lessened. The decline of the University was exacerbated by extremely inadequate government subventions and weak internal management practices (Baryamureeba, 2007; Muyimbwa, 2004), constraints which characterised the University to the close of the 1980s (Keirungi, 2006).

In the early 1990s, the University began improving financially as a result of macro-economic recovery and structural adjustment policies that introduced economic liberalisation in Uganda generally, and in higher education in particular (Lejeun, 2005; Muyingo, 2004). Economic liberalisation ushered in the private sponsorship scheme that boosted UNU University's financial capacity (Kayongo, 2007). Nevertheless, the scheme led to skyrocketing enrolment, which had a severe effect on the university's manual, educational service management practices (Muyimbwa, 2004). Increased enrolments consequently led to work overload-putting pressure on lecturers, with the demoralisation of staff being the outcome (Ndagire, 2011). Increased enrolment resulting in some 200 students per class, which was four times the number recommended by professional teachers as suitable class size (Buzindadde, 2005), overstretched the University's physical, educational capacity (Nantagya, 2010).

The University, in the spirit of liberalisation, went on to introduce evening and weekend classes to cater to the working groups in Kampala; the capital city. This trend in the higher education raised fears that Uganda was again losing its competitive edge in the region due to the inferior quality of its higher education (Ssengendo, 2012). Emphasis is on the importance of library services in enhancing educational services particularly student learning is made by several scholars among them (Layzell, 2003; Luyiga, 2011; Musiime, 1995; Nanteza, 2000; Nakabuye, 1996; Ndawula, 1995). However, with increased enrolment, additional programmes, library facilities were so overstretched that many students failed to get seats and reading tables in the libraries, thereby resorting to reading under tree shades in compounds (Nantagya, 2010). The above constraints, coupled with poor staff remuneration (Kasenene, 2011; Ndagire, 2011), prompted lecturers to take on private research projects and consultancies to make ends meet (Kayongo, 2007; Nantagya, 2010). Others over-stretched themselves by taking on teaching in private universities and secondary schools to earn a little more money. The consequence of this action was that many lecturers became unreliable and unresponsive to student learning needs (Nabwire, 2008).

The victims of this scenario were the students who needed much guidance with their research projects, yet the supervisors had limited time to attend to them. Consequently, incompleted projects meant students were unable to graduate within the stipulated period. Many dropped out of programmes altogether, particularly the postgraduate programmes. As a result, the management of educational services could no longer assure students that they would learn effectively, and this made students dissatisfied (Nantagya, 2010). The combined discontent of the lecturers and students was expressed in a series of staff and student strikes that took place intermittently in the 1990s and 2000s (Nabwire, 2008). Solutions to such problem trends in institutions of higher learning, such as UNU University, are suggested by authors such as Adepiju (2008); Duncan-Adanusah (2009); Lewin (2009); Okebukola (2006); Patton (2010) and Shulha, Caruthers, and Hopson (2010). Resolutions included transparency, training of staff, improved internal management, development of student and staff code of conduct, and adoption of ICT in teaching, supervision and close monitoring of staff and students, among others.

In the face of the mentioned strikes, some of which led to temporary closure of UNU University, the top administration started improvising strategies to offset the constraints and revitalise management of the University's educational services. One of the devised strategies focused on equipping the university with modern, effective and efficient educational service management inputs (Musaazi, 2006); Tabaire & Okao, 2010). Information and Communication Technology (ICT) was introduced as one such input (Matovu, 2009) as ICT is known to be a resource whose adoption tends to translate into significant improvements in educational services management (Ajayi, 2001; Madu, 2004; Odey, 2009). The introduction of ICT at UNU University was thus intended to invigorate the institution as a centre of academic excellence, capable of fully developing student talent in addition to empowering them with the needed high-level knowledge and skills in an efficient manner (Baryamureeba, 2010).

1.2.2 The Introduction of Information Communication Technology

UNU University introduced ICT in 1997, with the installation of NUKLA (UNU University Kampala Network), a donor-funded project that unfortunately collapsed soon after its installation due to shoddy quality and use of outdated equipment (Matovu, 2009). NUKLA was then replaced by private Internet Service Providers (ISPs) (Nakanyike & Nansozi, 2003). However, no sooner had the ISPs been contracted than they were abandoned as they were too expensive for the University to afford (Baryamureeba, 2010). After failing with the ISPs, UNU University installed a relatively efficient ICT system in 1998, pioneered by the Faculty of Law. The Department of Forestry followed in 1999 using funding donated by the Norwegian Agency for Development (NORAD) (Baryamureeba, 2007).

ICT became an integral part of managing educational services at UNU University in the early 2000s (Tusubira & Mulira, 2004), after developing the 2000 ICT Policy and Master Plan. The primary purpose was to increase ICT capacity and utilisation within a university-wide system and in so doing, improve, and make the management of educational services efficient in all faculties (Tusubira, 2005a; Tusubira & Mulira, 2004). ICT was fully embraced in that the University established the Faculty of

Computer Science not only to ensure that the system was adequately working but also offer ICT education as well (Baryamureeba, 2010).

1.3 PROBLEM STATEMENT

The university-wide access and utilisation of ICT are vital in minimising manual labour by automating most of the work involved in the management of educational services (MacCallum, 2010). For instance, lecturers can use appropriate ICT tools to automate the designing of educational programmes relevant to meeting stakeholder expectations, to electronically deliver the designed programme content to students, and to evaluate students by electronic means (Baryamureeba, 2010; Kasenene, 2011, 2012). In effect, this means that ICT was implemented to make educational services management effective and efficient.

Designing relevant educational programmes implies enabling the University to provide educational services that effectively meet student and other stakeholder expectations of university education (Baryamureeba, 2010; Curtain, 2004; Eggleston, Jensen & Zeckhauser, 2002). ICT-supported delivery of the prepared programme content increases the effectiveness of delivering the content to students since it implies that the need for physical lecturer-student academic interaction is minimised by replacing it with efficient automated interaction enabled by ICT tools (Farrell, 2007). Also, ICT-supported evaluation is efficient and minimises manual evaluation of students (Odey, 2009).

Therefore, the adoption and implementation of ICT at UNU University would help decrease lecturers' work overload resulting from excessive class sizes. In addition, students could also use appropriate ICT tools to effectively facilitate, by electronic means, their self-directed learning such as private reading, revision and further desk research instead of converging in one physical library building to access needed library services manually (Aguti & Fraser, 2006; Akinsende, 2002; Ajayi, 2001; Itohowo, 2005; Madu, 2004). The adoption of ICT at UNU University would therefore help do away with overstretched physical library facilities. In general, the adoption of ICT is aimed at the effective management of educational services and meeting

stakeholder expectations. Besides enhancing the teaching and learning or student learning, ICT would improve the management of the University as a whole. According to the UNU University ICT Policy 2005-2009, the adoption of ICT was to establish University-wide access to and utilisation of ICT to enhance the position of UNU University as a centre of academic excellence (UNU University ICT Policy, 2005-2009), and it could also contribute to sustainable societal development (Baryamureeba, 2007).

It is now over a decade since ICT was introduced at UNU University. However, management of educational services is still ineffective, being marred by the very problems that ICT was adopted to address. The designed educational programmes do not help transform students into graduates who can meet stakeholder expectations. Most of the graduates from UNU University fail to become productively self-employed, to find employment from potential employers, and to be as useful to society as expected (Nabayego, 2011). As a result, Uganda now reports a graduate unemployment rate of over 80 percent (Nabayego, 2011).

Besides, the delivery of the designed programme content continues to be mainly manual and mostly dependent on the physical labour of lecturers who continue to be overloaded and ineffective because they are unable to complete their assigned workloads (Kasenene, 2012; Ndagire, 2011). Students are still discontented with the teaching and learning process, reporting absenteeism, unreliability and unresponsiveness to their learning and research supervision needs (Abaasa, 2005; Nabwire, 2008; Nantagya, 2010; Neema-Abooki, 2004). Students continue learning in crowded environments in both lecture rooms and library facilities (Kasenene, 2012). The University Management, inclusive of the Vice-Chancellor, the Deputy Vice-Chancellors (Academic Affairs and Finance and Administration), the University Secretary, the Bursar, the Academic Registrar,the Librarian and the Dean of Students at the university, have indicated their aspirations for more utilisation of ICT in their work than currently (Ssengendo, 2012). This whole scenario questions the role of ICT in enhancing the effectiveness of educational services management at UNU University. It, therefore, culminated in the need to conduct this study. In light of this problem statement, the following two main research questions were formulated:

1. What is the nature of ICT adopted at UNU University?
2. What role does ICT play in enhancing the effectiveness of educational services management at UNU University?

1.4 RATIONALE OF THE STUDY

The study analysed the contribution of ICT to the effectiveness of the management of educational services at UNU University. ICT refers to all hardware and software tools that electronically facilitate the creation, processing, storage, transmission, retrieval and utilisation of information as and when it is needed (Baryamureeba, 2010, Curtain, 2004; Eggleston *et al.,* 2002). This information tends to be found in different forms but includes all forms needed in the management of educational services (MacCallum, 2010). At the university level, management of educational services refers to a process that involves the designing of educational programmes needed to develop the human capacity required to meet societal development aspirations, delivery of the designed programme content to students, supervision of teaching and learning, providing library and student support services and other administrative services,including the facilitation of self-directed learning, and evaluation of academic performance (Nabayego, 2011).

ICT is introduced in the management of educational services as an innovative intervention expected to add the desired value to educational quality management (Ajayi, 2001; Farrell, 2007; Hinostraza, Guzmán & Isaacs, 2002; Neema-Abooki, 2004). The rationale for adopting ICT is well articulated by the Adaptive Structuration Theory (AST) selected to inform the conceptualisation of this study. According to Matovu (2009), AST advances a view that ICT is introduced in organisations with the optimism that it will change the management of their structural functioning as well as the underlying human need for better results.

Although the rationale for the adoption of AST is based on anticipation for better results, it implies that ICT is introduced to ensure that the management of educational services leads to desired ends. That is to say that ICT is adopted to facilitate the conduct of each of the management processes mentioned above in

such a way that it translates into the very educational services expected by students. Their graduate expectations imply that they are knowledgeable, skilled and productive enough to meet not only their self-employment and employability expectations but also those of their sponsors, potential employers and the country in general (Aguti & Fraser, 2006; Baryamureeba, 2007, MacCallum, 2010; Obot, Kintu & Elder, 2005; Odey, 2009;). Student learning, therefore, becomes the focus with the implementation of ICT in educational services management.

Thus, when a university adopts ICT in the management of its educational services but it continues to provide instructional and learning services that do not meet the expectations mentioned above, questioning the role of the introduced ICT becomes inevitable (MacCallum, 2010). The situation at UNU University is not any different (Kasenene, 2011, 2012; Matovu, 2009). UNU University is Uganda's most developed university regarding physical, educational infrastructure and intellectual capacity (Kasenene, 2012) and therefore it is expected to play a leading role as a centre of academic excellence that can effectively manage educational services required to develop the high-level workforce needed to propel sustainable societal development in Uganda and the world at large (Tabaire & Okao, 2010).

ICT was adopted by UNU University in the early 2000s to assist in realising this very end (UNU University ICT Policy, 2005-2009; Nakanyike & Nansozi, 2003; Tabaire & Okao, 2010). Nevertheless, not much has been achieved. UNU University's educational services management remains marred with many of the problems that the top administration sought to address through the adoption of ICT (Abaasa, 2005; Kasenene, 2012; Nantagya, 2010). This casts doubt on the role of ICT in enhancing the effectiveness of educational services management particularly student learning at UNU University.

1.5 BROAD AIM OF THE STUDY

The broad aim of the study was to analyse the contribution of ICT to the effectiveness of the management of educational services at UNU University.

The specific objectives were as follows:

1. To explore how UNU University has provided access to ICT and facilitated the management of educational services through ICT adoption.
2. To understand the perceptions and experiences of educational service managers on the effectiveness regarding the implementation of ICT at UNU University.
3. To explain how ICT adoption has improved management and student learning at UNU University.
4. To propose ways in which ICT can be used to improve educational services management at UNU University.

1.6 SPECIFIC RESEARCH QUESTIONS

The broad research question focused on understanding the nature of ICT adopted at UNU University and the role it plays in enhancing the effectiveness of educational services management. The two main research questions were approached by answering the following specific research questions:

1. What is the nature of ICT adopted at UNU University and to what extent has it facilitated the management of educational services?
2. How do educational service managers perceive and experience the effectiveness regarding the implementation of ICT at UNU University?
3. How has ICT adoption improved management and student learning at UNU University?
4. How can ICT be used to improve the management of educational services at UNU University?

1.7 SIGNIFICANCE OF THE STUDY

It is hoped that the study could be of interest to policymakers at both international and national levels in the designing of ICT policies for government ministries, particularly for the Ministry of ICT and Ministry of Education. Countries will benefit

from the lessons learnt on the contribution of ICT to the effectiveness of the management of educational services at UNU University. Curriculum development experts will also benefit from the study by adopting different ICT components for the enhancement of academic and educational services management.

The study can also be used by the Ministry of Education and Sports as a case study for appreciating the role that ICT plays in university education. This ministry can use the recommendations of the study to forge the way forward as far as this role is concerned. Other universities can also use the study to appreciate how ICT can be introduced and utilised most effectively as far as educational services management is concerned. This can be especially so since universities are currently experiencing the upsurge in student numbers but with limited facilities, which will necessitate a move to adoption of technologies in teaching, learning and even administration in many other universities in the country and the African continent.

The study will enhance the position of UNU University as a centre of academic excellence internationally and at Sub-Saharan Africa level. The University is expected to benefit immensely from ICT through effective management of educational services. This is especially so after the adoption of the study findings, conclusion and recommendations.

The study can also be of help to academicians and researchers interested in further research about the role of ICT in the management of educational services particularly student learning and university management as a whole. The findings can also be used to enrich the theoretical and conceptual relationship between ICT and educational services management, particularly student learning.

1.8 LIMITATIONS OF THE STUDY

The study covers one university, implying that its findings may be limited regarding statistical generalisation. What is happening at UNU University may not necessarily apply to other universities and educational institutions in Uganda and beyond. The fact that UNU University does not keep records of its students after graduation

implies that it is difficult to cover the views of the stakeholders outside UNU University. This has limited the study regarding covering a wide range of stakeholder views on the effectiveness of educational services management, particularly student learning at UNU University as far as meeting stakeholder expectations is concerned. Difficulty in accessing information on student numbers from the colleges and departments was also a limitation of the study.

Many factors affect the management of educational services at a university like UNU University. These include, among others, lecturer motivation and commitment, student cooperation and willingness to use the services as expected, the financing of the University and top management support. All the factors will, however, not be studied in this research. Instead it concentrated on the nature of ICT and how it contributes to the management of educational services, institutional management and student learning at UNU University.

1.9 OVERVIEW OF THE THESIS

In Chapter One, the thesis presents the background to the study, problem statement, the rationale of the study, broad aim of the study, specific objectives, research questions, significance of the study as well as the limitations of the study.

Chapter Two is structured in the following manner and includes the introduction, theoretical perspectives, theoretical framework of the study, a review of the literature on the study variables, conceptual framework, and conclusion.

Chapter Three starts with an introduction followed by research design, study design, sample population, sampling strategy, data collection methods and instruments, data entry and analysis, methodological norms and rigour measures as well as the ethical considerations.

Chapter Four shows the presentation and discussion of quantitative data. It particularly presents the response rate, background characteristics of the respondents, factor analysis, ICT tools installed and accessed at UNU University ,

applications to manage educational services, perceptions of respondents on ICT access and utilisation, utilisation of ICT hardware and software in delivery of educational services in terms of university management and student learning, correlation analysis, multiple linear regression, challenges of ICT use at UNU University as well as the improvement strategies for ICT usage at UNU University .

Chapter Five is the presentation of qualitative data findings on the following thematic areas and includes the provision of access to ICT and facilitation of educational services management, perceptions and experiences of educational services managers on the effectiveness of ICT, improvement of university management through ICT adoption, and improvement of student learning through ICT adoption. The chapter further presents the theoretical interpretations of the research findings and conclusion.

Chapter Six, which is also the final chapter, comprises the recommendations and conclusion. The components of Chapter six include the summary of results and findings, recommendations, the scholarly contribution of the study to theory, policy, practice, literature, methodology and conclusion.

1.10 CONCLUSION

This chapter has covered the introduction, background to the study and problem statement. The rationale, broad aim, key research questions and specific research questions of the study are also discussed. Lastly, it highlights the benefits of the study, its limitations and provides an overview of the entire thesis. The following chapter deals with the literature review of this thesis.

CHAPTER 2
LITERATURE REVIEW

2.1 INTRODUCTION

The general rationale, conceptualisation, justification, and importance of the study were presented in Chapter One. This chapter presents a review of literature relevant to the study. The chapter is organised in five sections. The first section presents an introduction to the chapter, after that a review of the theoretical perspectives (2.2), one of which is selected to develop the theoretical framework of this study, presented in the third section (2.3). The fourth section (2.4) provides literature relevant to the variables of the study as derived directly from its objectives presented in Chapter One. The fifth section (2.5) provides literature on the effect of ICT on the effectiveness of managing educational services, while section 2.6 discusses strategies for making ICT effective in services management. The final section (2.7) presents the conceptual framework of the study including the diagrammatic representation of the conceptual framework of the study and its explanation. The last section of the chapter provides the conclusion. The literature is cited from relevant printed and online scholarly journals, papers, articles, dissertations, theses and other scholarly manuscripts. It is cited in a manner that highlights the gaps, which this study was intended to fill.

2.2 THEORETICAL PERSPECTIVES

Various studies cite different theoretical perspectives to explain the rationale of adopting technology as a management enhancement tool at a community level (Rogers 1962), organisational level (Stones, 2005) and individual levels (Meister & Compeau, 2002). One of these perspectives is the Adaptive Structuration Theory (AST) (Stones, 2005) selected to provide the theoretical foundation of this study. Others include the diffusion theory of adoption (Rogers, 1962), technology acceptance theory (Davis, Bagozzi & Warshaw, 1989), the theory of infusion (Meister & Compeau, 2002) and substitution (Norton & Bass, 1987) and the concerns-based adoption model (Newhouse, Trinidad & Clarkson (2002) amongst

others. These other perspectives are reviewed to highlight the fact that they also have been applied either singly or in combination with another to study how the introduction of ICT affects the effectiveness of managing educational services (MacCallum 2010; Janardhanam, Ritika & Suresh 2011; Yates, 2001), notably higher educational services (Hong & Songan, 2011). However, each of these theories has weaknesses that justify the choice of AST, its own weaknesses notwithstanding. The scholarly work from which all the perspectives are cited suggests that they can be clustered into four broad categories, namely integration theories, diffusion theories, infusion theories and the structuration theory. Consequently, this section is organised following these three categories.

2.2.1 Integration Theories

Integration theoretical models include the Concerns-Based Adoption Model (CBAM), instructional transformation model, the stages of concern with information technology model, levels of technology implementation framework, Apple Classrooms for Tomorrow (ACOT) model for teacher proficiency in technology-based classrooms, the seven dimensions technology in American schools, National Educational Technology Standards For Teachers (NETS), the technology maturity model, and the typology of ICT uptake. Although these theories are reviewed, they were not used in this study because they mostly cover the integration of innovations but not the effectiveness of the innovations.

Specifically, Newhouse, Trinidad and Clarkson (2002) observed that the Concerns-Based Adoption Model (CBAM) advances a view that adoption of innovation like ICT undergoes three stages. The first is the Stage of Concern (SoC), which describes how teachers or others perceive innovation and how they feel about it. The second stage is Levels of Use (LoU), which identifies what a teacher, is doing or not doing, about the innovation. The Innovation Configuration (IC) stage is the third stage, which focuses on describing the operational forms an innovation can take. While the SoC and LoU deal generically with the change process from the social-psychological perspective of the users of the innovation, the IC circumscribes the innovation itself.

Applied to ICT, this theory helps to study both ICT users and what makes them use ICT, as well as the ICT and what makes users want to, or need to use them.

Newhouse *et al.* (2002) pointed out instructional transformation theory as a further innovation integration theory. These scholars noted that this theory uses LoU to propose a hierarchy for successful application of technology to education. The hierarchy involves the following five steps (a) non-use, (b) familiarisation, (c) utilisation, (d) integration, (e) reorientation, and (f) evolution. These stages suggest that in schools, ICT users must go through a period of non-use, then familiarisation which represents baseline exposure to technology, utilisation (adoption) occurring when users try the technology, integration (adaption) beginning the appropriate use of ICT, reorientation (appropriation) where ICT becomes a part of the teaching-learning context and evolution or revolution (invention) where there is a change in methods and media to facilitate learning. Newhouse *et al.* (2002) observed familiarisation as the process of becoming acquainted with the notion of a computer and utilisation as making use of ICT for many educational activities but not in a committed way. They described integration as involving the crucial turning point of fully implementing ICT in education by assigning a purposeful role to ICT and demonstrating a commitment to using ICT for appropriate activities and processes. In schools, the integration stage is characterised by a teachers' emergent self-awareness of a change in teaching from teacher-centred to learner-centred.

Clouse and Nelson (2000) described the Levels of Technology Implementation (LoTi) theory as a theory of integration that defines seven levels of implementing ICT in a school. The levels are based on the original CBAM levels and are called: non-use, awareness, exploration, infusion, integration (mechanical), integration (routine), expansion, and refinement. Clouse and Nelson (2000) observed that theory helps to understand the degree to which ICT is used to support concept-based or process-based instruction, consequential learning, and higher order thinking skills by establishing the proportion of ICT use, the proportion of student-use of ICT and number of computers in use.

Clouse and Nelson (2000) further discussed the ACOT for teacher proficiency in technology-based classrooms, observing that the ACOT defines three stages of teacher proficiency with technology: survival, mastery, and impact. Survival is characterised by preoccupation with own adequacy, concern about the ability to maintain control over the classroom and students, and reacting to problems rather than anticipating them. Mastery involves anticipation of problems and developing solutions to them, and increased technical competence, experience and confidence. Impact focuses on the effects of teaching on students and technology used to assist in managing the classroom.

The Technology in American Schools is another theoretical model proposed by Geroski (2000) to explain the integration of ICT in schools. This model was developed based on the premise that rapid technology changes in society require ICT to be used to transform schools to prepare students to live, learn and work successfully in a digital communication age. This integration is needed to help education maintain high academic standards, technological fluency, communication skills, interpersonal skills, information literacy, independence in learning, critical thinking abilities, and economic viability all within the context of a digital communication age. According to Geroski (2000), this model uses seven interdependent dimensions to analyse the integration of ICT in education. These include learners, learning environments, professional competency, system capacity, community connections, technology capacity, and accountability.

According to the International Society for Technology in Education (2000), the National Educational Technology Standards for Teachers (NETS) is another model that describes standards, assessments, and conditions that facilitate the integration and use of technology to support student learning. The model explains the rationale for adopting and using ICT in education in order to produce technology-capable children (International Society for Technology in Education, 2001). The model maintains that integration of ICT must enable students to become capable information technology users; effective information seekers, analysers, and evaluators; problem solvers and decision makers; creative and productive users of

productivity tools; communicators, collaborators, publishers, and producers; and informed, responsible, and contributing citizens.

Krathwohl, Anderson and Bloom (2001) observed that the Technology Maturity Model (TMM) was developed to analyse the challenges of integrating ICT in schools. They argue that single attempts and first efforts are often aimed well enough, but they rarely persist long enough. This model posits that challenges to which attention should be paid include the need to approach ICT integration and implementation in a cyclic manner and over an extended period. Two critical components of this model are its ability to address both educational processes and products and encourage best practice approaches to both. The Maturity Indicators are identified at four stages, namely: the Emergent Stage, the Islands Stage, The Integrated Stage, and the Exemplary Stage. The Emergent Systems Stage is characterised by lack of formal support when using ICT for instruction, no formal plans, policies or procedures exist to ensure the efficient and appropriate acquisition or use of technology throughout the Institution. ICT facilities are used sporadically throughout an educational institution, institution-wide coordination to ensure grade level and programme level access is absent, and formal support for teacher training is minimal. The Islands of Technology Stage is characterised by regular use of ICT at one or more grade levels, and programme levels at each school within the Institution on a regularly scheduled basis. The formal plans, policies and procedures exist to facilitate the optimal use of technology in both instructional and administrative areas throughout the Institution. The institution-sponsored and school-sponsored training is available and technology has budgetary visibility at the Institutional level and school/programme level. The instructional delivery system is somewhat dependent on technology.

According to Newhouse *et al.* (2002), the typology of ICT uptake is another ICT integration model developed by Brundage and McKerracher (1980) based on four stages, namely: Dependent, Counter-dependent, Independent, and Interdependent. The typology was derived from a series of models of learning and with considerable input from studies about teachers and their teaching practices with ICT. It posits that ICT is integrated into education not by mere adoption of ICT hardware and software,

but by inculcating ICT knowledge in students. Its stages reflect typical phases through which all learners pass as they achieve mastery on any new topic. ICT is merely another topic for learners to master, in this less techno-centric conception of ICT uptake as a learning issue.

2.2.2 Diffusion Theories

The development of diffusion theories began with the pioneering rural-based sociological work in 1943 of Ryan and Gross (Yates, 2001:1), but it was popularised in the 1960s after Everett Rogers' postulation of the theory of innovation diffusion (Rogers, 1962). This was well articulated by Janardhanam *et al.* (2011:1429) that, "Rogers' diffusion of innovations theory forms the basis of conceptual models of the adoption and use of new technologies". The theories whose roots are traced to Rogers' diffusion of innovations theory of adoption include the technology acceptance theory and the theory of planned behaviour. In general, these theories focus on explaining the process by which an innovation (or a technology such as ICT) is diffused (widely spread and used) in a particular social system (community, organisation or group) to cause desired changes (Sahin, 2006), which can be in the management of the social system (Stillman, 2006) as a whole or in the management of its specific components like the delivery of educational services (Surendra, 2001; Zakaria, 2001).

In particular, Rogers' (1962) diffusion of innovations theory advances a view that innovation is diffused in a social system through a process involving its communication to members of the social system using certain channels and over time.

Accordingly, Rogers' theory is based on four components: the innovation itself, its communication, the social system to which the innovation is communicated and into which it is to be diffused, and time. This theory considers innovation as "an idea, practice, or project that is perceived as new" by an individual or an entity adopting it (Rogers, 1962:11). It regards communication as an interpersonal or mass media process in which adopters create and share information in order to reach a mutual

understanding of the innovation being diffused and how best it can be adopted. According to Rogers (1962), time refers to the rate of adoption while the social system refers to a set of interrelated units engaged in joint problem solving to accomplish a common goal.

The diffusion of innovations theory posits that the adoption of innovations follows three related and consecutive steps (Rogers, 1962) namely: knowledge, persuasion, and decision. In other words, members of a social system into which an innovation is to be diffused, need information and knowledge about the innovation before they can be persuaded to adopt it. As this theory is modified by its very author, it tends to treat the words 'innovation' and 'technology' as synonyms (Sahin, 2006). Since ICT is a technology, it can, therefore, be considered as an innovation.

Rogers (1962) developed four corollary theories to explain the process of diffusion of innovations more articulately. These are the innovation-decision process theory, the individual innovativeness theory, the rate of adoption theory, and the theory of perceived attributes. The innovation-decision process theory postulates that potential adopters must first learn about the innovation. Second, they must be persuaded as to the merits of the innovation. Third, they must decide to adopt the innovation. Fourth, once they adopt the innovation, they must implement it. Fifth, they must confirm that their decision to adopt was the appropriate decision. Once these stages are achieved, then diffusion results.

Individual innovativeness theory focuses on who adopts the innovation and when. A bell-shaped curve is often used to illustrate the percentage of individuals that adopt an innovation. According to Rogers (1962), the first percentage (25%) of adopters includes innovators, also referred to as risk-takers or pioneers who lead the way. The second proportion (13.5%) includes early adopters who come on board early and help spread the word about the innovation to others. The third and fourth proportions are called the early majority and late majority. Each constitutes 34% of the potential adopting population. According to Yates (2001), the innovators and early adopters convince the early majority. The late majority wait to make sure that adoption is in their best interests. The final group is the laggards (16%), so called

because they are highly sceptical and resist adopting until it is necessary. In many cases, laggards do not adopt the innovation.

According to Casmar (2001), the theory of the rate of adoption suggests that the adoption of innovations is best represented by an s-curve on a graph. The theory holds that the adoption of innovation grows slowly and gradually in the beginning. It will then have a period of rapid growth that will taper off and become stable and eventually decline (Braak, 2001). Janardhanam *et al.* (2011) observed that Rogers' (1962) corollary theory of perceived attributes is based on the notion that individuals will adopt an innovation if they perceive that the innovation has the following attributes. First, the innovation must have some relative advantage over an existing innovation or the status quo. Second, it is essential that innovation be compatible with existing values and practices. Third, the innovation cannot be too complex. Fourth, the innovation must have trialability. This means the innovation should be tested for a limited time without adoption. Fifth, the innovation must offer visible results. These attributes are summarised in Table 2.1.

Table 2.1: Summary of Innovation Adoption Factors

Adoption Factors	Description
Relative Advantage	The degree to which innovation will offer benefits surpassing those of its predecessor.
Compatibility	The level at which the new innovation acts by previously existing values, attitudes, experiences of using predecessors and the requirements of future adopters.
Complexity	The degree to which an innovation is difficult to understand or use. This could refer to the ease of use
Trialability	The level at which the innovation can be used and tested before adoption.
Observability	The degree to which the outcomes of the innovation are evident to the adopter or external viewers.

A careful scrutiny of Rogers' diffusion of innovations theory reveals that its rationale focuses on the innovation to diffuse, how the innovation can be communicated to a

social system in which it is to be diffused, the nature of the system to diffuse it, the time it can take to diffuse it, and the expected results and their confirmation. In other words, it focuses on understanding how innovation or a technology is adopted, depending on the internal and external characteristics of a social system and its members. This rationale has attracted many scholars to use Rogers' (1962) diffusion of innovations theory as a basis for introducing ICT in educational processes (Chew, Grant & Tote, 2004), including the process of managing the delivery of educational services (Carlsson, 2006; Schreurs, 2006; Sharples, Taylor & Vavoula, 2005; Stead, Sharpe, Anderson, Cych & Philpott, 2006.; Straub, 2009).

Rogers' theory has also been widely used to provide a theoretical foundation for investigating the adoption of technology in higher education and educational environments (Finley, 2003; Medlin, 2001; Parisot, 1995). The theory considers technology as a design for instrumental action that reduces uncertainty in the cause-effect relationships involved in achieving the desired outcome (Rogers, 1962). It also asserts that technology is composed of two parts, namely hardware which is "the tool that embodies the technology in the form of a material or physical object," and software which is "the information base for the tool" (Rogers, 1962:12).

Rogers' (1962) diffusion of innovations theory is, however, criticised in many ways. Firstly, it considers adoption as a decision of full use of an innovation, implying that innovation is not considered adopted until it is fully used. This is not practical. Adoption of innovation is a process. It is not a mere snapshot decision that takes place at the end of diffusing an innovation. Secondly, this theory focuses so much on the innovation or technology itself, thereby emphasising the attributes of the innovation rather than the users' actual utilisation of the innovation (Janardhanam *et al.*, 2011; Rao & Perry, 2003). Thirdly, it readily asserts that because the software is difficult to observe, it has a slow rate of adoption compared to the hardware. This may not hold in the case of ICT since most of the adopted ICT innovations tend to be in the form of software. Lastly, the theory does not specify who should evaluate the results of an innovation and how the results should be evaluated (Pan & Jang, 2008).

The above criticisms make Rogers' diffusion of innovations theory inadequate to guide a study intended to analyse the role of ICT. Certainly, this role does not focus on the only ICT as an innovation. It also focuses on how ICT is utilised as a management enhancement tool and how it achieves this purpose in the eyes of both ICT administrators and users not only regarding results but also regarding the process through which the results are realised. Rogers' (1962) diffusion of innovations theory is therefore deemed inadequate to cover all the dimensions that explain the role of ICT in the management of educational services.

Another diffusion theory is the theory of adoption and substitution, which was propounded by Norton and Bass (1987). According to Pedersen (2003), this theory draws upon acceptance and the economic concepts of demand and substitution to postulate that newer technologies diffuse in a social system through a population of their potential buyers over time. New technologies are rapidly replacing old ones by providing more powerful tools, efficiency and speed for users. This is because new technologies develop new hardware and software, which were previously not feasible. The developed hardware and software tend to be more superior, efficient, effective, more user-friendly, and because of these attributes, they attract members of a social system to buy and use them as substitutes for the earlier hardware and software versions (Lee, Kim, Rhee & Trimi, 2006). The substitution effect eventually diminishes the need for the earlier technologies. These observations suggest that the theory of adoption and substitution focuses on how new technologies are adopted to replace the old technologies. They also indicate that this theory centres on how successive technologies compete with older ones and in so doing, substitute them regarding effectiveness, efficiency and user-friendliness (Yates, 2001). Evidently, this theory analyses the effectiveness of innovations about one another, but not concerning how any of the analysed innovations affect the effectiveness of another variable such as the management of educational services.

The theory of Technology, Organisation, and Environment is another diffusion theory developed by Tornatzky and Fleischer (1990) and Oliveira and Martins, 2010a, 2010b. This theory focuses on three aspects to analyse the process by which a technology is diffused and implemented in an organisation, namely: technological

context, organisational context, and environmental context (Hsu, Kraemer & Dunkle, 2006; Oliveira & Martins, 2009). Technological context describes both the internal and external technologies relevant to the firm and includes current practices and equipment internal to the firm as well as the set of available technologies external to the firm (Li 2009; Lin & Lin, 2008). Organisational context refers to descriptive measures about the organisation such as scope, size, and managerial structure (Kuan & Chau, 2001). Environmental context is the arena in which a firm conducts its business - its industry, competitors, and dealings with the government (Lee, Wang, Lim & Peng, 2009).

The Technology, Organisation, and Environment theory provides a useful analytical framework that can be used for studying the adoption and assimilation of different types of IT innovation (Oliveira & Martins, 2009; Liu, 2008). It has a solid theoretical basis and potential for being applied to study technological innovation in an organisation relative to its environment. Its coverage is, however, limited in that it stops at the implementation of technological innovations.

It, therefore, does not extend to analyse the outcomes of implementation - which are the primary concern of this study.

In general, diffusion theories focus on adoption and use of innovations or technologies at a broader level such as society, community, and organisation. In so doing, these theories pay little attention to the adoption and use of innovations or technologies at a narrow or individual level (Sundaram, Schwarz, Jones & Chin, 2007). Consequently, theories that focus on adoption and use of technologies at an individual level have been developed. These theories are reviewed in the following section.

2.2.3 Infusion Theories

According to Grgecic and Rosenkranz (2010), these theories include Meister and Compeau's (2002) theory of infusion, the theory of reasoned action, the self-determination theory, the technology acceptance theory developed by Davis,

Bagozzi and Warshaw (1989), and the theory of planned behaviour. Infusion theories began to attract scholarly attention after realising that organisations often followed the rationale of diffusion theories to invest heavily in adopting ICT for value addition, only to end up failing to realise the anticipated increase in the productivity of their individual members (Sundaram *et al.,* 2007). Viewing this scenario as an ICT productivity paradox, infusion theorists argued that its cause lay in the under-utilisation of the adopted ICT (Hsieh & Robert, 2006; Hsieh & Wang, 2007; Ng & Kim, 2009; Ross & Ernstberger, 2006). They, therefore, developed the theories to explain the under-utilisation.

The question that infusion theories sought to answer was how organisations could maximise the use of ICT in order to increase their individual employees' productivity and performance (Chang & Cheung, 2001). To this end, infusion theories assumed that realising the potential that ICT offers depends on the extent to which it is fully, deeply and comprehensively embedded within an organisation's individual employees' work systems (Peijian & Lihua, 2007; Talukder, Harris & Mapunder, 2008). In other words, the realisation depends on the degree to which individual employees are willing and able to use the introduced ICT to its full potential, beyond management prescription and to the extent of identifying new ways by which the ICT can improve work processes even further than management expectations (Thatcher, McKnight, Baker, Arsal & Roberts, 2010).

One of the infusion theories is the theory of reasoned action. This theory explains the adoption and use of ICT based on the nature of an individual's attitude toward or conscience about it (Kwok & Gao, 2006). It advances a view that individuals are more likely to adopt and use ICT if they possess a positive attitude toward it and vice versa (Kwok & Gao, 2006). Attitude refers merely to a person's judgement that adopting and using technology is useful and beneficial or not, or to a state of being in favour of, or against adopting and using ICT. The foundation of this theory is provided by the distinction between beliefs, attitudes, intentions, and behaviours (Konana & Balasubramanian, 2005). The theory posits that a person's adoption and use of a technology is determined by their behavioural intention to adopt and use. In

general, ICT will be fully adopted and used if individuals are attitudinally positive about it, but it will be ignored if they are attitudinally negative.

The self-determination theory is a further infusion theory, which was developed to explain the psychological factors that promote adoption and use of ICT in various activities that characterise human life and development (Ryan & Deci, 2000). This theory postulates that at the individual level, the adoption and use of ICT depend on the relationships between motivation, behaviours, and behaviour outcomes. It strongly emphasises the influence of self-motivation on people's ICT behavioural adoption and outcomes (Davis, Bagozzi & Warshaw, 1992; Venkatesh, 1999). Research on ICT adoption indicates that psychological factors shape people's motivations, perceptions, and attitudes towards the introduced technology, thereby determining people's ICT usage intentions and subsequent ICT usage behaviours (Karahanna, Straub & Chervany, 1999). This theory places emphasis on ICT acceptance and how this acceptance predicts individual's intention and use of ICT (Karahanna *et al.*, 1999; Taylor & Todd, 1995; Venkatesh, Morris, Davis & Davis, 2003).

While this theory is useful in understanding the psychological factors that explain the adoption, use and outcomes of ICT, it does not help to understand the nature of the adopted ICT. For this reason, this theory is considered inadequate to underpin the conceptualisation of this study.

The other infusion theory is the technology acceptance theory. The main focus of this theory relates to assessing the perceived ease of use and the perceived usefulness of ICT as a basis for determining its adoption (MacCallum, 2010). The theory was developed by Davis, Bagozzi and Warshaw (1989) as an adaptation of the theory of reasoned action tailored specifically to explaining user acceptance of information technology. It posits that two particular beliefs - perceived usefulness and perceived ease of use - are of primary relevance for computer acceptance behaviours (Bruner & Kumar, 2005; Davis, Bagozzi & Warshaw, 1989). Perceived usefulness connotes the fact that people tend to use or not use an application depending on how they believe it will help them in better performing their jobs

(Huang & Liaw, 2005). Perceived ease of use posits that even if potential users believe that a given application is useful, they may, at the same time, believe that the adopted ICT is too hard to use and that the performance benefits of usage are out-weighed by the effort of using ICT. In other words, in addition to perceived usefulness, usage is theorised to be influenced by perceived ease of use (Chang & Cheung, 2001).

The technology acceptance theory maintains that innovation should be easy to use, that is, easy to learn and not too complex to negate its usefulness (Lee, Lee & Kwon, 2005). This theory is based on the premise that not all adopted innovations translate into desired results because of factors related to the decisions made by organisational members either to accept or not to accept the introduced innovations (Lee *et al.,* 2006). The theory asserts, therefore, that acceptance of ICT is vital because the expected benefits, such as usage and gain in efficiency, effectiveness, or productivity, cannot be realised if individual users do not accept ICT for task performance (Bhattacherjee & Sanford, 2006). In other words, the adoption of ICT can be successful only when employees accept and effectively use it; which means that employees must use innovation to realise the intended benefits.

The technology acceptance theory has been widely used in the educational setting to determine the adoption of instructional technology by educators and students (Huang, Lin & Chuang, 2007). It is, however, criticised for focusing so much on the use rather than the effect of this technology, particularly on the effectiveness of educational services management. A further criticism is that it is more concerned with understanding the acceptance process and the factors that are essential in making this process effective, rather than the outcomes of accepting and using ICT (Lee, 2004; Lee *et al.*, 2006). Liu (2008) proposes a change to this theory to include performance expectancy, effort expectancy, social influence, and facilitating conditions as enhancers to its usability in mobile education. Technology acceptance theory is considered inadequate in providing a convincing theoretical platform for the current study as it is intended to analyse the outcomes of ICT adopted at UNU University.

Powell, Yager and Vandever (2005) discussed the theory of planned behaviour as a theory by which innovations can be introduced in organisations, including educational institutions. This theory posits that attitudes, subjective norms, and perceived behavioural control influence an individual's decision to adopt an innovation such as ICT. This theory focuses on how innovations are adopted based on adopters' perceptions. It, therefore, advances a view that the rate of adopting an innovation, such as ICT, depends on how its adopters perceive it based on their level of knowledge and experience, the degree of communication on the benefits it offers, and the extent to which the adopters value it. Clearly, this theory is about the rate of adoption but not the effect of the adopted innovation. So, it too is inadequate to provide a sound basis for this study.

Meister and Compeau (2002) developed a theory of infusion, based on the combined rationale of the technology acceptance theory and the theory of planned behaviour. They argued that infusion is a multi-dimensional theory that explains the adoption of ICT using the intensity of its use, scope of its use and user satisfaction with the ability of ICT to be used as expected. The intensity of use is defined as the amount of time that an individual uses ICT in a fixed period. As such, it is best measured as a scale variable. This is the most visible dimension of infusion in that it is what is frequently measured as the dependent variable in ICT adoption research. Meister and Compeau (2002) defined the scope of use as the degree to which ICT is used for a variety of purposes. It is based on the theory that, as an individual appropriates an innovation for more purposes, it becomes a more significant part of that individual's work system. The innovation becomes connected to more tasks and processes. Through these connections, the innovation becomes more infused. Satisfaction with ICT is the degree to which an individual would like to continue using ICT. Satisfaction should not be confused with inertia or avoidance of change. It is, instead, a positive belief that ICT is excellent and worthwhile. If an individual is pleased with ICT as innovation and does not anticipate a preferred alternative, the innovation is said to be more embedded in that individual's work system.

Meister and Compeau's (2002) theory of infusion is useful in understanding how individuals use an innovation. It is criticised in that it overemphasises the individual's

use of innovation (such as ICT), therefore ignoring what happens to the effectiveness of the organisation adopting the innovation. It is therefore inadequate to inform a study whose main aim is to analyse the changes in the management of educational services resulting from adopting ICT as technological innovation.

In general, infusion theories focus on analysing the extent to which the full potential of an innovation is embedded within a person (Yi, Wu, Tung, 2006; Yi, Jackson, Park & Probst, 2006) or within an individual organisation's work system (Talukder *et al.,* 2008) based on reasoning, attitudes, and perceptions of individual adopters about the adopted ICT. The theories help to understand and put into consideration these aspects when adopting ICT, but there are weaknesses that limit the application of their general rationale. The first weakness is that there is ambiguity relating to the term 'full use' or what it means to use the adopted ICT to its full potential. In an attempt to offer clarity, Meister and Compeau (2002) defined 'full potential' as used in all possible and appropriate applications. However, it is still unclear what constitutes 'possible' and 'appropriate'.

An individual's use of ICT to its fullest extent is also associated with low usage (Schwarz, 2003), implying that 'full use' is the extent or variety of use of different functionalities of ICT (Peijian & Lihua, 2007). Wang (2005) extends this idea of low usage by defining it as the extent to which an individual fully uses technology to enhance productivity and the degree to which they find ways to extend its contribution (to productivity or task execution), which was not originally envisioned by the managerial adopters. From this perspective, enhanced productivity may be viewed as integral to infusion, but the clarity as to what is meant by 'full use' and 'full potential' makes adopting any of these theories rather tricky.

2.2.4 Structuration Theory

The theory, which has received broad application in research regarding adoption of ICT in organisations, including educational institutions, is the Adaptive Structuration Theory (AST) developed by DeSanctis and Poole (1994) based on the rationale of Giddens' (1984) structuration theory (Naik & Kim, 2010). In brief, Giddens (1984)

postulated that his theory was based on the analysis of the concept of structuration (Falkheimer, 2009), which focuses on a process that involves the reciprocal interaction of human actors and structural features of a social system (Naik & Kim, 2010). The rationale of Giddens' (1984) structuration theory is that a social system (such as an organisation like a university) can be understood, based on the analysis of the nature of its structure and agency (Pavlou & Majchrzak, 2002; Workman, Ford & Allen, 2008). Agency refers to the capacity of members of a social system to act on and/or through its structure, which, itself, refers to the resources, rules, regulations, norms and procedures that define or are introduced to define the social system (Parker, 2000).

The rationale of Giddens' (1984) structuration theory assists in analysing and understanding how a social system changes as a result of the interaction of its structure and agency. It helps to explain how social systems change as a result of member use of rules, procedures/processes and resources in interaction (MacCallum, 2010; Orlikowski, 2000; Parker, 2000; Stillman, 2006; Stones, 2005). It is, however, very generalised, does not offer a practical methodology of how to analyse the change, and does not pay attention to changes that come about in a social system as a result of introducing an innovation or a technology such as ICT.

Notwithstanding the above-mentioned weaknesses, the tenets of Giddens' (1984) structuration theory, that is, structure and agency, were adapted by DeSanctis and Poole (1994) to develop the Adaptive Structuration Theory (AST), which has since been applied to study the changing structure and agency of organisations as a result of introducing and using advanced information technology (Wang, Wang & Yang, 2010).

AST adapted the tenets based on the argument that understanding the role of technology should not be based on the technology itself; rather, this understanding should be based on the use of the technology (Poole & DeSanctis, 2004). AST, therefore, takes a socio-technical perspective (Bostrom, Gupta & Thomas, 2009). Human actors and organisational context are introduced within this perspective as moderators of the technology impact. The adoption of advanced technology,

therefore, is a process of organisational change resulting from the mutual influence of the technology and social processes (DeSanctis & Poole, 1994).

The premise of AST is that the purpose of adopting ICT is to automate the functions of a social system (like an organisation or university) (Zhu, Dong, Xu & Kraemer, 2006). The subsequently realised level of automation changes both the structure (norms, regulations, procedures, operations) and agency (human activities) of the system (Zhu, Kraemer & Xu, 2003). Accordingly, the rationale of AST focuses on analysing, establishing and understanding these changes (Maznevski & Chudoba, 2000). AST guides this analysis based on a view that organisations that adopt ICT for their work, dynamically create perceptions about the nature and utility of the adopted ICT (Zhu & Kraemer, 2005; Zhu, Kraemer & Xu, 2006). These perceptions influence the way technology is used, thereby influencing the outcomes of the technology. The perceptions are created about the type and usefulness, or contribution of the introduced ICT to the human activities carried out in a social system (Matovu, 2009; Rao & Perry, 2003). The perceptions are also based on the technological context of the social system and indicate the level of satisfaction that the adopted ICT yields to the members of the social system as far as realising expected changes in the system's processes and outcomes or effectiveness. (Stillman, 2006).

The rationale of AST suggests that a better understanding of the role of ICT in an organisation should be based not only on an analysis of the type of ICT equipment and programmes introduced to automate a social system's structure and agency (organisational processes and human activities). It should also be based on an analysis of the services and outcomes that emerge from human activities carried out using the introduced ICT (Stillman, 2006). In other words, AST uses the perceptions of organisational members who interact with the introduced ICT to analyse its (ICT's) role from two perspectives: (1) The types of ICT equipment (hardware) and programmes (software) adopted to automate the structure of an organisation.(2) How the adopted ICT is used and how it enables members to realise expectedoutcomes (Matovu, 2009). This way, AST establishes the role of ICT regarding the installed ICT equipment and programmes, the ICT services that the

adopted equipment and programmes are perceived to provide, and the perceived contribution of these services to the anticipated improvement in organisational processes and the outputs (Janardhanam *et al.*, 2011). AST advances further that the findings obtained from the conducted analysis can then be used to develop strategies regarding how members may use ICT better for better ends (Stillman, 2006).

The rationale of AST has been applied to analyse the changes caused to social systems by the adoption of various innovations such as the printed press, electricity, telegraph, mass transportation, radio, telephone, TV, the Internet, and other forms of ICT. It also shows how the social system responds to modify the innovations and realise their original intent (Falkheimer, 2009; Maznevski & Chudoba, 2000; Naik & Kim, 2010). AST is criticised in that it considers too many techno and social variables which may make it a rather involving theory to apply (Naik & Kim, 2010). Notwithstanding this criticism, AST is adopted to provide the theoretical framework of this study as explained in the next section.

2.3 THEORETICAL FRAMEWORK OF THE STUDY

As noted above, the theoretical framework of this study is derived from the Adaptive Structuration Theory (AST) developed by DeSanctis and Poole (1994). This is because the rationale of AST covers the majority of tenets of most of the diffusion and infusion theories as illustrated in Figure 2.1.

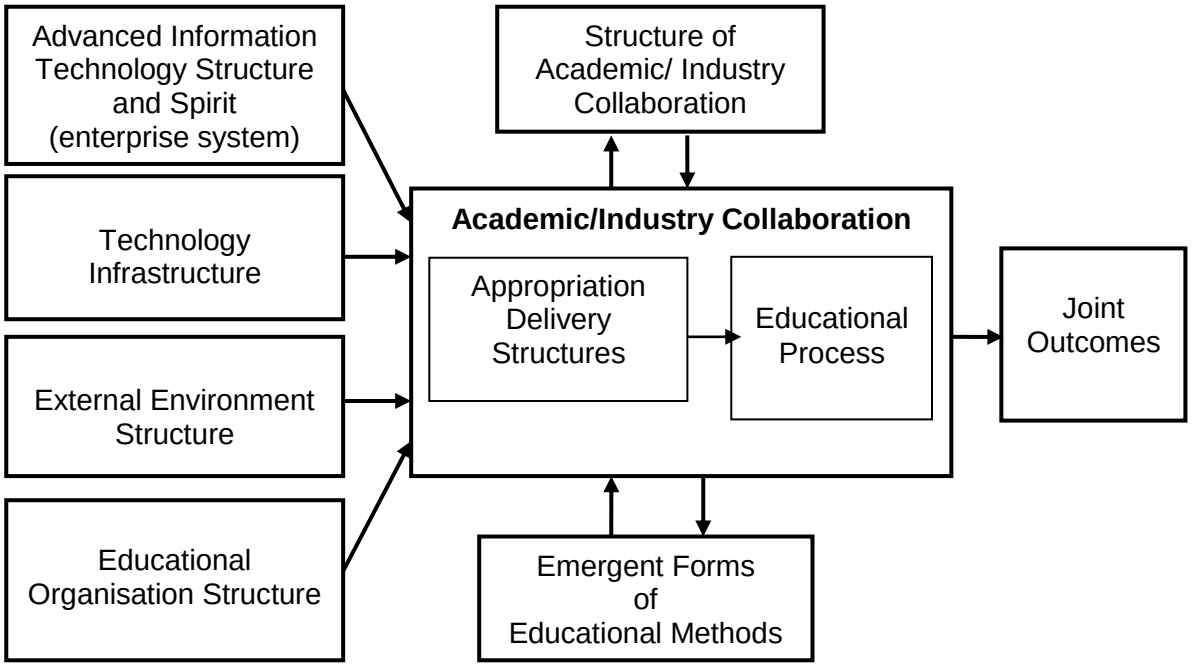


Figure 2.1: Adaptive structuration theory as applied to the management of educational services management

Source: Adapted from DeSanctis and Poole (1994:132).

As indicated in Figure 2.1, the academic/industry collaboration refers to a structured social practice of interdependence between educational institutions and industry that needs the results or outcomes of these institutions (DeSanctis & Poole, 1994; Hoerup, 2001). The industry referred to represents society in this study. In this practice of interdependence, ICT actions that support the delivery of educational services are considered as activities that sustain the relationship (collaboration) between society and academia. From society, this practice is expressed in the form of curricula activities that society recommends to be carried out by educational institutions in order to develop competences, which are relevant to addressing societal needs (Zhang & Wang, 2011). Examples of practices that should be carried out to support a successful collaboration include cooperative gathering of information from society that should be used to design the curriculum needed to produce graduates who have the skills and knowledge relevant to solving the development problems of the society from which the graduates were drawn (Gupta & Bostrom, 2009). This academic/industry collaboration is formed from a combination of an

external environment structure, an educational organisation structure, as well as the structure and spirit of the, introduced advanced information technology and technology infrastructure (DeSanctis & Poole, 1994).

The external environmental structure refers to the nature of societal needs, which education is expected to help solve. In this study, societal needs and problems were regarded as those expected to be adequately addressed by the graduates of the educational process (Furumo & Melcher, 2006). They were considered to include both the needs that individual students expect to satisfy using acquired education (such as improved employability and productivity) and the needs of the general society (such as increased skilled and productive labour and student sponsor expectations) (Furumo & Melcher, 2006). Educational organisation structure refers to the way the management of educational services is arranged regarding faculties, departments, curricula programmes, course objectives, instructor preferences, ancillary services, and interdisciplinary cooperation (Bhattacherjee & Harris, 2009).

The structure of advanced information technology refers to the structural features of the adopted ICT, and its spirit refers to its intended purpose or use (DeSanctis & Poole, 1994; Lee, Lee & Kwon, 2005). In this study, the structural features were considered as the application modules offered by the adopted ICT to support the management of educational service delivery. Those individually considered included computer-based training applications, Internet and intranet connectivity, electronic mailing, integrated library information system for online catalogue and maintenance, applications such as word processing, spreadsheet processing, databases and other programmes that support the management of curricula and course design, class scheduling (timetabling), space and teaching staff requirements and allocation analysis, and student academic performance evaluation and analysis.

As stated in UNU University ICT Policy and Master Plan (2001, 2005), the spirit of the adopted ICT was regarded as its intended contribution to improving the effectiveness of managing educational services. Technology infrastructure refers to both the internal and external technologies (hardware and software), which are relevant to an educational institution (Sedera & Zakaria, 2008). It also includes

current practices and equipment internal to the firm as well as the set of available technologies external to the firm (Li, 2009; Lin & Lin, 2008). In this study, technology infrastructure is conceived as the type of ICT equipment and programmes introduced to facilitate the management of educational services management. Educational organisation structure determines the nature of technology structure and infrastructure to adopt.

This academic/industry collaboration, formed out of the combination of each of these structural and spiritual aspects, is translated into practice by the appropriation and delivery structures and the educational process (DeSanctis & Poole, 1994). The education process takes place in the form of instructional services and all motivated and practical actions that facilitate the development of talents, skills and impartation and acquisition knowledge needed to address societal needs and problems (Bhattacherjee & Harris, 2009).

ICT is appropriated to facilitate this process through its information delivery structures (processes, applications and resources) (Lerouge & Webb, 2004). The appropriation takes place in the form of automating instructional designs, curriculum delivery and learning strategies (such as collaborative learning, hands-on experience, simulations, conceptual presentations, programmed instruction, real-world exposure, case studies, and so on). It also occurs in the form of instructor and learner utilisation of the introduced ICT tools (Lerouge & Webb, 2004). Appropriation is critical to the management of educational services because the effectiveness of this management depends on how appropriate the adopted delivery and learning ICT tools are (Gupta & Bostrom, 2009).

Emergent forms of educational method refer to the techniques of teaching and learning which come into being as a result of the adopted ICT. Examples of new educational methods include the use of computer-based teaching and learning, also called programmed instruction, internet-assisted or online teaching and learning, virtual team teaching and learning and others (Maznevski & Chudoba, 2000). Joint outcomes refer to mutually beneficial ends that emerge from the collaboration between educational institutions and society. Examples of common outcomes

include employable and productive graduates and realisation of goals of education by both the institution that adopts ICT and society. While the goals of the institution may be in the form of academic excellence and contribution of societal development, those of any industry may be in the form of increased productivity, increased skilled and/or competent labour, increased economic or revenue growth and others related to staffing needs. The realisation of these goals is, however, only guaranteed when appropriation and delivery structures are correctly handled.

The theoretical framework explained above is used in this study because it can facilitate analysis of the nature of ICT introduced at UNU University, the effectiveness of the university's educational services management and the role that ICT plays in enhancing this effectiveness, with a view to proposing strategies that the university can use to meet its stakeholder expectations as desired.

The framework provides a rationale covering a rich theoretical and methodological base for analysing the nature of ICT introduced at UNU University and its contribution to the management (planning, implementation, and control) of educational services, including facilitation of self-directed student learning. This rationale can also help suggest strategies of how UNU University employees and students may use ICT to realise their educational expectations as well as asses the perceived effectiveness of ICT equipment, programmes, and services on educational services management.

2.4 LITERATURE REVIEW ON THE VARIABLES OF THE STUDY

This section draws on literature to discuss specific dimensions of the variables presented in the theoretical framework. The variables include management of educational services, nature of ICT adopted in educational institutions, perceptions, and experiences of educational services on the effectiveness regarding ICT implementation, the effect of ICT on University management and student learning and strategies for making ICT as effective as expected by the stakeholders.

2.4.1 Educational Services Management

A range of studies have been conducted about the concept of management of educational services in various schools and institutions of higher learning, including universities (see, for instance,Addae-Mensah, 2009; Adepiju, 2008; Aguti & Fraser, 2006; Ajayi, 2001; Akubuilo, 2007; Akuegwu, Ntukidem, Ntukidem & Jaja, 2011; Amenumey, 2007; Darlan & Anani, 2006; Duncan-Adanusah, 2009; Kasenene, 2012; Kreysing, 2002; Lewin, 2009; Matovu, 2009; Muyimbwa, 2004; Muyingo, 2004; Nabayego, 2011; Oduro, 2007; Tam Wai-Ming, 2008). A scrutiny of these studies reveals that they use different theoretical, conceptual, methodological, and contextual perspectives to analyse what this concept entails regarding functional dimensions, processes and activities. Some of the studies approach the concept from a general perspective, describing it as a process involving the dimensions of planning, implementation, and control of educational programmes (Amenumey, 2007; Duncan-Adanusah, 2009; Tam Wai-Ming, 2008).

The use of a general perspective implies that the above-cited studies are too comprehensive to be of any practical help when one is interested in understanding the nature of educational services management in specific institutions like UNU University. In particular, the study of Tam Wai-Ming (2008) dealt with the management of education quality in general, taking a comparative approach to the competing perspectives of this management. The work of Amenumey (2007) was generalised to the whole of Ghana in its attempt to analyse the challenges of educational management in the 21st Century. Duncan-Adanusah's (2009) study focused on the management of school services in general. This study was therefore needed to draw convincing conclusions about the nature of this management.

It should be noted, however, that notwithstanding their general approach, the studies cited above provided the dimensions that were used in this study as a basis for establishing the nature of educational services management at UNU University. A review of these studies together with those of Kasenene (2012), Muyimbwa (2004) and Muyingo (2004) also revealed that each of the dimensions of educational

services management is actualised through various activities, which could help explore how ICT affects the dimensions and subsequently, the management.

Specifically, the dimension of planning, which begins with the designing of educational programmes needed to develop the human capacity required to meet societal development aspirations (Musaazi, 2006), focuses on designing the curricula content (information), converting the content into specific syllabus material, and translating the syllabus material into lectures, coursework, laboratory experiments and/or field work, and testing exercises. This planning also involves determining the appropriate methods and media to be used while delivering the specified syllabus material as educational services to students (Musaazi, 2006). It also determines how learners are to be evaluated and accredited (Amenumey, 2007). The planning dimension of educational services management further involves determination of the ancillary facilities (such as lecture-room, library and laboratory facilities) required to facilitate the delivery of the services. The financing required to put the facilities in place (Kayongo, 2007), and the time-table following which of these services should be used by the staff and students to ensure that desired teaching and learning take place (Kasenene, 2012). Planning is also expected to design educational programmes in such a way that they can meet the expectations of learners (Darlan & Anani, 2006). In short, the planning of educational services involves the determination of educational programmes, the content of the programmes and how to deliver it to learners.

While the studies cited above specified various processes and activities that define the dimension of planning for educational services, they related the processes and activities to variables that were conceptualised differently and did not take into account how the success is affected by the implementation of ICT. In particular, Muyimbwa's (2004) interest was in examining the effects of liberalised funding on the management practices at UNU University. Kasenene (2012) was concerned with analysing how quality assurance management affected the quality of higher education in Uganda. Muyingo (2004) focused on examining the financial contributions of the private sector and its implications for management of university education in Uganda. Darlan and Anani's (2006) concern entailed assessing the

management capacity to deliver education, health and water services to the poor local communities in Ghana. Addae-Mensah (2009) focused on high school programme planning with a specific interest in analysing the quality and equity or expediency. Musaazi's (2006) focus was on explaining the principles, tools, and applications of educational planning in the developing world. Consequently, the studies left a gap regarding how the effectiveness of planning for educational services was affected by ICT introduced at UNU University. This is the gap that this study was intended to fill.

Studies like that of Nabwire (2008) and Oduro (2007) described implementation as a dimension, involving the delivery of the syllabus content of the planned educational programmes to students. The delivery takes place in the form of lecturing, giving coursework and testing exercises to students, directing student research, and preparing them for an internship (Nabwire, 2008). The delivery of the planned syllabus content has also been described as a process involved in preparing lecture content out of the planned teaching content and passing on the prepared content as lecture notes to students (Harwell, Ong'uti, Aanyu & Ojoo, 2003; Kyle Ingle, 2009; Wilen, Ishler, Hutchison & Kindsvatter, 2000). The process involves actual teaching through giving notes, conducting tutorials, holding discussions with students by encouraging them to ask questions for better understanding, and giving them classroom exercises (Kankunda, 2009).

It is vital to note that while the above-cited scholars identified and described some indicators of the implementation dimension of educational services management, none of them delved into how the effectiveness of the indicators is affected by ICT. Oduro's (2007) interest was in analysing the missing ingredient in the manner of coping with the challenge of quality basic education in Ghana. Nabwire (2008) focused on how budget management affected the delivery of educational services at Kyambogo University. Harwell *et al.* (2003) were interested in identifying strategies for enhancing the delivery of basic education. Wilen *et al.,* (2000) dealt with the dynamics of effective teaching while Kankunda (2009) was interested in discussing the mentoring role of coordinating centre tutors in improving teacher effectiveness in primary schools. The focus of these scholars did not include the use or adoption of

ICT. This study is therefore needed to establish how the effectiveness of the implementation activities identified by these scholars is affected by ICT.

The implementation dimension of educational services management is further described as a process involved in preparing and guiding students through laboratory experiments, which are recommended in the planned syllabus (Kasenene, 2011). It also involves procurement, maintenance, upgrading, and provision of library services that students need in order to facilitate learning through revision, further reading, research and curing of curiosity, and encouraging students to utilise the services (Luyiga, 2011; Musiime, 1995; Nakabuye, 1996; Nanteza, 2000; Ndawula, 1995). According to Layzell (2003), these services include all facilities in the form of science, literary and artistic facilities such as reference books, journals, periodicals, newspapers, pamphlets, prints, photocopies, tapes, reading space, tables, seats that library users need to realise any of the purposes as mentioned earlier. Research by Nabayego (2011) endorses these observations by indicating that the implementation of educational services should also involve facilitating students' self-directed learning. This research maintains that facilitating student learning transforms them into graduates who can meet their self-employment expectations as well as those of their potential employers and society as a whole.

The studies cited above indicate that implementation involves actualising the planned educational content by putting into practice the planned educational programmes while supporting learners with supplementary services. The studies, however, did not deal with how the effectiveness was affected by ICT. In particular, Nabayego's (2011) study approached the concept of education management in general, focusing on how its application in informal education could be adopted to improve formal education in the whole of Uganda. The studies of Layzell (2003) were mainly concerned with the relationship between the overall management of an educational institution and the management of information, knowledge-based and library services. Kasenene (2011) was interested in assessing the consumer perspective focusing on whether or not Ugandan universities were still centres of excellence.

Furthermore, Luyiga's (2011) interest was in analysing the management of library services in primary education schools in the Masaka municipality; while Kyle Ingle (2009) focused on examining teacher quality and attrition in a US school district. Kankunda (2009) focused on examining the effect of tutors' mentoring role on teacher effectiveness in primary schools in Bushenyi district. Frederiksen (2006) dealt with off-campus library services while Nanteza (2000) focused on the management of library information in Uganda secondary schools. Nakabuye (1996) dealt with the constraints of providing library services in boarding schools while Musiime (1995) focused on describing the state of school libraries in rural areas of Uganda. It was, therefore, necessary to establish how ICT affected the effectiveness of conducting the implementation activities identified by these scholars, taking UNU University as a case in point.

Turning to control, the literature indicates that it is a management dimension that focuses on the setting of rules and regulations, supervision, coordination, and monitoring for purposes of ensuring that the implementation dimension does not deviate from expectation when it is putting the planned tasks, roles and activities into practice. Barrett (2003) came to these conclusions while researching the management and motivation of people in general. Dublin (2002) explored the meanings, methods and practices of management as a general concept and reported that the role played by control is so critical in the management of any activity or service (such as education) that it is difficult to achieve expected ends without this dimension (Dublin, 2002). Chapman (2004) while analysing theories of management and leadership in general, pointed out that the type of control that involves the formulation of rules, regulations, standards and guidelines to follow when implementing any plan (be it an educational service delivery plan) is referred to as prescriptive control (Chapman, 2004). It is this type of control that guides the execution of planned tasks, roles, responsibilities, duties, and activities reported Bosch, Tait and Venter (2006) when examining the entrepreneurial approach to business management.

According to Dublin (2002), who explored the meanings, methods and practices of management as a general concept, prescriptive control ensures that any plan is

implemented by complying with formulated procedures, guidelines, rules, and performance standards. While investigating the relationship between internal control and financial performance of UNU University, Duku (2004) found that it also provides a practical basis for coordination and harmonisation of all planned roles, tasks, and activities so that they are conducted and accomplished in a clear and effective manner.

The above observations are general and descriptive, and these apply to all organisations, including educational institutions like UNU University; however, there is no link to the use of ICT. This study is, therefore, necessary to extend these observations by analysing how the effectiveness of the control activities that they highlight is affected when ICT is adopted in an educational institution like UNU University.

The studies of Kayors (2009), Kwagala (2011) and Manyindo (2008) indicate that an additional type of control is referred to as concurrent control. This type involves supervising, overseeing and following up the execution of planned tasks, programmes, responsibilities, and activities to ensure that they are conducted as per plan (Gomez-Mejia, Balkin & Cardy, 2008; Kasenene, 2003). A further type of control is referred to as detective control.

Kwagala (2011) researched the performance indicators of microfinance institutions in Uganda and found that this type of control involves monitoring and evaluation of what is being or has been implemented, checking and reviewing the progress made against plans, giving feedback, and recommending remedial action where modification is deemed necessary. These two types of control, delineated by Kasenene (2003) while investigating management and growth of secular education of the Muslim community in Uganda, are carried out to ensure that desired ends are or have been attained (Kasenene, 2003; Manyindo, 2008). Gomez-Mejia *et al.* (2008) defined the types while dealing with how to manage people and achieve desired performance and change. Generally, these observations indicate that concurrent and detective control involves supervising how plans are being implemented and how they have been implemented, respectively. The observations

were, however, made while describing or relating the specified types of control to variables that differ from the effectiveness of the types of control as influenced by ICT.

The above-identified weakness has, however, been addressed by some scholars who have researched the area of educational services management (Adepiju, 2008; Duncan-Adanusah, 2009; Lewin, 2009; Okebukola, 2006; Shulha, Caruthers & Hopson., 2010). These scholars contextualised the three types of control, describing prescriptive control as a type of control that involves the stipulation of regulations, rules, procedures, performance standards, and time-table that should be observed when implementing planned educational programmes, that is, when delivering the content and/or services highlighted in the programmes to students (Shulha, Caruthers & Hopson., 2010). Concurrent control is described as a type of control involving supervising, guiding and directing the implementation of planned educational programmes and delivery of planned educational services to students (Lewin, 2009). Detective control is delineated as a type that involves the evaluation and monitoring of the delivered services through testing and examining students, marking, grading and accrediting students. Detective control also involves regular review and improvement in the quality of the planned academic programmes (Patton, 2011; Lewin, 2009).

Even though the studies cited described the types of control within the context of educational services management, they fell short of establishing how the effectiveness of each type is affected when ICT is introduced in an educational institution. Duncan-Adanusah (2009) confined his study to the description of the management of school services in Ghana while Shulha, Caruthers & Hopson (2010) were interested in developing programme evaluation standards as guides for evaluators and evaluation users. Lewin (2009) focused on managing and controlling the delivery of school services in Ghana while Okebukola (2006) focused on how to achieve quality control in the Nigerian university system while Patton's (2011) interest was in discussing essentials of utilisation focused evaluation.

Generally, the cited literature indicates that within the context of educational services management, control involves prescribing how educational services should be delivered to students (prescriptive control), supervising how the services are delivered (concurrent control) and monitoring, evaluating and reviewing how they have been delivered (detective control). The literature is however silent on how the effectiveness of each type of control is affected when ICT is introduced in an educational institution. Breaking this silence explains why this study was needed. The study sought to break the silence after establishing that no similar study had been conducted at UNU University and elsewhere. To this end, some studies that had been conducted about management and ICT in education generally, and at UNU University, in particular, were reviewed.

Beginning with studies conducted elsewhere, Ajayi (2001) carried out a study about the role of information and communication technologies in the management of university education. He discovered that although ICT played a decisive role in this management, the role was still insignificant and therefore, needed to be enhanced. Ajayi (2001) therefore, recommended that there was a need to build the capacity for ICT utilisation in Africa universities. Ajayi's (2001) study was however so generalised to all the universities in Africa that it fell short of revealing the ICT situation in the specific African universities like UNU University.

Carnoy (2004) conducted a study on ICT in Education looking at establishing possibilities for adopting ICT in educational management in general and the associated challenges. This study revealed that ICT related positively and significantly with the management of educational services. The scholar concluded that this management would improve if ICT was fully adopted.

Akubuilo (2007) conducted a study in tertiary institutions of Nigeria about how effective the utilisation of ICT was in the management of science instruction at the tertiary level. He found out that this utilisation was not as effective as expected and that there were some factors that inhibited it, the significance of which included low user knowledge on the use of ICT, lack of ICT training and installation of poor-quality ICT.

Akuegwu *et al.* (2011) conducted a study among university lecturers in Nigeria, on the utilisation of information and communication technology facilities in instructional service delivery. They revealed that there was a significant and positive relationship between these variables. They thus concluded that increasing the utilisation of information and communication technology facilities improves the quality of instructional service delivery.

Other studies that have been conducted about the role of ICT in the management of educational services include that of Alexander, McKenzie and Geissinger (2008), Ashton, Beevers, Korabinski and Youngson (2005), Bamiro and Liverpool (2002), Barreket, Scott and Payne (2009), Barter (2004), Bassey, Akuegwu and Udida (2009), Bassey, Umoren, Akuegwu, Udida and Akpama (2007), Casmar (2001), Finley (2003), Hong and Songan (2011),James and Hopkinson (2009), Janardhanam, Ritika and Suresh (2011), MacCallum (2010), Medlin (2001), Okhiria (2007), Okon and Jacob (2002), Onuma (2007), and Scott and Yates (2007). However, these studies were not conducted within the context of establishing the effect of ICT on the effectiveness of managing educational services at UNU University.

Indeed, the study of Alexander *et al.* (2008) concentrated on evaluating the effectiveness of the information technology projects for university learning, not the effect of these projects on the effectiveness of managing educational services. Ashton, Beevers, Korabinski, and Youngson (2005) investigated and established a significant medium effect in the computer-aided assessment of school chemistry and college computing national examinations, but it took a general approach. As to whether the permanent effect applied to UNU University needed to be therefore established. The study of Bamiro and Liverpool (2002) was conducted in Nigeria covering ICT and university administration based on Ibadan and Jos as examples. Barreket ***et al.'s*** (2009) study was about equity and effective use of ICT in higher education generally while that of Barter (2004) concentrated on searching excellence in libraries based on an analysis of managing the writings of Tom Peters and its implications for library and information services.

Also, Bassey *et al.* (2009) conducted a study on ICT management for staff and student empowerment at the University of Calabar while Bassey *et al.'s* 2007 study investigated the impact of technological infrastructures on academic staff work performance in southern Nigerian universities. The study of Casmar (2001) analysed the administrative planning issues of adoption of computer technology by faculty in a college of education, while the study of Finley (2003) took a descriptive approach to examine the utilisation of technology from a perspective of full-time faculty in Virginia's higher education teacher-education programmes. The study of Hong and Songan (2011) analysed ICT in the changing landscape of higher education in South East Asia while that of James and Hopkinson (2009) was about sustainable ICT in further and higher education.

Furthermore, the study of Janardhanam *et al.* (2011) analysed the adoption of new technology in B-school in Bangalore, and that of MacCallum (2010) explored the adoption theory and the integration of mobile technology in education. Medlin (2001) looked at the factors that may influence a faculty member's decision to adopt electronic technologies in instruction. Okhiria (2007) examined ICT in tertiary level education, which included universities and colleges of education. Okon and Jacob (2002) were interested in exploring the use of information technology by academics in selected universities in Nigeria while Onuma's (2007) focus was on suggesting solutions to the problems in the utilisation of ICT in schools. Finally, Scott and Yates (2007) concentrated on the virtual university and educational opportunity investigating issues of equity and access for the next generation.

Focusing on UNU University, many studies have been conducted about ICT, how it is accessed and utilised in the management of particular functions at the university, and the challenges associated with its adoption. One of these studies was that of Aguti and Fraser (2006). The findings of this study revealed that although ICT had been integrated into the management of this programme, the level of integration was still wanting and recommended thus, that there was a need to improve the integration of ICT in the management of this programme. Aguti and Fraser's (2006) study was about integration of ICT in just one of the many educational programmes

at UNU University and did not deal with how the integrated ICT affects the effectiveness of managing all the educational services at the university.

Byaruhanga (2002) observed that the use of ICT was still low in curriculum innovation and implementation, especially in the liberalised higher education system in Uganda. He argued that this situation arose from the inadequate levels of ICT adoption, adding that this problem was still a critical challenge to UNU University. Nakanyike and Nansozi (2003) added their voice by observing that during its ICT transition from 1993 and 2000, UNU University did not realise the critical role of ICT as expected because its rate of ICT adoption was low.

The studies of Byaruhanga (2002) and Nakanyike and Nansozi (2003) were both concerned about the level of adoption and use of ICT, but not effectiveness realised from the adoption and use of ICT, especially in the management of educational services at UNU University.

Tusubira and Mulira (2004) analysed the integration of ICT in the management of UNU University and other organisations. These scholars found out that although ICT contributed positively and significantly to this management, the contribution was still below expectation because of some challenges, which included inadequate financing, installation of inappropriate ICT and low rate of ICT usage explained by incompetency demonstrated by ICT users. The scholars, therefore, made some what they called best practice recommendations, including ensuring that adoption of ICT is adequately financed, making sure that the installed ICT is the appropriate type, and training ICT users to improve their ICT usage competency. Similar observations are recommendations echoed in the work of Tusubira (2005a, 2005b). After adopting the recommendation to train ICT users at UNU University, Bisaso's (2006) study revealed that there were gaps in this training, especially as far as the training of the staff handling the university's educational management was concerned. Although the studies of Bisaso (2006), Tusubira (2005a, 2005b) and Tusubira and Mulira (2004) were conceptually focused on how the adoption and use of ICT could be improved at UNU University, they did not investigate how ICT affected the effectiveness of managing educational services at this university.

Matovu (2009) conducted a study on the availability, accessibility, and use of information and communication technology in the management of student academic affairs at UNU University. The findings revealed significant relationships amongst these variables, implying that the availability, accessibility, and use of ICT affected the management of student registration and examination results in a significant manner. The study was, however, not about how ICT had affected the effectiveness of managing the delivery of educational services. Instead, it focused on how access to and the extent of using the adopted ICT affected the management of student registration and examination results. Certainly, student registration takes place before educational services management begins and examination results are managed after the entire process of educational services management as conceptualised in this study has ended.

Baryamureeba (2007, 2010) conducted investigations into the use of ICT at UNU University. The study conducted in 2007 focused on the role and opportunities of ICT as an engine for Uganda's economic growth. The 2010 study dealt with curricula, which the Faculty of Computing and IT required in order to create the human capital needed for ICT-led economic growth. Neither of these studies focused on how the ICT introduced at UNU University affected the effectiveness of managing educational services.

Tabaire and Okao's (2010) study on how to revive and restore UNU University to a leading institution for academic excellence in Africa, revealed that the University could accelerate the realisation of this end by improving the adoption and use of ICT in the management of its educational functions, programmes, activities and services. The adoption and use of ICT can only be accomplished if it improves efficiency in the management of the University generally, and the educational services in particular. It is, therefore, necessary to establish how this effect has been affected, since the studies, cited above, have not examined this effect.

In general, the previous literature indicates that ICT can have a positive effect on both the management and effectiveness of managing educational services. The effect may be significant or insignificant, depending on the level of adoption and use.

The literature, however, does not cover the impact of ICT adopted and used at UNU and how it affects the effectiveness of managing the university's educational services. Also, the studies do not identify the specific ICT hardware and software adopted and used in the management of these services. Accordingly, the next section provides literature reviewed about the ICT equipment used in the management of the services.

2.4.2 Nature of ICT Tools used in the Management of Educational Services

A perusal of the available literature suggests that the nature of the ICT introduced and used in the management of educational services has been covered in a considerable number of studies (Aginam, 2006; Akinsende, 2002; Ashton *et al.,* 2005; Barreket, Scott & Payne, 2009;Baryamureeba, 2010; Brockman, 2005; Carlsson, 2006; Curtain, 2004; Eggleston *et al.,* 2002; MacCallum, 2010; Sharples, Taylor & Vavoula, 2005; and Stead *et al.,* 2006). While these studies explain the nature of ICT used in this management, and even though some of them discuss the extent of its use, they all fall short of analysing how it affects the effectiveness of this management at UNU University. Notwithstanding this gap, which this study is seeking to address, some of these delineate the nature of this ICT, thereby providing some indicators that can be used to establish the nature of ICT introduced in the management of educational services at UNU University.

The studies of Aginam (2006), Baryamureeba (2010), Curtain (2004) and Eggleston *et al.* (2002) explicitly indicate that the nature of this ICT refers to all forms of hardware and software tools and applications that electronically facilitate the creation, processing, storage, transmission, retrieval and utilisation of information for purposes of educational services planning, delivery in terms of teaching and learning and control in terms of monitoring and evaluation. Newhouse *et al.* (2002) defined ICT as all technologies used for the collection, storage, manipulation, and communication of information. They also defined hardware tools as all physical ICT components and software as electronic instruction files or applications that are used by ICT to complete tasks for a user. Barreket, Scott, and Payne (2009) view this regarding the capacity and cost efficiency of the ICT tools installed to manage

educational services. Capacity refers to how modern, relevant, and adequate ICT tools available for use in educational services management are. While 'modern' refers to how up-to-date the tools are, 'relevance' refers to how appropriate the ICT tools are in facilitating the management of educational services as expected (Adepiju, 2008; Alexander, McKenzie & Geissinger, 2008). ICT cost efficiency compares the cost incurred to install ICT tools to the budgeted cost. ICT is cost efficient when the cost incurred to install it is equal to or less than the expected cost. The studies cited above describe the nature of ICT concerning installed hardware and software tools, their cost efficiency, adequacy, modernity, and appropriateness to the management of educational services. The studies, however, treat ICT in general terms, thereby falling short of specifying any installed ICT tools, particularly at UNU University. There is, therefore, a gap about the nature of ICT installed at UNU University, and it is this gap this study sought to fill.

Research indicates that there are some hardware and software tools that have been developed to facilitate the management of educational services such as teaching, lecturing, research, provision of library information, and others that support learning. According to Newhouse (2002a:14) the most important of all ICT tools is a computer defined "as an electronic machine, operated under the control of instructions stored in its own memory, which can accept data (input), manipulate data according to specified rules (process), produce results (output) and store the results for future use". Other ICT tools include software and hardware such as internet services that facilitate searches of online sources of publications, online access to book dealers and book publishers and order placement, checking in, query on-order records using the World Wide Web; and intranet facilities that support the design, development and storage of information formatted as web pages and made accessible through the Local Area Network (LAN) (Odey, 2009; Okon & Jacob, 2002; Madu, 2004).

Other ICT tools include Data Communication (DC) tools,Electronic Performance Support Software (EPSS),Computer Managed Learning (CML) systems, personal computers such as laptops, monitors, desktops, CPUs, databases, CD-ROMs, MS internet information server, electronic mailing, networked information services, Universal Resource Locators (URL), access from home, shared curriculum

resources, video-conferencing facilities, handheld mobile telecommunication facilities, library services management and many other devices designed to facilitate information creation and utilisation for educational purposes (Akinsende, 2002; Fife & Pereira, 2003; Itohowo, 2005; Newhouse, 2002b; Sharples, Taylor & Vavoula 2005). Other tools include personal digital assistants, mobile telephones and MP3 players, radio, television (Carlsson, 2006; Kwon & Chidambaram, 2000; MacCallum & Jeffrey, 2009). Each of these tools has the capacity or can be configured to have the capacity to support teaching and/or enable learning (Stead *et al.,* 2006). Indeed, computers and the Internet complement each other to form powerful and essential educational tools, which have made teaching and learning virtual, easy and effective (Pedersen, 2003; MacCallum & Jeffrey, 2009). Mobile ICT facilities like mobile telephone sets have made a significant contribution to teaching and learning (Carlsson, 2006).

Although the above studies identify some tools that define and characterise the nature of ICT used in the management of educational services, they are specified while dealing with institutions and case studies differ with UNU University. In particular, the study of Odey (2009) focused on ICT as a useful tool for university education. The same applies to the study of James and Hopkinson (2009) as it focused on sustainable ICT in further and higher education generally. Madu's (2004) study was also generalised to all developing countries as it covered technology for information management and services in modern libraries and information centres. Okon and Jacob (2002) identified the tools while dealing with the use of information technology by academics in selected universities in Nigeria.

Itohowo's (2005) study was conducted in Nigeria while that of Sharples *et al.,* (2005) involved developing a theory of mobile learning. The study of Fife and Pereira (2003) investigated the diffusion of mobile data applications while that of Akinsende (2002) researched electronics services in Nigerian libraries. Kwon and Chidambaram (2000) concentrated on attitudes toward knowledge sharing in the adoption of mobile devices or services. MacCallum and Jeffrey (2009), Carlsson (2006) and Pedersen (2003) dealt with the adoption of mobile devices and services. Based on the above

research, there is, therefore, need to verify whether the tools that are identified apply to UNU University.

Several studies have revealed that ICT tools such as iPad, laptops, modems and other handheld tools provide many opportunities for widening participation and enabling easier access to learning at any convenient location (Stead *et al.,* 2006). These tools support mobile and online teaching and learning by using devices, features and facilities that enable phone calls, taking pictures and images, recording audio and video messages, storing data, playing music and movies, and interacting with the Internet (Pedersen, 2003; Teo & Pok, 2003). According to Lee, Kim and Chung (2002), as more and more new devices continue to come onto the market, new features and capabilities are appearing at an accelerated pace, thereby making teaching and learning more comfortable, more accessible and more effective in meeting learning needs and educational expectations. Therefore, ICT opens the door to countless uses for educational purposes and offers a more convenient and effective change in learning (Phuangthong & Malisawan, 2005).

Information and Communication Technologies (ICT) are a diverse set of technological tools and resources used to communicate, and to create, disseminate, store, and manage information. ICTs are also those technologies that can be used to interlink information technology devices such as personal computers with communication technologies such as telephones and their telecommunication networks. Chee (2006), Kirimi (2014), Osakwe (2013) and Oviawe (2011) define ICTs as a range of electronic technologies which, when converged in new configurations, are flexible, adaptable, enabling and capable of transforming organisations and redefining social relations. Personal computers and laptops with e-mail and the Internet provide the best example. The range of technologies is continually increasing, and there is a convergence between the new technologies and conventional media (Chee, 2006; Kirimi, 2014; Osakwe, 2013; Oviawe, 2011). Information and communication technology (ICT) has proliferated in all spheres of society in different areas. Examples of ICTs include fax, video-conferencing, digital radio, e-mail, broadband, network (wired and wireless, mobile phones, GPS (Global Positioning Systems), instant messaging, digital television.

ICTs are also defined as all communication technologies (computers, internet, telecommunications, telephones, cameras .and so forth) installed to enhance the capture, storage, transfer, and usage of information needed. ICT has made tremendous contributions in various areas. Communication and information are at the very heart of the educational process, and consequently, ICT-use in education has a long history.

In educational services management, which is the focus of this study, ICT has made a significant contribution to the communication and consultation between students and higher education institution staff (Gani, 2013). Students do not only use ICT to produce objects for display of information but use it to create knowledge (Scardamalia & Bereiter, 2003). The students produce theories, models, proofs, problem formulations, interpretations, histories, critiques, and the like. These function for them as conceptual tools used in making sense of the world. ICT is therefore relevant because of the roles it can play in supporting a process of continued knowledge advancement, such as educational services management (Bereiter & Scardamalia, 2006).

A review of various studies suggests that installing ICT facilities such as internet-connected desktop computers and institutional cyber cafes, Local Area Network (LAN) and Wireless Area Network (WAN), Domain Name Service (DNS), proxy servers, firewall, email connectivity, and e-learning programmes improves the quality of learning in universities. For example, Aginam (2006) listed some ICT facilities that improve the quality of learning in universities in Nigeria such as Local Area Network (LAN) and Wireless Area Network (WAN), Domain Name Service (DNS), proxy servers, firewall, email connectivity, and e-learning programmes. Akubuilo (2007) conducted a study in tertiary institutions of Nigeria about how effective the utilisation of ICT is in the management of science instruction at the tertiary level. Akuegwu *et al.* (2011) conducted a study among university lecturers in Nigeria on the utilisation of information and communication technology facilities in instructional service delivery. Okebukola (2006) focused on how to achieve quality control in a Nigerian university system. Bassey, Okodoko and Akpanumoh (2009) posit that proper utilisation of ICT by university management was crucial in Nigeria to achieve high-

level workforce. These facilities also improve efficiency in the delivery of educational services, especially when lecturers utilise the facilities effectively.

It should be noted that although these scholars identified various types of ICT equipment, programmes, and services used in the management of educational services, many did not focus on those used at UNU University. Even scholars such as Matovu (2009), whose study focused on UNU University, did not attempt to identify the ICT facilities used in the management of educational services at the University. He only identified those used in the management of student registration and examination records. The scholars listed above have therefore left a gap regarding the specific ICT tools used at UNU University. This is another gap that this study proposed to fill.

2.4.3 Perceptions and Experiences of Educational Services Managers on the Effectiveness of ICT Implementation

Many studies have been conducted on the perception and experience of diverse categories of ICT-users including teachers, lecturers and educational services managers on the effectiveness of ICT. A study of the available literature suggests that the perceptions and experience of ICT users concerning the implementation of ICT has been covered in a considerable number of studies (Nyambane & Nzuki, 2014; Buabeng-Andoh, 2012; Krishnaveni & Meenakumari, 2010; Mishra & Akman, 2010; Václav, Antonín, & Petra, 2011; Zahra, 2013).

While each of these studies attempts to explain the perceptions and experiences of effectiveness regarding ICT implementation in different educational and non-educational institutions, none shows how the educational service managers at UNU University perceive and experience the effectiveness of ICT. A study by Deaney, Ruthven and Hennessy (2003), carried out in Britain, focused on pupil perceptions on the contribution of Information and Communication Technology to teaching and learning in the secondary school. The study showed pupils valued ICT tools as enabling them to carry out academic tasks easily, rapidly and reliably, yielding results of high quality. The students, however, experienced situations where they

were hampered in exploiting this potential because of lack of proficiency in using the tools.

In a study conducted by Akpan (2014), it was found that on average, teachers feel that ICT has helped them increase their classroom efficiency. They also discovered that teacher perception of their increased job efficiency was associated with their level of ICT competence. This finding suggests that ICT is useful in providing educational delivery to students. According to BECTA (2007), leadership and management are significant factors, particularly when policy becomes practice and developments in ICT become embedded in the life of the school and experiences of staff and students. BECTA (2007) further opines that within schools, networking has a number of potential benefits, including more accessible and more effective communication, central record keeping and monitoring, access to shared resources and information and standardisation across administration processes.

Hamdane, Khaldi and Bouzinab (2013) researched the perceptions of the effectiveness of ICT implementation in the teaching of Mathematics in Morocco. The government, through its Ministry of Education, has invested heavily in the new technology showing how crucial it is in the management of educational services in the country. Another study, conducted in South Korea by Song and Kang (2012), concentrated on evaluating the impact of ICT-use, taking a multi-level analysis with hierarchical linear modelling. In this study, some variables were seen to affect the level and efficiency of ICT implementation in educational institutions, among them being the perceptions of the principals of the educational institutions. In their study, Bassey, Okodoko and Akpanumoh (2009) posit that proper utilisation of ICT by university management is crucial in Nigeria if they want to achieve the aim of providing high-level workforce.

Alharbi and Drew (2014) conducted a study on using the Technology Acceptance Model in understanding the academic, behavioural intention to use Learning Management Systems in Saudi Arabian schools. They discuss how important the education services managers in this country consider ICT-use as a vehicle for effective and efficient teaching and learning tool, the low levels of the technology so

far notwithstanding. In an earlier study conducted in Saudi Arabia, Althobeti (2013) dealt with administration and integration of ICT in Saudi Universities, and his findings are similar. Umeagukwu and Ngozi (2014), discussing an analysis of ICT impact on the curricula of major Nigerian Universities in the last ten years 2003-2013, took a critical look at the emergence of ICT and the development stages in a Nigerian university. They further display the effect and impact of ICT on university curricular and expose some challenges faced by educational services managers in the proper diffusion of ICT into Nigerian universities.

In Ghana, the study conducted by Buabeng-Andoh (2012), notes that to initiate and implement educational technology in the school programme successfully depends strongly on teacher support and attitudes. He points out that if teachers perceived technology programmes as neither fulfilling their own needs nor their students', it is likely that they will not integrate the technology into teaching and learning. Evidence suggests that teacher attitudes and beliefs influence the successful integration of ICT into teaching (Hew & Brush, 2007). On the other hand, if teacher attitudes are favorable toward the use of educational technology, or ICT for that matter, then they can easily provide useful insight about the adoption and integration of ICT into the teaching and learning processes (Buabeng-Andoh, 2012).

The Ministry of Education in Iran invested a great deal in facilitating the integration of ICT in schools (Afshari *et al.,* 2010). Research into the use of computers by secondary school principals showed that despite significant expenditure of funds, the potential for ICT to alter principal use for instructional and administrative purposes, teachers' teaching methods, and student learning processes in Iranian schools had not been fully realised. Factors identified in this research point to the need for high-level computer access, strong perceptions of the role that ICT plays, a high level of computer competence, and most importantly, and a high level of leadership to effect change (Afshari *et al.,* 2010).

Further research findings on the perceptions and experience on the effectiveness of ICT implementation in educational services management conducted in the Republic of Kenya show that despite the investments on ICT infrastructure, equipment and

professional development to improve education, effective integration of this technology into classroom practices poses a challenge to teachers, administrators, and policymakers. Research conducted in some schools established that many were not effectively adopting and using ICT to support learning, teaching and management as intended (Nyambane & Nzuki, 2014). The success of integration and effective adoption of ICT was therefore not dependent on the availability or absence of one individual factor, but was determined through a dynamic process involving a set of interrelated factors among which were the negative perceptions of these teachers, administrators and policymakers on the new technology (Nyambane & Nzuki, 2014).

In Uganda, (Ali, Haolader and Muhammad, 2013) found that various levels of leadership such as principal, administrative leadership and technology leadership influenced the successful use of ICT in schools. These aspects of leadership help the principal share tasks with subordinates while focusing on the adoption and integration of technology in the school. Institutions exemplified by executive involvement and decision-making, strengthened by an ICT plan, effectively adopt the ICT integration curriculum (Ali, Haolader & Muhammad 2013). This study also revealed that the majority of the administrators in the Higher Education institutions in Uganda regularly used ICT in administration, thus simplifying their administrative work. The researchers found out that ICT exposes teachers and administrators to the modern world through searching, reading, and connecting with resources from around the world with the help of the Internet. Among other benefits of ICT-use in the institutions studied, ICT facilitated the advertisement of the institution on the World Wide Web: students could enrol for courses online and vacant positions were advertised electronically. The researchers, therefore, suggested that for effective administration, the institutions should implement ICT-use in order to facilitate their administrative work (Ali *et al.,* 2013).

E-Learning Nordic (2006), a study conducted on the impact of ICT on education in Finland, Sweden, Norway, and Denmark reveals that it was essential to involve headmasters in the implementation of ICT in schools. They are responsible for setting the strategies for their individual schools and for determining the means to be

used for meeting the goals of ICT integration in teaching. The headmasters also knew to what degree they saw ICT as a tool to achieve school objectives and, if they did, to what degree they had experienced any such impact. The headmasters were also in charge of deciding the conditions for ICT-use (such as type and amount of equipment, competence development, and support) (E-Learning Nordic, 2006). This study reveals the perceptions and experience of education service managers on the effectiveness of ICT implementation in countries in the Nordic region.

Leadership characteristics in Australian schools, according to Grainger and Tolhurst (2005), are crucial because they can also affect the context of ICT implementation in schools. These researchers investigated links between leadership characteristics and successful ICT initiatives in schools. They classified schools based on the model of change management that was being effectively utilised by the school and its leaders. In one of the ICT adoption models considered in the study, the catalytic integration model, the school principal was identified as the key change agent, exhibiting visionary leadership. As a result, staff development and involvement in ICT implementation, among other activities, was cultivated among teaching staff. On a particular note, the researchers report that organisational culture has influenced the successful implementation of several collaboration-focus technologies such as Lotus Notes, CASE tools, advanced manufacturing technologies, and intranets (Grainger & Tolhurst, 2005). The survey conducted by Grainger and Tolhurst (2005) covered a variety of leadership questions. The results showed that teachers felt executive staff were involved in the implementation of new ICT tools and systems (84%), that generally executive staff help communicate the benefits of new ICT tools and systems (61%), and that on the whole, the use of ICT at the school is seen as a priority by executive staff (73%).

Al-Mobaideen (2009), in his findings about managers' perceptions and experience on the effectiveness regarding the implementation of ICT in Jordanian universities, reports that some of the success factors may depend on specific organisational attributes such as the stakeholders within a university environment, the university itself and its situation within the higher education institution (HEI) sector and the environment, such as government policies and strategies, international grant

organisations such as the World Bank, USAID and UNESCO. He further reveals that universities in Jordan use formalised ICT procedures to provide management at all levels in all functions with appropriate information based on data from both internal and external sources, to enable them to make timely and effective decisions for planning, directing and controlling the activities for which they are responsible. According to Maki (2008), ICT plays a vital role in supporting powerful, efficient management and administration in the education sector. This technology can be used right from student administration to various resource administrations in an educational institution such as a university.

ICT is changing the way head teachers run their schools using a combination of strong central direction and distributed or shared leadership, in which leadership was given to those who showed enthusiasm, skill, and knowledge in an area of development. In this way, the leadership role of the head teacher is made much easier by the use of the ICT technology. Perry (2003) evaluated the use of handheld computers or personal digital assistant (PDAs) in schools, including how senior management and leadership teams use this technology to manage their work. How senior managers made personal use of the PDAs included synchronising the timetable and meeting arrangements across their management team or even the whole school staff, accessing staff and student contact details, writing documents and making PowerPoint presentations. PDAs were also found to have a role in monitoring truancy. This use of ICT in schools, can in a similar manner be applied by educational services managers of higher education institutions and universities. Williams (2010) in his case study on the academic staff perceptions on the effectiveness of ICT and e-learning implementation talks about the pressures on Thai universities to provide the government with evidence of achieving set course standards and student performances. Universities also have the task of ensuring that stakeholder money is spent as efficiently and effectively as possible. For this reason, many Thai universities are turning towards managing quality in e-Learning environments by ensuring effective implementation of ICT (Williams, 2010).

In research carried out in the United Kingdom schools, Crawford (2001) points out how online conferencing worked for those educational services managers who were

involved in the study. He showed how ICT played a role in providing them with support, affirmation, and direction for their leadership. Walsh (2002) in his study of ICT use, based on interviews with school principals in England, Australia and Singapore, reveals that with the development of ICT, a new type of leader has emerged, an instructional and transformational leader who through commitment and enthusiasm for learning, works with colleagues across the curriculum to embed ICT in the learning process. Meanwhile, Yee (2000) investigated the ICT experience among ten school principals drawn from Canada, New Zealand, and the United States of America whose schools were ICT-enriched. The ICT leadership characteristics and practices, demonstrated by the principals, reflected transformational leadership factors such as charisma, inspiration, and innovation. Barta, Telem and Gev (1994) and Carter and Burger (1994) carried out two different studies. In their reviews on how education managers can manage primary and secondary schools, they state that using a Management Information System (MIS) can reduce the burden of administrative tasks and make more time for effective management, teaching, and assessment.

A major study carried out between 1999 and 2002, involving 60 schools in England, showed that managers perceived ICT provision as inadequate to meet the demands of ICT-discrete sessions and the use of ICT in the curriculum, with subject work using ICT mainly losing out (ImpaCT2, 2002). Senior managers are still very concerned with the sustainability and improvement of ICT provision. The perceptions and experiences in this study contravene the majority of educational services managers' perceptions of the effectiveness of ICT implementation. North, Strain, and Abbott (2000) however, re-echo the views of managers who perceive ICT implementation in a positive light, sharing the findings of other work by Barta, Telem and Gev 1994 as well as Carter and Burger (1994). Selwood and Drenoyianni (1997) examine how computerised management information systems (MIS) can support the information and decision-making needs of school leaders. They further note that well-designed and implemented MIS assist educational managers in planning, organising, reviewing, monitoring and evaluating the operation of their schools. Telem (2001), who investigated the effects of introducing MIS into a secondary school in an Israeli case study, found changes in the way the school handled its flow

of information. The MIS significantly increased the principal's control over the school. Additionally, Visscher (1996) contends that senior managers who frequently analyse pupil data can operate more effective schools.

On ICT implementation in libraries, Eguavoen (2011) notes that the drastic change in library practice, brought about by rapid changes in information communication technology, is posing challenges to the librarians in recent time, particularly in developing countries. To cope with these challenges posed by ICT, librarians in developed countries moved quickly to learn and adopt new information technologies (Eguavoen 2011). Library services are of paramount importance in educational services management of a university. Eguavoen (2011) further points out that significant and fast changes occurring in librarianship, where digital and electronic libraries are being established to complement, and in some cases to completely replace, the traditional libraries.

Nchunge, Sakwa, and Mwangi (2012) drew on survey responses from managers using Executive Information Systems (EIS) across organisations in Mexico, Sweden, and the United States of America. Their study examined whether cultural differences influence perceptions of the relationship between EIS-use and decision-making outcomes. The study found significant differences, predicted by cultural factors, in the impact of EIS-use on senior management decision-making.

As previously stated, the Ministry of Education in Iran invested a great deal in facilitating the integration of ICT in schools. Afsari *et al.* (2010) suggest that to ensure the effectiveness of ICT implementation, educational leadership programmes should be provided to train principals to use technology as a management tool and stated that if principals do not use technology on a consistent basis, they should not also expect the faculty to use technology regularly.

Ilomaki (2008), researching the effects of ICT on school as perceived by teachers and students, contends that in a successful ICT implementation, the principal and the school board are also key actors. Kyakulumbye, Olobo and Kisenyi (2013) argue that top management needs to establish willingness on the part of the organisational

members by creating a climate of cooperation, demonstrating the efficacy of the new system and its benefits over the old ways of doing things. They further add that the degree of acceptance or resistance to ICT projects will be due to the degree of top management support for the project. Kyakulumbye, Olobo and Kisenyi (2013) point out that top management systems are critical issues in ICT utilisation among users. They also recommend that for ICT usability, there needs to be ICT capacity building among staff to improve skills. This means that leader awareness, understanding, and use of ICTs are essential for effective utilisation of ICTs among staff. The reverse is also true.

Nyaga (2010) underscores fear of the use of ICT by the administration in her study about challenges of ICT implementation in Kenyan secondary schools. She reports that there is still a keen perception, especially by the older generation, that computers require highly skilled personnel to operate them and that some school administrators also fear that their students will be exposed to adult sites and other undesired sites, through the use of the Internet. There is also fear of the infection of viruses to their computers leading to data loss. This means that although there is a need for ICT use by the education services managers, there are reservations about its effectiveness.

Mingaine's (2013) research supports the idea that school leadership behaviour determines the success or failure of schools to implement ICT in its activities. These studies add to others to testify that a school leader's behaviour is fundamental in the implementation of ICT in schools. This means that the educational services managers must thoroughly understand the challenges of ICT implementation they face themselves, in order to appreciate those faced by the institutions to which they provide leadership. Mingaine (2013) further reveals that the educational services managers in Kenya, despite the Government National Policy on ICT implementation, have not yet entirely taken it up. In concluding his report on the skill challenges in the adoption and use of ICT in public secondary schools in Kenya, Mingaine (2013) recommends that teachers need examples of good practice and leadership from their school leaders and necessary time for professional development in order to successfully implement ICT in schools. He adds that ICT use by school leaders will

have a commendable encouraging result on those teachers who may have a more indifferent attitude towards technology.

According to Davis (1993), lack of user acceptance has long impeded the success of new information systems such as ICT. He addresses why users accept or reject information systems and how system design features affect user acceptance. The Technology Acceptance Model (TAM) specifies the causal relationship between system design features, perceived usefulness, perceived ease of use, attitude towards using and actual usage behaviour (Davis, 1993). TAM is, therefore, an important model in that it determines the perception and experience of the educational services manager on the effectiveness of ICT. Consequently, the model will determine whether the educational services manager will adopt it for his or her usage in accomplishing daily tasks or encourage his or her subordinates to use it.

There are diverse perceptions and experiences of educational services managers on the effectiveness of ICT hardware and software tools that have been developed to facilitate the management of educational services such as teaching, lecturing, research, provision of library information and others that support educational services in a review of the work of scholars. In particular, are the studies of Ali *et al.,* (2013) on the role of ICT to make teaching learning in higher institutions of learning in Uganda, and Krishnaveni and Meenakumari (2010) in the use of ICT for information administration in higher education institutions. Mingaine (2013) found that school leadership behaviour determined the success or failure of schools to implement ICT in its activities in Kenya and Omona *et al.,* (2010) indicated that the perceptions and experience of educational services managers refer to what these managers see in terms of ICT implementation, how they feel about the effectiveness of the ICT implementation and how much ICT they should use or actually use in their daily tasks of educational services management. Makewa, Meremo, Role, and Role (2013) carried out their study on ICT in secondary school administration in rural Southern Kenya on its importance and use. They report teacher and administrator perceptions on the importance of ICT in secondary school administration presenting an evaluation of the extent to which administrators and teachers used it. They found

out that both the teachers and administrators considered ICT as vital in carrying out their duties.

The above literature describes the perceptions and experience of the educational services managers on the effectiveness of ICT regarding installed hardware and software tools, their cost efficiency, adequacy, modernity, and appropriateness to the management of educational services. The studies, however, treat these perceptions and experiences in general terms. These studies deal with institutions and case studies that differ from UNU University. In particular, Obiri-Yeboah, Kwarteng and Kyere-Djan's (2013) study investigated factors affecting ICT adoption in Ghanaian tertiary institutions while that of Odongo (2011) provided an assessment of ICT adoption in Kenyan university libraries. Magambo (2007) writes about the use of ICTs in teacher education in Sub-Saharan Africa in selected African universities. Mudasiru, Modupe & Balogun (2011) reveals student-teacher competence and attitude towards Information and Communication Technology in a Nigerian University. A study conducted by Bafrouei, Sarlak, Mahmoudi and Jandaghi (2014) concentrated on evaluating the use of ICT in Universities and Higher Education Institutes in the City of Qom from managers' points of view. Kirimi (2014) underscores the impact of ICT on education in Kenya, citing in brief terms how perceptions of educational services managers play an important role.

Anyamene, Nwokolo and Anyachebelu (2012) discuss the availability and use of ICT resources for counselling university students in South East States, Nigeria. They point out that implementing ICT in schools is the responsibility of school principals, who need to ensure that the best interests of the students are served through effective ICT infrastructure and staff professional development. The principal is responsible for the investment, financial and otherwise, of ICT in the school for the benefit of the whole community.

Osakwe's (2013) study focused on the impact of ICT on teacher education and its implication for professional development in Nigeria while that of Chee (2006) dealt with the implications of advances in ICT for Universities in Singapore. Oviawe and Oshio (2011) discussed the impact ICT on teaching and learning the ability of

Education Students in Universities in Edo State, Nigeria. Kalema (2013) discussed strategising with ICT to manage large universities enrolments while Nisar, Munir and Ali Shad (2011) focused on the usage and impact of ICT in the education sector in general in Pakistan.

A review of various studies suggests that educational services managers who take charge of the educational institutions at various levels perceive and experience the effectiveness regarding the implementation of ICT in different ways, but the majority perceive and experience ICT as a tool that enhances their performance (Adeyemi, 2011; Carnoy, 2004). Daouk, 1995; Giusy, 2007; Kyalo & Nzuki, 2014; Oguta, Egessa & Mushiega, 2014). Adeyemi (2011) reported on the effectiveness regarding the implementation of ICT understanding it as central to effective functioning. Carnoy (2004) revealed that ICT related positively and significantly with the management of educational services. Daouk (1995) underscored the uses of ICT in a private Lebanese university in the changing of modes of work for teachers and librarians. Giusy (2007) established the impact of ICT in school, the modification of the school activities and the learning environment using ICT to overcome distance and isolation. Kyalo and Nzuki (2014) presented the determinants of information and communication technology (ICT) integration in tertiary institutions while Oguta, Egessa & Mushiega (2014) noted the effects of Information Communication and Technology (ICT) application on strategic educational quality standards and management in Bungoma County of Kenya.

In conclusion, it should be noted that although these scholars identified various ways in which educational services managers perceive and experience the effectiveness regarding ICT, none focused on those used at UNU University. Even scholars such as Matovu (2009), whose research was conducted on UNU University, made little attempt to identify the perceptions and experiences of educational managers regarding the effectiveness in ICT implementation at the University. He limited himself to ICT equipment used in the management of student registration and examination records. The scholars, therefore, left a gap this study proposed to fill. There is, therefore, need to verify whether or not their discussions of the perceptions

and experiences of educational services managers regarding the effectiveness of ICT implementation apply to UNU University.

2.5 EFFECT OF ICT ON UNIVERSITY MANAGEMENT AND STUDENT LEARNING

This section looks at two aspects of the ICT effect, that on University Management and that on Student Learning at UNU University.

2.5.1 Effect of ICT on University Management

University management is a category that is engaged in activities, which ensure that the teaching and learning activities of the university take place, in addition to ensuring other non-teaching departments complete their work effectively. University management is at the helm of the conduct of all university operations and comprises departments such as academic records, library and resource centre, finance, estates, student support services, human resource to mention a few of them. A plethora of research studies concerning the effect of ICT on university management has been carried out.

Among the studies on ICT and university management is that of Moyle (2006), whose Australian study focused on the role of ICT on the library. The participants consistently mentioned the physical spaces of libraries and/or resource centres, and the roles of teacher librarians. She delineates that libraries and resource centres are growing to include a range of electronic and digital resources and facilities now being renamed with labels such as the ‘Thinking Centre’ or the ‘Centre for Solutions’. At UNU University, information systems have been established to simplify the management of libraries, human resources, finance and academic records (UNU University ICT Policy and Master Plan, 2001). In this policy, the university aims at improving both the efficiency and effectiveness of library operations and services through the implementation of an integrated on-line Library Information System (LIBIS).

Krubu and Osawaru (2010), in their study on the impact of ICT in Nigerian university libraries, posit that the effect of technology is remarkable since it enables automation of most library services. In Kenya, Ujunju, Wanyembi and Wabwoba (2012) evaluated the role of ICT on the management of institutions of higher learning used mainly in the context of running different campuses of the same learning institution. They concluded that ICT provided advantage regarding service improvement and in lowering the cost of strategic management functions.

At UNU University also, there exists a system termed the Academic Records System (ARIS), which is the generic term for the collection of ICT services designed to support student and education-related administrative and managerial processes. These include management of student personal records, student academic performance registration and analysis, student admission/ registration, examinations, management of data related to academic programmes and courses, allocation of facilities and staff, class scheduling (UNU University ICT Policy and Master Plan, 2001).

Hengst and Sol (2001) emphasise that developments in ICT such as the World Wide Web, electronic data Interchange, and electronic mail can be seen as enablers to cross-organisational boundaries more easily when dealing with information-intensive processes. This exchange of information is also critical in a university setting particularly between the administrative and academic departments, making university management more accessible and more effective. ICT adoption in university management, as reported by Mutagahywa (2012), also enhances monitoring performance of teaching/research and various projects and simplifies various university processes. Bogere*,* Haolader and Rahman (2013) consider ICT a strategic and essential functional requirement for many institutions of higher learning. Bogere, Haolader and Rahman *(*2013) further posit that in the developing world, ICT is achieving a breakthrough in management and teaching through online learning, which helps to cater to the increasing student population.

Further research on the effect of ICT on the management of university records was carried out by Gitonga, Ndirangu and Githeko (2013). Their findings indicated that

the majority of students and staff perceived ICT integration in student records management as influencing positively on the quality of its management. Bhardwaj and Singh (2011) report on an Automated Integrated University Examination System in India, stating that ICT is a useful tool for integrating and automating various activities of examination system at different administrative levels to bring reliable, efficient, scalable, transparent, and robust e-governance solutions. Apulu and Latham (2011) stated that ICT removes distance and time constraints in accessing required information flows. They further point out that it reduces the cost of production, as knowledge is produced, transmitted, accessed, and shared at the minimum cost. There is a reduction in the degree of inefficiencies and uncertainty with the use of ICT because it enables businesses or institutions such as universities to interact more efficiently (Apulu & Latham, 2011). The University of South Africa (UNISA), a comprehensive distance higher education institution, espouses values among which are being accessible to all students and responding to the needs of the global market. This dream of the university would not be met efficiently without the use of ICT in its management of educational services.

Increasing transparency and accountability in budgetary and financial management, revenue mobilisation and expenditure can be achieved through the adoption of ICT (Mutagahywa, 2012). The financial management function at UNU University, like in any organisation, encompasses a significant number of closely related administrative and managerial processes. Financial processes combine day-to-day verification and registration of financial transactions with managerial tasks like financial forecasting (budgeting), allocation of funds, performance monitoring, budgetary control, decision-making, and auditing. The University Policy aims to enhance and streamline financial management processes and reporting facilities at both central and faculty level through the implementation of an integrated Financial Information System (FINIS) (UNU University ICT Policy and Master Plan, 2001).

UNU University established the Human Resource Information System (HURIS). Human resource management refers to adequate utilisation of human labour for productivity and attainment of the organisational mission, goals and objectives. At UNU University, human resources form a primary organisational resource, which is

scarce, expensive, and difficult to maintain (UNU University ICT Policy and Master Plan, 2001). The University of Dodoma's (Tanzania) ICT policy states that it is meant to guide the handling of organisational information within the University. This ensures compliance among university staff with applicable statutes, regulations, and mandates for the management of information resources. ICT is thus important is in ensuring the discharge of the human resource function of university management (ICT Policy of the University of Dodoma). The positive effect of ICT on the productivity of the labour force was reported by Kamuzora (2006) citing examples of economies of the United States, Canada, European Union, Australia, and Tanzania. This could translate to the productivity of the labour force of any university, which adopts ICT in its management and ensures its effective utilisation.

Research on the provision of student support services, which is one of the functions of university management, reveals the significant impact that ICT has on counselling among Nigerian University students. They categorically state that ICT generated high levels of enthusiasm and commitment during the counselling process as well as increased reasoning ability of learners, increased attention, and concentration (Anyamene *et al.* 2012). Other forms of student support could be in information dissemination, programme (conferences and seminars) planning, and execution, communication at different levels, crises prevention and management. With this array of interest areas, ICT has become a versatile tool for running a smooth and efficient university system (Babatunde, Kayode, Aderonke, Bethy & Ola, 2012). There can be increased access for the university community to the processes of policymaking, rulemaking and procedures. Also, the interaction between university management/administration with internal and external stakeholders is facilitated when ICT is adopted in university management (Mutagahywa, 2012).

In a study conducted by Uchendu (2012) on the use of ICT in the management of Nigerian Universities, he recommends that the Nigerian government should provide funds for universities, at both federal and state levels, to access ICT facilities to make their work more efficient and thus more effective. To further strengthen the argument for the use of ICT in university management, the study of Adebayo (2012) recommends that administrators of polytechnics in Nigeria should place greater

emphasis on ICT in their respective institutions to foster the capacity building of human resources, material resources, and financial resources. The University of Glasgow, in its Information and Communication Technology Infrastructure Strategy (2005), sets out a medium to a long-term vision of how ICT infrastructure will develop to support the University in its increasing dependency on Information Technology (IT) and help enhance the performance of the University in achieving its mission. This is yet another demonstration of the positive effect of ICT on university management.

A review of various studies suggests that university managers(Officers of the University) and managers of educational institutions at various levels should consider ICT as a tool that enhances their performance and that of the other stakeholders in the university system (Balasubramanian, Clarke-Okah, Daniel, Ferreira, Kanwar, Kwan, Lesperance, Mallet, Umar & West, 2009; Emmanuel & Sife, 2008; Kasozi, 2012;Oboegbulem & Ochai, 2013; Olsson, 2002; Slavici, Mnerie, Darvasi, Untaru & Dorneanun, 2011; Ujunju, Wanyembi & Wabwoba, 2012).

2.5.2 Effect of ICT on Student Learning

This section deals with how ICT impacts on student learning. Research indicates that ICT facilities have revolutionised the management of educational services and student learning in particular, and enhanced the effectiveness of this management by providing consolidated data centre services, enabling efficient access to the centres and sharing of the information provided by the centres to support the conduct of this management (Bassey, Akuegwu & Udida, 2009). ICT acts as a catalyst and a powerful lever for delivering planned educational services (Carnoy, 2004). In researching the positive and significant effect of ICT on the management of higher education, James and Hopkinson (2009) concluded that the integration of ICT in higher education was inevitable. Daniels (2002) observed that ICT equipment, programmes, and services have become a core part of education because of the role they play in facilitating reading, writing and numeracy. According to Moeller and Reitzes (2011), ICT has a significant effect in teaching and learning processes because it increases interaction with and reception of educational information.

Moeller and Reitzes (2011) observed that ICT significantly improves the teaching and learning methods used by teachers by making them integrative and interactive, giving way to new scenarios, which favour both individual and collaborative learning. They went on to point out that, ICT increases the flexibility of delivery of education in such a way that learners access knowledge anytime and from anywhere. It also significantly improves the way students are taught and how they learn, by making the teaching-learning process learner-driven as opposed to being teacher-propelled (Bennett & Bennett, 2003; Finley, 2003; Less, 2003; Seemann, 2003). ICT therefore enhances the quality of lifelong learning and makes the preparation of learners better (Moore & Kearsley, 1996). A similar conclusion was reached by Less (2003) after investigating faculty adoption of computer technology for instruction in the North Carolina Community College System.

Although the studies highlight the significant and positive effect of ICT on student learning, the studies do not specify the teaching-learning methods. Such methods are described in the work of Kankunda (2009), Krishnaveni and Anitha (2007), Watty, Hilliar, Ji, Magdziarz and Simpson (2006), Harwell *et al.* (2003), and Wilen *et al.* (2000) as educational service management techniques that involve curriculum designing, development of work schedules, lesson planning, classroom teaching (lecturing), and student evaluation.

The above studies were not conducted at UNU University, and despite describing the specific techniques of student learning, they did not delve into how ICT affects or improves student learning, particularly at UNU University. In fact, even Ashton, Beevers, Korabinski and Youngson (2005,) who established a significant and positive effect of ICT on student evaluation, did not conduct the study at this university. The question that this study was proposed to answer is whether Ashton *et al.* (2005) findings were also valid at UNU University. Thus, the validity of the observations cited above needs to be established at this university.

Medlin (2001) found out that there was a significant effect between the newly adopted electronic technologies and classroom instruction. Medlin (2001) discovered, however, that this effect is influenced by educational manager decisions

as to the use of ICT and that the decisions were themselves significantly affected by factors such as personal interest in the use of ICT, the influence of friends, mentors, peer support, and student response. He also discovered that the effect of ICT was influenced by organisational variables such as physical resource support and mandates from the university governing and management body. Medlin's (2001) study was however, conducted at Virginia Polytechnic Institute and State University and its conceptualisation related to factors affecting use, but not how ICT affects student learning.

According to Newhouse (2002a), ICT has made a significant positive impact on pedagogical effectiveness. This scholar defined pedagogy, as a concept, was concerned with what teachers do when they interact with students to support their learning. He observed that pedagogy encompasses the beliefs and actions of teachers including their teaching strategies, the organisation of learning experiences, and the learning environment generally. Newhouse (2002b) observed that ICT has enhanced pedagogical practices by providing learning environments that are more learner-centred, knowledge-centred, assessment-centred, and community-centred. This way, ICT has led to better curriculum designing; efficient use of classroom time; interactive, motivating, enjoyable, and faster learning; accelerated completion of assignments; more in-depth understanding of the designed curriculum content; as well as diversified and more exciting ways of teaching. Newhouse (2002a) concluded by noting that through the use of ICT, students develop an appropriate level of capability, become more engaged with their own learning, and achieve learning outcomes across the curriculum at a higher level.

Newhouse (2002a) warned, however that such positive effects are realised only when the following conditions are met:

a. the ICT introduced at a school has the capacity necessary to ensure that all teachers and students have immediate access to all software that is required to support the designing, implementation and control of the relevant curriculum;

b. the school environment is supportive of teacher and student use of ICT on a shared basis focused on the equipping students with the knowledge and skills needed to work and live successfully in a knowledge-based, global society; and

c. teachers can exploit the potential and capabilities offered by the introduced ICT by effectively integrating their use, wherever appropriate, to support the learning of students and contributing to realisation of the learning outcomes. Newhouse's (2002a, 2002b) observations were made while dealing with educational institutions in Australia, not in Africa, Uganda, let alone UNU University.

Another most vital contribution of ICT to improving student learning in higher education is in the form of *Easy Access to Learning* (Huang, Lin & Chuang, 2007). By enabling *Easy Access to Learning*, ICT not only facilitates students browsing through e-books, sample examination papers, previous year papers, and other online manuscripts that support learning, it also enables students to have easy access to research information and resource persons such as supervisors, mentors, consultants, researchers, professionals and peers all over the world. Yusuf (2005) observed that *Easy Access to Learning* has significantly heightened the availability of just-in-time learning and provided learning opportunities for many more learners who previously were constrained by other commitments. The drive to reform teaching and the organisation of the teaching-learning process in schools has significantly been aided by ICT (Carnoy, 2004). Hong and Songan (2011) reported that the use of ICT in higher education has resulted in a move away from teacher-centred delivery and transmissive learning to student-centred learning.

The Commission of the European Communities (2008) pointed out that one of the main contributions of ICT to education is its capacity to support Self-Directed Learning (SDL). Gibbons' (2002) notion of SDL stresses the importance of developing ownership of learning, as it will motivate a learner to pursue a learning goal and persist in the learning process. He described SDL as an increase in knowledge, skill, accomplishment, or personal development that an individual selects and brings about by his or her efforts using any method in any circumstances at any

time. The Commission of the European Communities (2008) observed that ICT supports this type of learning by supporting personal methods of acquiring knowledge, skills, and competencies using programmed and/or online learning programmes and modules, sometimes aided by electronic networks and applications that enable access to and sharing of teaching-learning information. The Commission went on to note that ICT promotes e-learning by which teachers send educational resources such as lectures, course works, testing exercises, and examinations to learners. ICT therefore, provides new opportunities for SDL, thereby enhancing the development of knowledge and skills personally needed to successfully pursue challenges met in daily life and at work in particular (2008).

The observations cited above, indicate that the use of ICT has considerably improved student learning by supporting *Easy Access to Learning* and SDL. They, however, do not show how this happened at UNU University. It is, therefore, necessary to establish whether the observations hold at UNU University. Isleem (2003) observed that ICT has improved the efficiency of student learning in a significant manner. The use of programmed learning modules and digital teaching applications such as PowerPoint aided by projectors has made classroom teaching and learning faster and systematic. Isleem's (2003) observations were made while examining the level of computer use for instructional purposes by technology education teachers in Ohio public schools, not at UNU University. Moreover, his interest was in establishing the effect on perceived teacher expertise, perceived access to computers, and perceived attitude toward computers on the level of computer use, but not the effect of ICT on student learning.

According to Brockman (2005), ICT has significantly improved the effectiveness of managing educational services such as library services. An integrated library information system for online catalogue management, which, together with internet or online books, journals, and other manuscripts, has improved access to library services needed not only to facilitate reading for a better understanding of taught concepts but also as references to support academic research. Similar observations appear in the work of Abbott (2006), Akinsende (2002), and Itohowo (2005). MacCallum (2010) observed that ICT has improved the effectiveness of managing

educational services by introducing and promoting the use of mobile, aided by the Internet and other mobile data applications and supported by mobile telephones, i-Pads, and other handheld mobile telecommunication facilities. These observations are also echoed in the work of Carlsson (2006); Fife and Pereira (2003); Huang, Lin and Chuang (2007); Lee, Kim & Chung (2002); MacCallum and Jeffrey (2009); MacCallum and Kinshuk (2008); Sharples, Taylor and Vavoula, 2005); Stead *et al.* (2006); and Pedersen (2003). These studies indicate that ICT has influenced the effectiveness of management of educational services by introducing applications and systems that have electronically, efficiently improved access to, and utilisation of library information services. The studies also indicate that ICT has enhanced the delivery of and access to instructional and learning services by introducing communication devices that facilitate mobile earning. The studies are, however, silent about the situation at UNU University; hence the need for this study.

Surendra's (2001) study, conducted in Ontario, examined acceptance of Web technology by professors and administrators of a college and found out that access in general, and training in particular, were significant predictors of using Web technology in the management of student learning. Zakaria (2001) researched the Malaysian Ministry of Education Polytechnic faculty members' attitudes toward IT, their IT use in teaching, and the availability of IT. He concluded that IT had not significantly affected curriculum planning and implementation. This scholar found out that despite an insignificant effect of IT, faculty members expressed a very positive attitude toward IT-use in their teaching, and their willingness to adopt it was a significant predictor of its use in teaching and delivery of student learning in general,

Anderson, Varnhagen and Campbell (1998) focused on IT-use at a large Canadian research university and established that it had improved the effectiveness of delivering educational services at the university but not significantly because the adoption of relevant ICT applications in teaching was very low. The scholars found that the effect depended significantly on the attitudes, skills, and behaviours of the faculty members. They thus concluded that desired improvements in the consequences of IT-use on effective student learning were to be realised through a positive change of attitude and improved IT skills.

In conclusion, although these scholars discussed views of university managers (officers of the university) on the effect of ICT on university management, none of them focused on those used at UNU University. A scholar such as Kasozi (2003), who focused on UNU University, made little attempt to discuss how university managers (Officers of the University) view the effect of ICT on the improvement of university management and student learning at the University. He only reported on the contribution of ICT in the management of student academic records at UNU University. Another related study by Opati (2013), dealt with the use of ICT in teaching and learning at UNU University involving the College of Education and External Studies. This study also fell short in dealing with what management at UNU University has to say about the effect of ICT on management and student learning. The scholars, therefore, left a gap in how ICT improves university management, specifically at UNU University. There is, therefore, need to verify whether their discussion of the effect of ICT on university management applies to UNU University.

2.6 STRATEGIES FOR MAKING ICT EFFECTIVE AS EXPECTED BY THE STAKEHOLDERS IN UNIVERSITY EDUCATIONAL SERVICES MANAGEMENT

This section focuses on studies that relate to strategies for making ICT as effective as expected by stakeholders in the management of educational services. A number of them delve into the strategies for making ICT as effective as expected by stakeholders. However, none focuses on this scenario in Uganda let alone UNU University. The categories that are discussed here include ICT Administrators, Principals, Deans of Schools, Heads of Department, and University Managers (Officers of the University).

2.6.1 Suggestions for the Improvement of ICT Effectiveness by ICT Administrators

Studies conducted on the improvement of ICT effectiveness reveals that one of the ways of improving ICT effectiveness is by creating a budget for ICT for more equipment (Oliver, 2005; Rudd, 2001)**.** Another way is ensuring that lecturers make

full use of ICT for teaching (Virvou, Katsionis & Manos, 2005). A related submission too on this subject is that of Russell and Schneiderheinze (2005), who contend that teachers or lecturers can support student learning by taking advantage of technology tools that foster cognitive processing and collaboration. In addition to what has been proposed above, universities should lobby for ICT donations, funding and skilling staff as a way of improving ICT effectiveness. Concerned governments should eliminate taxes on ICT related equipment. In line with the argument raised by the ICT administrators of subsidising delivery of education to the country's citizens, is the strategy that the University of Phoenix launched known as the E-CaD (Enhanced Curriculum and Delivery Model) which enables innovation in their online design and delivery of online education. The authorities at this university have been investigating ways to make their delivery model more efficient without sacrificing academic rigour (Muirhead & Betz, 2005). Some scholars suggest that one way of improving the implementation of ICT effectiveness is by introducing new systems in university financial management (Semenov, Pereverzev & Bulin-Sokolova, 2005). These initiatives are all with the view to make ICT as effective as expected by the stakeholders.

2.6.2 Suggestions for the improvement of ICT Effectiveness by Educational Services Managers

Another important category of respondents who made suggestions on how to improve ICT effectiveness is the Principals, Deans of Schools and Heads of Department. Referred to as Educational Services Managers in this study, they carry out managerial duties but at the same time teaching in the units under their jurisdiction. The literature reviewed will be reported according to the three different levels of management, offering suggestions on the improvement of ICT effectiveness.

2.6.2.1 Suggestions for the improvement of ICT effectiveness by Principals of Colleges

Reviewed literature provides important views on how principals of educational institutions, as stakeholders, thought ICT effectiveness could be improved. They contend that there is an urgent need for the universities to secure affordable ICT facilities, secure i-Pads for lecturers, and install more LCD projectors in lecture rooms. They also point out that students need to be given more time to access the Internet. The Australian educational technology standard SCORM (Shareable Content Object Reference Model) enables sequencing and dynamic presentation of learning content to suit the needs of a particular learner. The level of enhancing the particular learner's needs is yet to be attained by many universities in the world. The universities should also send notices that are more official in an electronic form to encourage more staff to use ICT. Deakin University in Australia requires all graduates to complete at least one online course (Matusov, Hayes & Pluta, 2005). This enforcement on ICT training rules out the possibility of a graduate completing studies without exposure to ICT skills.

2.6.2.2 Suggestions for the improvement of ICT effectiveness by Deans of Schools

Studies reveal that Deans emphasise the need for universities to address the challenge of poor bandwidth to ensure full access to the internet at all times. The other important point is training staff in ICT skills, equipping staff with laptops, purchasing projectors and smart boards, and prioritising staff training of in ICT (Matusov, Hayes & Pluta, 2005). Other views on the ways of improving ICT effectiveness were improving power supply by providing generators, upgrading the computer laboratories. In addition to these views, is the need to strengthen partnership with both public and private sectors where they exist and form them where they do not, to assist in the upgrading of ICT facilities and training of lecturers in ICT.

2.6.2.3 Suggestions for the improvement of ICT effectiveness by Heads of Department

Studies reviewed in this study portrayed the views of the Heads of Department on ways of improvement of ICT effectiveness at universities. They suggested, among other ways, that the university secure affordable ICT facilities that are conveniently accessible to all students and staff and they further contend that the universities should assist lecturers in acquiring i-Pads for use in teaching (Oliver, 2005; Rudd, 2001). Installation of more projectors, training of staff in ICT, providing students with more internet access time, increasing electronic communication among staff and providing the department with a generator, are additional ways of improving ICT effectiveness as suggested by Heads of Department (Oliver, 2005; Rudd, 2001).

Other ways of improving ICT effectiveness include constant updating of software, better pay for ICT staff, increased funding for the ICT Directorate, and the purchase of more projectors and the provision of better student access to the Internet. Further suggestions offered to improve ICT usage were for universities to expand their ICT training programmes to match modern technologies,increase partnerships with development partners and private sector in order to facilitate both students and lecturers with laptops for carrying out research and other university activities, provide projectors for presentations and purchase more smart boards to support learning (Bialobrzeska & Cohen, 2005; Condie & Munro, 2007; Eadie, 2001; Eickelmann, 2011; Jung, 2005; Korte & Husing, 2006; Oliver, 2005; Passey, Rogers, Machell & McHugh, 2004; Rudd, 2001; Sonia, 2012; Zepp, 2005).

2.6.2.4 Suggestions for the improvement of ICT effectiveness by University Managers (Officers of the University)

The literature on the improvement of ICT effectiveness suggested by University Managers was that the university needed to motivate ICT so that personnel attend further training, are provided with modems or laptops, install greater and faster bandwidth, and motivate the governments to prioritise higher education with fund allocation. Additionally, universities should provide wifi in all-important offices,

introduce ICT in the management of different departments, enforce ICT policy for all staff to become computer literate and procure more modern ICT equipment and computers for all teaching and administrative departments (Goktas, Yildirim & Yildirim, 2009). Alhawiti (2013) emphasises the need for university staff to go for further training in ICT if it is to improve its ICT implementation. Bakia, Murphy, Anderson and Trinidad (2011) cite government efforts in this regard in countries such as Australia, Canada, Estonia, Israel, Japan, New Zealand, Portugal and South Korea. The literature supports the need for universities to provide incentives for staff to go for further studies in ICT in order to increase the number of Information and Technology (IT) personnel (BECTA, 2003).

It has been recommended that university libraries receive modern ICT equipment, making the ICT training a must for all staff, thus prioritising the university as one of the most important departments at the heart of university academics. Further suggestions are that libraries should subscribe to more international journals to enable students to access more reading materials online, emphasising the way of improving implementation of ICT particularly for student learning (Adomi & Kpangban, 2010).

2.6.2.5 Suggestions for the improvement of ICT effectiveness by University Students

The literature reviewed under this section indicates that students suggested ways of improving ICT effectiveness by stating that the universities should give them more time to use ICT at the university library. Other scholars suggest that the university should invest in more computers (BECTA, 2003). Also, other suggestions in the literature include employing qualified and competent staff in ICT (Alhawiti, 2013). Another suggestion to improve the effectiveness of ICT that the students make is to regularly service data room computers, updating the software in the computers that students use (Goktas, Yildirim & Yildirim, 2009).

There are also other ways suggested which include improving the network as one way of improving ICT effectiveness, lowering the cost of Internet provision and supplying free Internet/wifi to all the students at the universities (Korte & Hüsing, 2006; Oliver, 2005; Rudd, 2001; Sonia, 2012). Another important suggestion is that the University should try various models of delivering academic content to the students (Adomi & Kpangban, 2010; Hudson & Porter, 2010).

2.6.2.6 Suggestions for the improvement of ICT effectiveness by University Academic Staff

The literature reviewed in this section suggests refresher courses in the latest ICT applications among proposed ways to improve the role of ICT in the management of educational services in universities. Some scholars opted for continuous training and also providing computers to every student (Korte & Hüsing, 2006; Oliver, 2005, Rudd, 2001; Sonia, 2012), hiring a committed and competent staff (Alhawiti, 2013) and upgrading software and hardware facilities (Goktas, Yildirim & Yildirim, 2009). A good suggestion was providing standby generators to supplement power supply, purchasing enough ICT tools, capacity building among both students and lecturers on ICT use, providing a computer to every student, enforcing the ICT policy in teaching, setting up computer laboratories and providing internet connectivity in the whole university (Semenov, Pereverzev & Bulin-Sokolova, 2005).

2.7 CONCEPTUAL FRAMEWORK

Drawing on the reviewed literature, the study was conceptualised as shown in Figure 2.2. This framework illustrates that the nature of ICT is conceptualised as the independent variable, management of educational services as the moderating variable and effectiveness of this management as the dependent variable. This conceptualisation implies that the effectiveness of educational service management is assumed to depend on the nature of ICT adopted in this management.

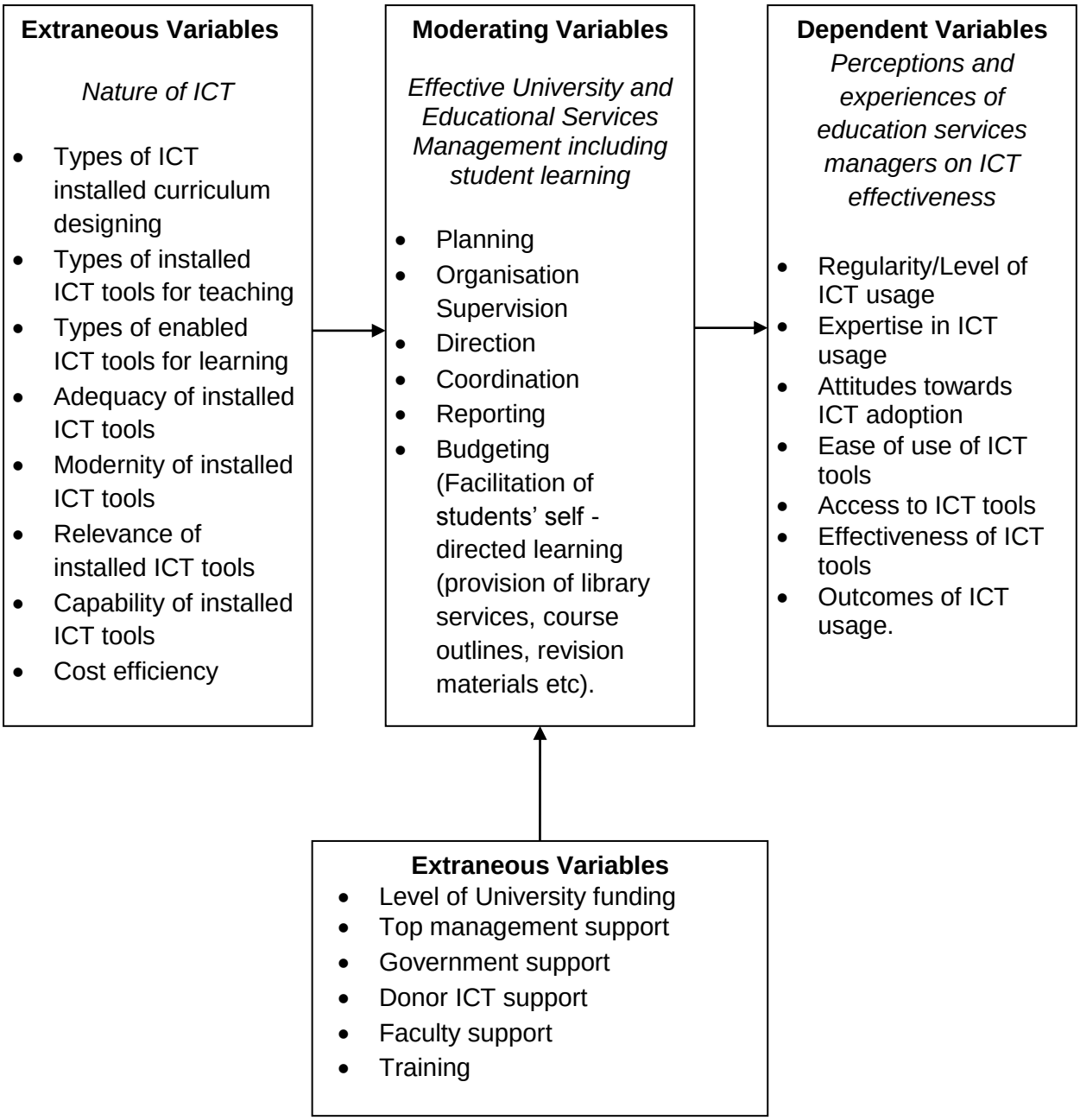


Figure 2.2: Conceptual Framework illustrating the relationship between ICT and Management of Educational Services at UNU University

Source: Developed by the author based on DeSanctis and Poole's Adaptive Structuration Theory (AST) and cited literature.

The nature of ICT is indicated in the form of the types of ICT equipment, programmes, and services installed or enabled to facilitate curriculum design, teaching and learning at UNU University. It is also measured regarding the level of ICT connectivity in the University faculties and departments. It should be noted that

while installed tools are those that are immobile and entirely owned by UNU University, enabled tools are personal ICT tools owned by lecturers or students but used for teaching or learning purposes using the installed ICT facilities. For instance, a mobile phone may be owned by a student but can be enabled to access lecture notes or course outlines prepared and sent by lecturers via email services accessed using the ICT internet applications. Measuring the nature of ICT in this manner helps establish the ICT equipment, programmes, and services used at UNU University, thereby setting a basis for proposing the kind of ICT needed to make the management of educational services effective concerning meeting stakeholder expectations.

The effect of ICT on student learning is measured in terms of how it impacts planning of new or re-designing curricula programmes, implementation of the planned or re-designed programmes (through lecturing, coursework, and attending to student classroom learning needs), and control of programme implementation (through the supervision of student research work, administration of student examinations, marking, and delivery of examination feedback/results). This effectiveness will also be measured regarding the level of facilitating self-directed student learning (through the provision of library services, course outlines, revision materials, and so on).

The effectiveness of student learning through ICT-use is measured regarding its two dimensions. Process effectiveness is measured in terms of ICT competency of users: ICT administrators, university managers (officers of the university), educational services managers (Principals, Deans and Heads of Department), lecturers and students, capability, modernity, adequacy and relevance of the installed ICT tools, timely delivery of student learning, cost of ICT tools, and conditions of delivering and accessing student learning. These measures help establish how to improve the University's educational delivery process through ICT. Outcome effectiveness is measured regarding the perceived relevance of student learning delivered to meeting self-employment, employability, and productivity expectations.

The conceptual framework presented in Figure 2.2 recognises that apart from ICT, student learning can be affected by other factors called extraneous variables. These factors may include the level of university funding, top management support, donor support, faculty support, government support, student and lecturer expertise of using ICT and attitude towards the installed ICT tools, and training among others. Although these factors are recognised, their effects are studied for purposes of concentrating on analysing how ICT affects student learning and management at UNU University.

2.8 CONCLUSION

Overall, this chapter presented a review of theories that can be contextualised and used to examine how ICT affects the effectiveness of managing educational services relevant to the study. Out of the reviewed theories, the chapter indicates that the one that is most relevant to this study is the Adaptive Structuration Theory (AST). It, therefore, provides the theoretical framework of the study developed based on the rationale of AST. The chapter further provides a view of the literature about the variables of the study, which include educational services management, the nature of ICT equipment, programmes and services used in this management, perceptions and experience of educational services on the effectiveness regarding ICT implementation and the effect of ICT implementation on University management and student learning and strategies for making ICT as effective as expected by the stakeholders in educational services management.

The chapter indicates that while considerable literature exists about the adoption and utilisation of ICT in the management of educational services, almost no literature exists about the effect of this ICT on the effectiveness of this management at UNU University. This effect is therefore still questionable. This study was therefore proposed to examine the nature of this effect, thereby covering this gap in the literature. Consequently, the chapter provides the conceptual framework which considers the nature of ICT as the independent variable, management of educational services and university management as a whole as the moderating variable and perceptions and experience of educational services on ICT effectiveness as the dependent variable. This conceptualisation implies that the study was proposed to

investigate how the nature of the adopted ICT affects the management of educational services and management as a whole at UNU University. The following chapter handles the research design and methodology used in the thesis.

CHAPTER 3
RESEARCH DESIGN AND METHODOLOGY

3.1 INTRODUCTION

The previous chapter provided the literature review and conceptual framework upon which this research was based. The chapter begins with the research paradigm (ontology and epistemology) followed by the research design used to answer the research questions. The researcher then presents the rationale of the mixed methods research design and the research methodology covering the study population, sample size, and strategy. He further includes the description of the research site, data collection instruments, data entry, data analysis, quantitative, qualitative, mixed methods methodological norms, and ethical considerations. The analysis of the variables was based on the broad and specific research questions that guided the study. The broad research question focused on understanding the nature of ICT adopted at UNU University and the role it plays in enhancing the effectiveness of educational services management, including planning, implementation and control of educational programmes as well as the facilitation of self-directed student learning at the university. The specific research questions were the following:

1. What is the nature of ICT adopted at UNU University and to what extent has it facilitated the management of educational services?
2. How do educational service managers perceive and experience the effectiveness regarding the implementation of ICT at UNU University?
3. How has ICT adoption improved management and student learning at UNU University?
4. How can ICT be used to improve the management of educational services at UNU University?

The above research questions will be addressed by conducting descriptive statistics, correlations, and multiple linear regression analyses on the quantitative data collected. In addition, content analysis will be adopted in the analysis of qualitative

data. The data will be summarised based on the themes developed from the research questions.

3.2 PRAGMATISM AS A PARADIGM

The term paradigm originated from the Greek word *paradeigma, which* means *pattern* and was first used by Thomas Kuhn to denote a conceptual framework shared by a community of scientists, which provided them with a convenient model for examining problems and finding solutions (Kuhn, 1962). He defines scientific paradigms as "accepted examples of actual scientific practice, examples which include law, theory, application, and instrumentation together that provide models from which spring particular coherent traditions of scientific research. Men whose research is based on shared paradigms are committed to the same rules and standards for scientific practice (Kuhn, 1962:10). Together, ontological, epistemological, and methodological assumptions make up a paradigm (Mack, 2010).

The pragmatic paradigm to which mixed methods research design belongs, according to Bazeley (2002), suffered paradigmatic wilderness for some time but has regained not just acceptability, but popularity, with a significant number of studies arguing its virtues regarding greater understanding and validation of results. The idea that one's paradigmatic view of the world might be related to the way one went about researching the world was prompted by Kuhn (1962), while Guba and Lincoln's work on naturalistic inquiry contributed significantly to the "paradigm wars" of the '80s (Lincoln & Guba, 1989). Researchers are holding the belief that there were strong associations between paradigm, methodology, and methods consequently considered different methodologies and methods to be philosophically incompatible, making their combination logically impossible. During this period, therefore, mixed methods research was strongly attacked and fell from favour amongst methodologists (Bazeley, 2002). The pragmatists believe philosophically in using procedures that 'work' for a particular research problem under study and that one should use many methods when understanding a research problem (Tashakkori, Teddlie & Teddlie, 1998). Over the years, other philosophies have emerged such as

the transformative research perspective advancing the need for addressing issues of social justice for underrepresented groups as a foundation for mixed methods research (Mertens, 2010). The dialectical position was espoused by Greene and Caracelli (1997a). Cherryholmes (1992) recommends that researchers report the multiple worldviews they hold and advocate for honouring those worldviews and collection of both quantitative and qualitative data. The researcher believes that the use of mixed methods research design has yielded richer data on the adoption of ICT in the management of educational services at the University than any single approach would have done. The design enabled the researcher to capture data from a cross-section of stakeholders on ICT-use as they responded to a variety of research instruments administered to them. Figure 3.1 provides the underlying assumptions of pragmatism.

Table 3.1: Pragmatism and its underlying assumptions

Pragmatism	**Underlying assumptions**
Ontology	Symbolic Realism
Epistemology	Possible knowledge
Empirical focus	Actions and Changes
Type of knowledge	Constructive Knowledge
Type of investigation	Useful for action
Data generation	Data through assessment and intervention
Role of researcher	Engaged in change

Source: Adapted from Goldkuhl (2012).

Table 3.1 presents different elements of pragmatism and underlying assumptions. However, a detailed discussion is provided below for only ontology and epistemology.

3.2.1 Ontology

Several scholars have written on the subject of ontology. The term is used in several areas of philosophy, medicine, and computer science. The traditional definition of

ontology and the most widespread was that introduced by Gruber (1993). According to him, ontology is a set of concepts and relationships between concepts that formally model objects of a domain of knowledge so that information is interpreted as well by the men and by machines. The ontology defines the shared vocabulary to reach a common understanding of a given area.

Mack (2010) defines ontology as the starting point which will likely lead to one's theoretical framework. He views it as the study of claims and assumptions that are made about the nature of social reality, claims about what exists, what it looks like, what units make it up and how these units interact with each other. In other words, if someone studies ontology, they study what we mean when we say something exists. The ontological conceptualisation, as a cohesive philosophical area, was introduced in 505-504 BC by Parmenides. He was the first to pose the argument about being in its totality, presenting issues of ambiguity among the conceptual level, ontology, and language. However, over the centuries, the meaning of ontology changed, depending on different visions and knowledge of other philosophers such as Leucippus, Democritus, Plato, Aristotle, Descartes, Kant, Lorhard, Hegel, Trendelenburg, Brentano, Stumpf, Meinong, Husserl, Heidegger, Gockel (Corazzon, 2010).

From a practical point of view, the primary objective of ontology is to model knowledge, as it provides the definitions of concepts and terms used to describe the knowledge of a field of activity, the logical and semantic relations between the concepts and the terms used as well as the constraints of their use. Also, the creation of ontology provides a unified framework to reduce and eliminate ambiguities as well as conceptual and terminological confusion. The ontological perspective to this study involves several ICT theories and concepts, but the focus is specifically on those that engender the use of ICT in the management of educational services such as the Adaptive Structuration Theory (AST) (Stones, 2005) selected to provide the theoretical foundation of this study. Others include the diffusion theory of adoption (Rogers, 1962), technology acceptance theory (Davis, Bagozzi & Warshaw, 1989), the theory of infusion (Meister & Compeau, 2002) and substitution (Norton &

Bass, 1987) and the concerns-based adoption model (Newhouse, Trinidad & Clarkson (2002) amongst others.

The philosophical study in the ICT field reflects the need to affirm the theoretical modalities of ontology on the basis of comparisons between alternative theories, models and conceptual frameworks and to contribute to investigation of modern ontological approaches such as 'Ontological Engineering', 'Ontology Learning', 'Ontology-based metadata integration methodology', 'Design of Ontologies used for Knowledge Sharing', and among others the 'Design of Ontologies used in Information and Communication Technologies'. This study focuses on the ontology of Information and Communication Technology and the Management of Educational Services at the University.

3.2.2 Epistemology

Epistemology is the theory of knowledge reflecting the view of what we can know about the world and how we can know it (Poetschke, 2003). The Stanford Dictionary of Philosophy (2009) explains that epistemology is about issues having to do with the creation and dissemination of knowledge in particular areas of inquiry. An epistemologist studies what we mean when we say we know something (Mack, 2010). He utilises Crotty's definition of epistemology, as the theory of knowledge embedded in the theoretical perspective and thereby in the methodology. The epistemological question wishes to establish what the nature of the relationship between the knower or would-be knower and what can be known is (Lincoln & Guba, 1989). The epistemological premise informing the study is that ICT should be an essential player in making the management of educational services better at a university.

The epistemological approach to this study is the mixed methods design that is anchored on pragmatism (Henning, van Rensburg & Smit, 2005; Brown, 2004). The interpretivist perspective, also known as the relativist perspective, claims that it is not possible to make an objective statement about the real world because there is no such thing as a real world; it is only socially and discursively constructed (Poetschke, 2003). The constructivist perspective refers to the fact that knowledge is socially

constructed and ICTs promote such knowledge because of the hands-on, exploratory, interactive nature of ICTs, particularly the Internet, as they use the ICT equipment (Wang, 2009). He further goes on to state that if constructivism had not already existed, it was likely that ICTs would have invented it to explain how they operate. The constructivist perspective, which has virtually the same meaning as instrumentalism, was the brainchild of the early twentieth-century American philosopher John Dewey whose teachings are generally known as pragmatism. Dewey believed that the purpose of intellectual reality is not to understand reality apart from experience but to be able to function in the best way possible in any given situation (Wang, 2009).

3.3 RESEARCH DESIGN AND METHODOLOGY

A research design has been variously defined. It can be conceived as a plan in which a given study is conducted to realise results being aimed at (Florio-Ruane & Raphael, 2004). According to Groenewald (2010), a research design is a prerequisite for fulfilling research objectives and answering research questions. Groenewald (2010:153) notes “the research design constitutes the requirements for collection, measurement and analysis of data”. According to McMillan and Schumacher (2010), a research design refers to a framework, which is developed to respond to decisions regarding what, where, when, how much, by what means an inquiry or a study should be conducted. Research designs are also defined as logical blueprints depicting the plan of the study. The designs serve as “links among the research questions, the data to be collected, and the strategies for analyzing the data—so that a study’s findings will address the intended research questions. The logic also helps to strengthen the validity of a study, including its accuracy” (Yin, 2011:75-76).

Amin (2005) viewed a research design as a conceptualised, functional structure within which a study is conducted and that it constitutes a blueprint for measuring variables and collecting and analysing data. Amin (2005) continued to describe a research design as a practical framework developed by a researcher to enable the researcher to use procedures and techniques which are appropriate to gathering,

processing and analysing data needed to find answers to the set research questions, and in so doing, attain the purpose and objectives of the study by establishing solution(s) to the research problem being addressed. This emphasises Babbie and Mouton's (2001) observation that the problem statement and research objectives of a study should serve as the point of departure when contemplating a study's research design. Creswell and Clark (2007) delineated a research design as a summary of the procedures employed to collect, analyse, interpret, and present his/her research data.

The above observations indicate that a research design is a plan that guides the methods and decisions that a researcher should use to collect, analyse and interpret data needed to respond to set research questions of a study, thereby meeting its purpose and objectives based on the problem to be addressed. For this study, the research objectives and problem statement were stated in chapter one. The observations by Babbie and Mouton (2001) and Creswell and Clark (2007) also suggest that a selected research design dictates the 'how' part of the study, which implies that it determines the research methodology suitable for a study. There are some research designs which include the qualitative research designs, quantitative research designs, and the mixed methods designs that are anchored on pragmatism (Henning, van Rensburg & Smit, 2004; Brown, 2004).

3.4 MIXED METHODS RESEARCH

Research methodology has been defined as a systematic approach guided by the adopted research design to solve a research problem by answering the set of research questions or verifying research hypotheses, thereby meeting the objectives and purpose of a study (Babbie & Mouton, 2001). Research methodology explains the research approaches and methods applied to select the sample of the study and to collect and analyse the data required to accomplish a study (McMillan & Schumacher, 2001). It also includes the research instruments, their validity and reliability as well as trustworthiness, reasons for using a particular method or technique and why other techniques are not used (De Vos, Delport, Fouche & Strydom., 2005). It answers questions like how the research problem is to be

addressed, what data were collected, what methods were used to collect and analyse data and how the methods were applied to the research questions or to verify the hypotheses of the study (Burns & Grove, 2009).

The study adopted a mixed research methodology with a Morse notation system that combines both quantitative and qualitative orientation (QUAN+qual). QUAN + qual notation implies a quantitatively oriented, quantitative, and qualitative simultaneous design (Morse, 1991).

Mixed methods relate to an emergent methodology of research that advances the systematic integration, or mixing of qualitative and quantitative data within a single investigation or sustained programme of inquiry. The basic premise of this methodology is that such integration permits a complete and synergistic utilisation of data than do separate qualitative and quantitative data collection and analysis. It is imperative that any researcher carefully notes that mixed methods research is traced from the social sciences. The mixed methods have recently expanded into the health and medical sciences including fields such as nursing, family medicine, social work, mental health, pharmacy, allied health, and others. For decades, its procedures have been developed and refined to suit a wide variety of research questions (Creswell & Plano Clark, 2017). These procedures relate, for instance, advancing rigour, offering alternative mixed methods designs, specifying a shorthand notation system for describing the designs to increase communication across fields, visualising procedures through diagrams, noting research questions that can particularly benefit from integration, and developing rationales for conducting various forms of mixed methods studies.

Mixed methods, in which quantitative and qualitative methods are combined, are increasingly recognised as valuable because they can capitalise on the respective strengths of each approach (Jick, 1979). Pairing quantitative and qualitative components of a more extensive study can achieve various aims, including corroborating findings, generating more complete data, and using results from one method to enhance insights attained with the complementary method (Morgan, 2007). Approaches to mixed-methods studies differ by the sequence in which the

components occur and the emphasis given to each (Morgan, 2007). The qualitative and quantitative components may be performed concurrently or sequentially, and emphasis may be placed on either component or equal weight given to both. A good example - the preliminary qualitative component may serve to generate hypotheses or to develop the content for a questionnaire to be used in a follow-up quantitative study.

Conversely, a preliminary quantitative component may generate surprising or inconsistent findings that may be examined in greater depth with a follow-up qualitative component. Strategies to enhance the validity of mixed-methods studies include recognising the role of the complementary strategy and adhering to the methodological assumptions of each method. Principles and practices specific to mixed-methods research have been described extensively (Morgan, 2007). Applications are regularly reported in the published Journal of Mixed Methods (Johnson, Onwuegbuzie &Turner, 2007). The use of computer programmes for merging quantitative statistical programmes with text analysis programmes has become common practice, and the identification and discussion of numerous mixed methods studies have been reported in the scholarly literature (Johnson, Onwuegbuzie &Turner, 2007; Tashakkori & Creswell, 2007; Teddlie & Tashakkori, 2003; Bazeley, 2002; Greene & Caraceli, 1997b). In mixed methods research, the researcher initially conducts a general exploration of the variables under study and studies those variables with a large sample of respondents. The option to this is for the researcher to conduct a survey with a large number of individuals and then follow up with a few respondents in order to obtain their voices and specific views on the phenomenon under study (Creswell, 2014).

Mixed methods research is now recognised as the third major research approach and has become popular in some disciplines (Leech & Onwuegbuzie, 2009; Johnson, Onwuegbuzie & Turner, 2007). According to O'Cathain, Murphy and Nicholl (2008), an excellent mixed methods study has the characteristics of clearly justifying the use of mixed methods, providing a transparent account of mixed methods design, providing appropriate sampling, data collection and analysis. Meanwhile, Creswell and Tashakkori (2007) consider good reporting of a mixed

methods study as those that describe the following justification for the use of mixed methods, design, sampling, data collection and analysis, level of data integration, how it occurred and any insights gained from mixing or integrating methods. Teddlie and Tashakkori (2009) cite two conventional approaches to mixed methods research questions as firstly, separate quantitative and qualitative research questions and overarching mixed research questions and then expanded or broken down into quantitative and qualitative sub-questions. This study takes the former approach where the quantitative and qualitative research questions appear separately. The first and fourth research questions collected quantitative data using questionnaires administered among students and lecturers. On the other hand, the second and third research questions collected qualitative data through the use of interview schedules administered among ICT administrators, educational services managers and university managers (Officers of the University).

A significant number of authors have developed typologies of mixed methods research designs, drawing mostly from approaches used in evaluation (Creswell, 2002; Steckler, McLeroy, Goodman, Bird & Cormick, 1992; Morse, 1991). According to Creswell, Plano Clark, Gutman and Hanson (2003), there are six primary types of mixed methods designs divided into two categories, and they include:

Sequential Designs

1. explanatory
2. exploratory
3. transformative

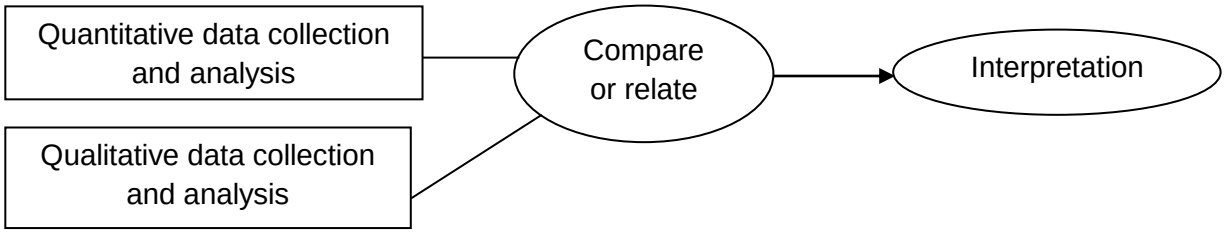
Concurrent Designs

4. triangulation
5. nested
6. transformative

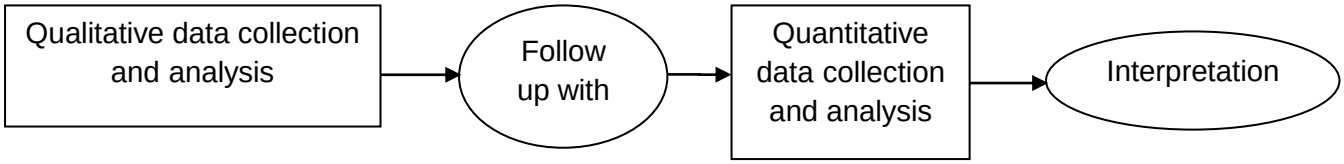
Each of these varies according to its theoretical or advocacy lens, approach to implementation, the sequential or concurrent data collection procedure, priority is given to qualitative and quantitative data (equal or unequal), stage of data analysis

and integration and procedural notation. Drawing from Creswell (2014), Figure 3.2 illustrates an adapted Mixed Methods Research Designs.

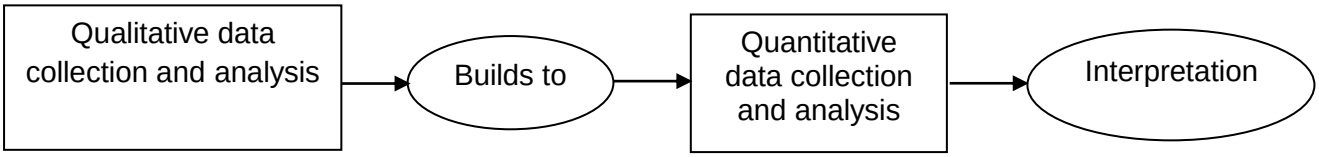
Convergent Parallel Design



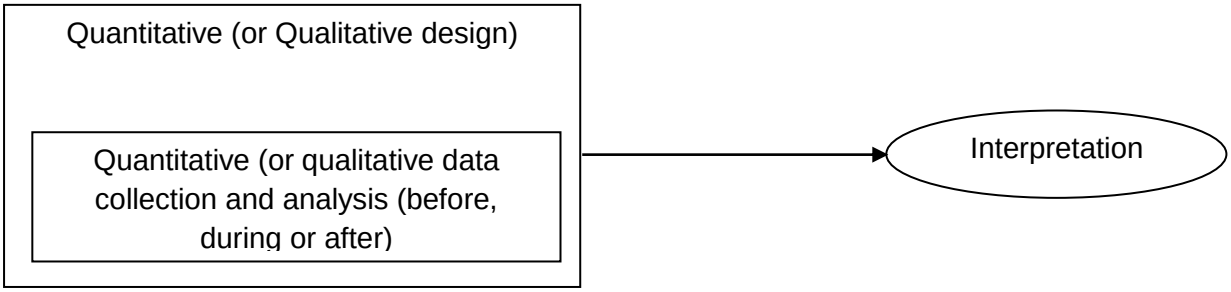
Explanatory Sequential Design



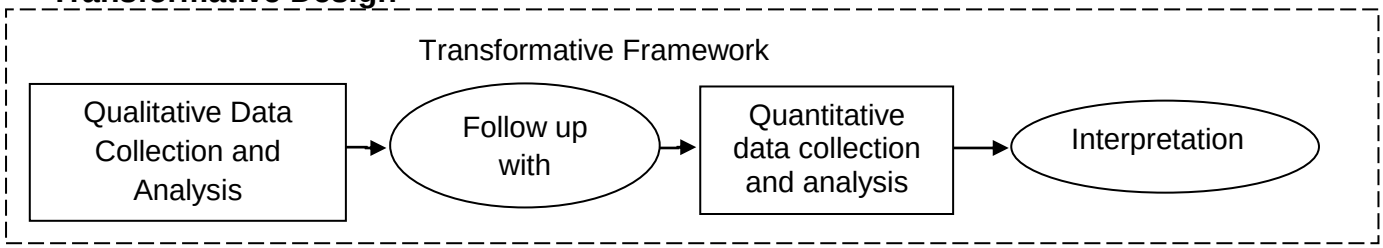
Explanatory Sequential Design



Embedded/Nested Design



Transformative Design



Multiphase Design

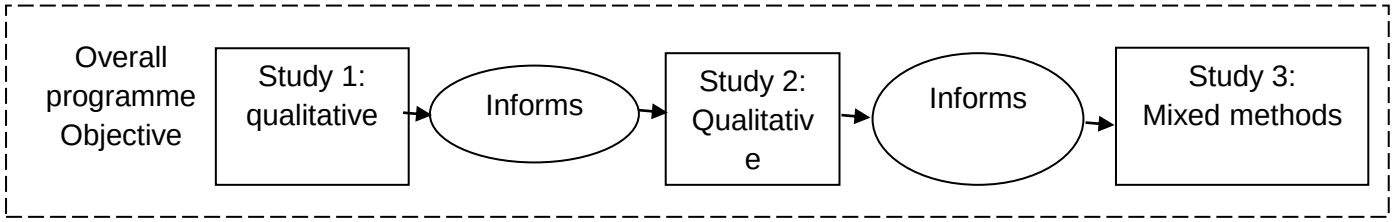


Figure 3.1: Mixed methods research designs

Source: Adapted from Creswell (2014)

According to Creswell (2014), the nested/embedded mixed design is hinged on the rationale of eclecticism and pragmatism in that it permits the use of multiple methods of data collection and analysis. It dispels methodological orthodoxy and advocates methodological appropriateness and triangulation as the basis for judging methodological quality. It, therefore, supports the use of pluralistic research methods and strategies, thereby facilitating the researcher to overcome the inherent weaknesses of using any one method (Willis, 2014).

The concurrent nested/embedded mixed research design was adopted in this study following the definition of what a research design is and after establishing that the rationale that this design was the most suitable for the study (Creswell, 2012). The concurrent nested/embedded and mixed methods research designs is used when the aim of the research is to understand a given unit of analysis in details. In its context and setting based not only on a triangulation of data collection and analysis methods and strategies but also, when necessary, on a triangulation of data sources and theories (Willis, 2014; Verschuren, 2003). It can therefore permit the collection and analysis of both primary and secondary data using both qualitative and quantitative methods of data collection and analysis (Berg & Lune, 2012; Bryman, 2012; Bennett & Elman, 2006; Scholz & Tietje, 2002; Stake, 2008). This type of research methodology permits methodological choices, rather than narrow and dogmatic preconceived approaches, and in so doing, enables researches to overcome challenges of having to choose between qualitative and quantitative, deductive and inductive techniques of research (May, 2011). It furnishes the researcher with empirically-rich and context-specific data collected from respondents that are carefully selected according to how relevant they are in providing this data (Hyett, Kenny & Dickson-Swift, 2014) so that it can be used to deductively examine observable implications of hypothesised situations and arrive at explanations in support or against theory being tested (Bennett & Elman, 2006). Figure 3.3 below shows the embedded/nested mixed methods study design.

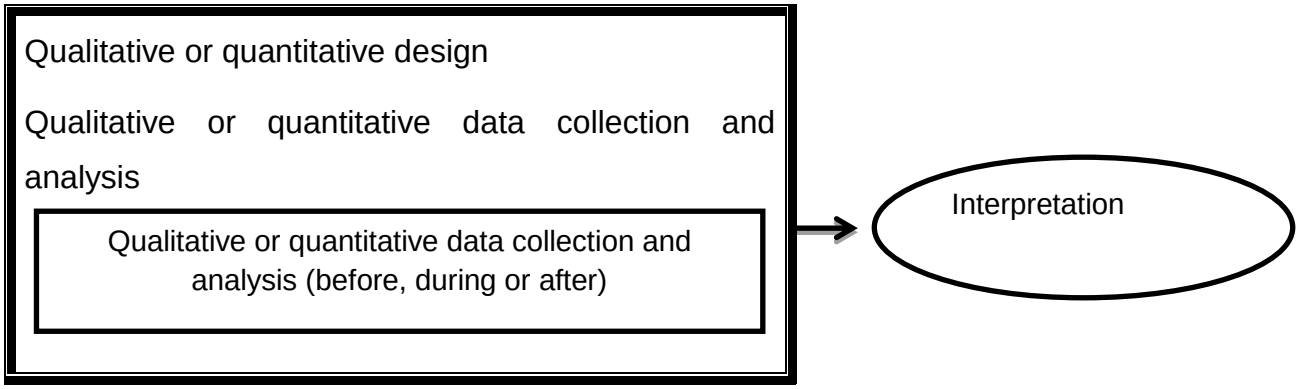


Figure 3.2: The Embedded/Nested Mixed Methods Study Design

Source: Adapted from Creswell (2011

Gagnon and Dragon (1998) observed that when a study such as the nested/embedded mixed study is adopted, for example, to investigate how technology has affected an organisation's operations and activities, some of the questions it can help to answer are: Has the technology achieved the purpose for which it was introduced? To what extent has the purpose been attained? Does technology have any strengths or weaknesses? How can the strengths be reinforced or the weaknesses be addressed? The nested/embedded mixed study can, therefore help address the concerns of different stakeholders, such as the adopters and beneficiaries of the new technology (Hatry, Wholey, & Newcomer, 2010). This way, it helps to positively influence or improve the contribution of the adopted technology for better performance both in process and outcomes (Gagnon & Dragon, 1998:23).

The nested/embedded mixed study was appropriate for this study since the foregoing questions are substantially similar to those that this study intended to answer by investigating the perceptions and experiences of educational services managers on the effectiveness regarding the implementation of ICT at the University and how this effect has improved management and student learning at the University. The nested/embedded mixed study can help answer the questions stated above by using qualitative or quantitative data, which may be collected using interviews or questionnaires. It can also answer the questions using secondary data collected from a review of relevant documents or databases (Stufflebeam & Shinkfield, 2007; McDavid, Huse & Hawthorn, 2005). In this case, the design

achieves its purpose by using the directed content analysis, in which initial coding starts with a theory or relevant research findings. During data analysis, the researchers immerse themselves in the data and allow themes to emerge from the data. The purpose of this approach usually is to validate or extend a conceptual framework or theory (Hsieh & Shannon, 2005). A combination of both qualitative and quantitative data was applied in this study following the rationale of Newhouse's (2002b) framework for articulating the impact of ICT adoption in the management of universities as shown in Figure 3.3. Quantitative data takes more priority than the qualitative data in this study and is denoted in the notation system as QUAN+qual, as proposed by Morse (1991).

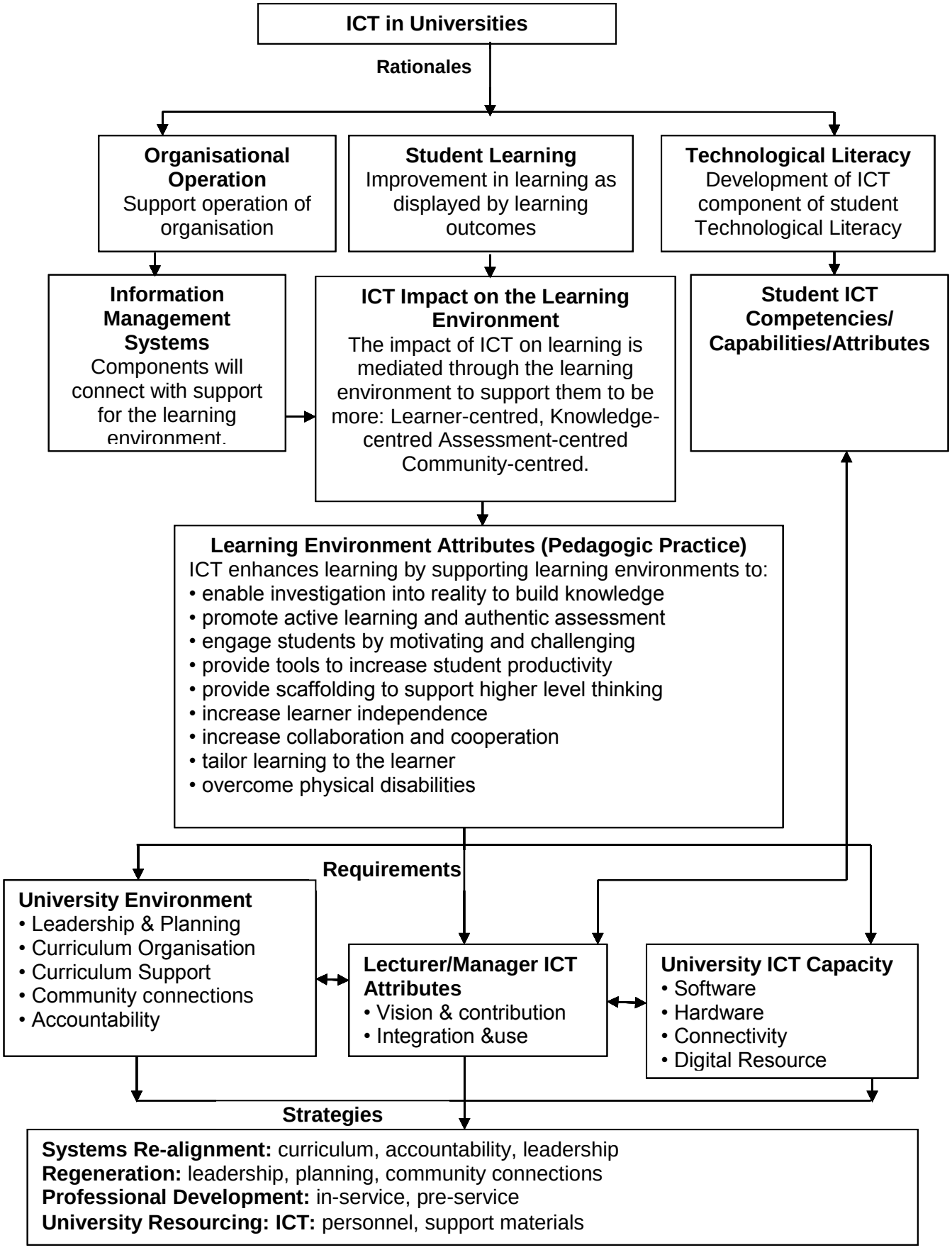


Figure 3.3: Schematic Framework for ICT adoption in University Management

Source: Adapted from Newhouse, C.P. (2002b).

The framework presented in Figure 3.4 was used to investigate the contribution of ICT to the effectiveness of managing educational services at the University mainly using the following dimensions, which it considers when guiding a study of this nature:

a) ***Student Dimension*****:** This dimension focuses on evaluating the contribution of ICT regarding its capability to support student engagement in learning, and to be convinced that in so doing, they are realising or will achieve their learning outcomes (expectations from education being attained with the support of ICT).

b) ***Learning Environment Dimension****:* This dimension involves assessing the contribution of ICT to the pedagogic practices. It focuses on evaluating the contribution of ICT not as a determining but as an enabling component of this environment. It, therefore, aims at establishing the level at which ICT enables the learner-centred, knowledge-centred, assessment-centred, community-centred pedagogical practices in an educational institution.

c) ***Lecturer/Manager Professional ICT Attributes Dimension*****:** This dimension involves assessing the contribution of ICT by focusing on establishing the level at which the academic, administrative and support staff can use the adopted ICT to facilitate teaching, learning, and administrative duties within the context of their institution's ICT vision. It focuses on establishing teacher and university manager attitudes towards the use of ICT, their level of acquired ICT usage skills, and level of ICT integration and use.

d) ***University ICT Capacity Dimension****:* This dimension focuses on assessing the nature of hardware (adequacy, efficiency, etc of the available ICT equipment), level of connectivity (Internet and intranet), type of software (teaching and learning programmes and applications), level of technical support, and available digital resource materials. These aspects are assessed by asking respondents to show what is available using a list of ideal indicators.

e) ***University Environment Dimension*****:** This dimension focuses on evaluating the contribution of ICT concerning how the university

environment is supportive of lecturer-student and university manager use of ICT built on a shared vision and tailored to preparing students to learn, work, and live successfully in a knowledge-based, global society. The considered ideal indicators include university management, leadership, or planning support regarding having a comprehensive long-term plan for the use of ICT, curriculum support to the use of ICT, connecting the use to ICT to solving the needs of the community, accountability regarding supporting ICT to deliver expected ends of education.

All these dimensions were used to achieve the aim of this study. Primary data from each dimension was collected using interview schedules to ICT administrators, educational services managers (Principals, Deans, and Heads of Department) and questionnaires to academic staff members and students. Educational Broadcasting Review (EBR) facilitated the review of relevant ICT documents in UNU University such as UNU University Strategic Framework 2007/08-2017/18, UNU University ICT Policy (2005), and ICT Policy and Master Plan (2001). This review was conducted as a means of collecting relevant secondary data. Primary data was collected using interviews and questionnaires facilitated the analysis of the perceived effectiveness of ICT on the management of educational services, university management, and student learning at the University. The methodology used in the study is presented in the forthcoming section.

3.5 RATIONALE FOR USE OF MIXED METHODS DESIGN

Much as challenges exist in the use of mixed methods research design, there are many opportunities to be gained by the mixed methods researcher. According to Creswell and Tashakkori, 2007; Johnson, Langley, Melin and Whittington, 2007; Teddlie and Tashakkori, 2003; Greene, Caracelli and Graham, 1989, there are a number of areas in which mixed methods are superior to single approach designs. Among the benefits of using mixed methods research is the ability to answer research questions that the other methodologies cannot. For instance, the research question on how the University has provided ICT tools for the management of educational services could not establish the perceptions and experiences of

educational services managers on the effectiveness of ICT implementation at the University.

Another benefit is that mixed methods research provides better (stronger) inferences. When quantitative data was collected from students and lecturers on ICT equipment installed at the university and qualitative data was collected from educational services managers and officers of the university, the degree of influence of ICT use in educational services management at the university was made more explicit.

Mixed methods further provide the opportunity for presenting a greater diversity of divergent views. The categories, ranging from administrators, lecturers, ICT administrators to officers of the university, provided divergent views on the use of ICT in educational services management at the University.

Mixed methods research also allows for elaboration or expansion – the use of one type of data analysis adds to the understanding being gained by another. For example, the use of univariate, bivariate and multivariate analyses of the variables involved in the use of ICT in educational services management at the University added to the understanding gained from factor analysis, documentary analysis, multivariate regression analysis and descriptive analysis of the variables involved in the study.

The use of the first method to spark new hypotheses or research questions that can be pursued using a different method is known as initiation. For instance, the quantitative research question on how the University has provided ICT equipment for educational services and the qualitative one on how ICT use can be used to improve the management of the university and student learning. In mixed methods research, it is also vital to identify contradictions. These only create areas of interest for others to explore in further research. The contradictions in the findings of this study as to whether or not ICT has improved the management of educational services at the University as a whole or just in some colleges and in teaching or non-teaching departments could be further researched. Triangulation, which is comparing

quantitative and qualitative findings on the use of ICT in educational services management at the University for corroboration, was another benefit of using mixed methods in the study.

For purposes of completeness, using both quantitative and qualitative research was paramount for a more comprehensive account on ICT use in the management of educational services at the University. Also, the use of mixed methods was important in sampling. It allowed for the use of quantitative research for selecting students, lecturers and ICT administrators and qualitative research to facilitate selection of respondents from the educational services managers and university managers (officers of the university). The illustration was also enabled by use of mixed methods in that qualitative data was used to illustrate quantitative findings in such a way that student, lecturer, and ICT administrator views on ICT use in educational services management at the University should have a bearing on the views of university managers and educational managers on the same subject. The enhancement was enabled by the use of mixed methods in supplementing or adding to one set of findings by gathering further data on the use of ICT in educational services management at the University.

In mixed methods, the explanation was enabled in that one method is used to help explain findings uncovered by the other. Issues of perceptions and experience of educational administrators on the effectiveness of the implementation of ICT at the University and strategies on improving university management through ICT use were handled through qualitative methods. Issues of how the University has provided ICT equipment for use in the management of educational services and how the stakeholders can make ICT as effective as expected are handled through quantitative methods. With mixed methods, different research questions were given due attention. Mixed methods allowed for an explicit link between research questions: the questions on perceptions, experience on the effectiveness of ICT implementation and strategies for improving ICT use are linked to qualitative methods, while those on the type of ICT equipment and how stakeholders can make ICT as effective as expected are linked to quantitative methods. Instrument development is enhanced by the use of mixed methods. Qualitative data was used to

develop a questionnaire, which meant that the instrument developed to collect quantitative data was based on qualitative research questions, not a hypothesis (Bryman, 2012). The questions used in the questionnaires for students and lecturers in the study had a bearing on the questions used in the interview schedule for the ICT administrators, educational services administrators, managers (officers of the university).

Mixed methods can be an ideal technique for assessing complex interventions (Nutting, Miller, Crabtree, Jaen, Stewart & Stange, 2009; Homer, Klatka, Romm, Kuhlthau, Bloom, Newacheck, Van Cleave & Perrin, 2008). Any researcher interested in using mixed methods can choose from five primary mixed methods designs depending on the research questions and resources available for the evaluation. For this reason, contemporary graduate students tend to use mixed methods research in order to learn and experience this form of research design.

However, a number of challenges are faced by the mixed methods researcher including: the development of new skills, additional time needed to complete the research, research design issues (i.e. sampling, participant selection, potential bias in the data, and data integration, extensive data collection and analysis), logistical issues in conducting the research, demonstrating the rigour of the supplemental data, the integration of findings, time-consuming procedures, requiring a research team, raising almost as many issues as when working across approaches, clarifying just *what* is being mixed—and *how* it is being mixed, difficulty in drawing 'lines of conflict' and addressing any contradictory findings (Creswell, 2014; Bryman, 2012; Azorin & Cameron, 2010; Creswell & Plano Clark, 2007; Brannen, 2005; Tashakkori & Teddlie, 2003; Bazeley, 2002).

In this study, the main concern was to understand in a better way how ICT had affected the management of educational service delivery and student learning at the University. The main actions included recording, presenting, construing, synthesising, clarifying, and producing meanings or understanding concerning the set research questions. The seven steps in conducting a Mixed Methods Research Design are indicated in Figure 3.5.

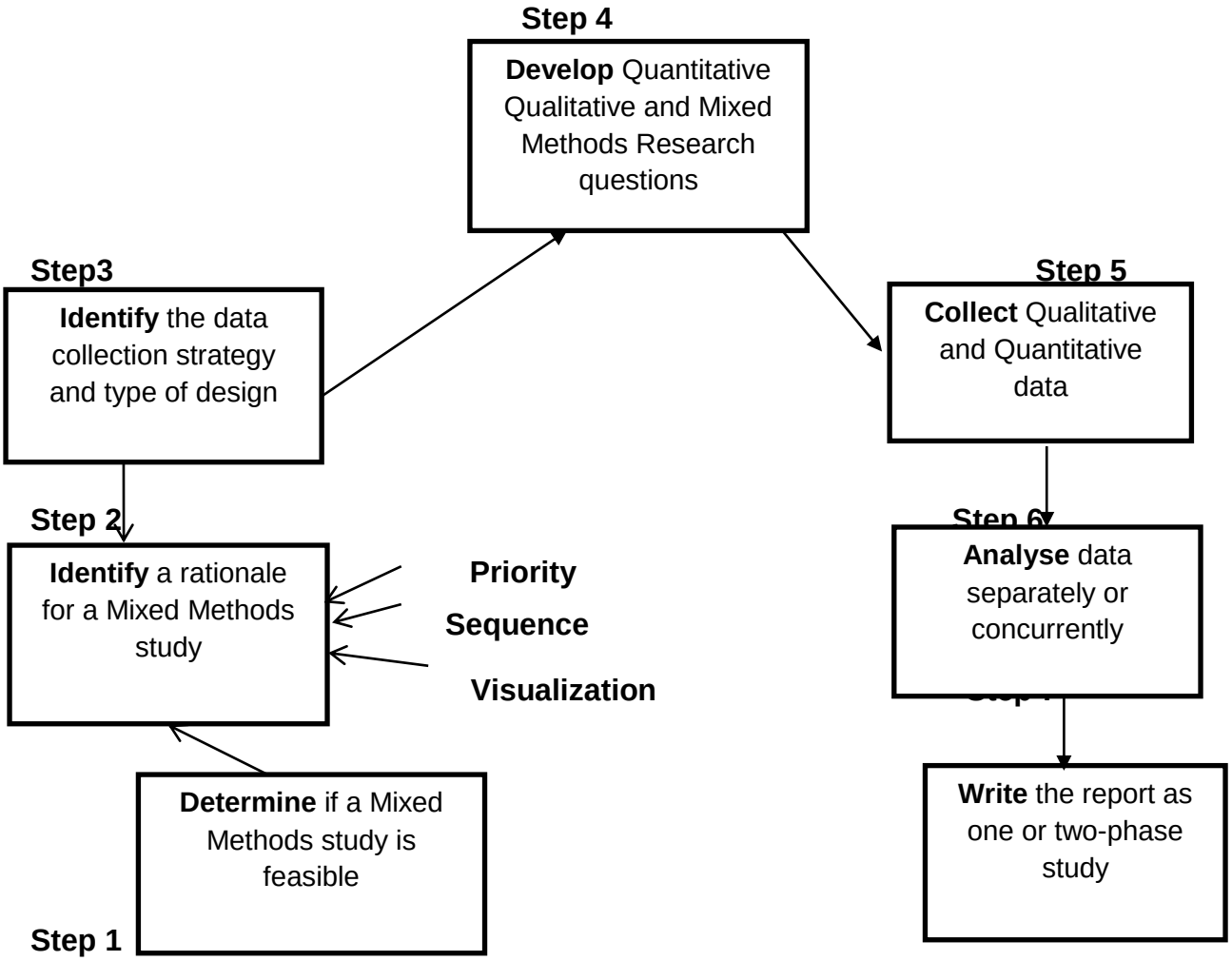


Figure 3.4: Steps in the process of conducting a Mixed Methods Study

Source: Adopted from Creswell (2014)

3.6 DESCRIPTION OF THE RESEARCH SITE

The study was conducted at UNU University in Uganda. This university is one of the public universities in Uganda (UNU University, 2007). It is the biggest and oldest university, established in 1922 (Lejeun, 2005). The university is located in Kawempe Division, one of the geopolitical divisions that make up Kampala district. It is located about three kilometres along Makerere Hill Road that radiates out of Kampala, the capital city of Uganda, towards the North. The University has a concentration of 20 faculties, institutes, and schools grouped into eight colleges, namely: the College of

Agriculture and Environmental Sciences, the College of Business and Management Sciences, the College of Computing Information Sciences, the College of Education and External Studies, the College of Engineering, Design, Art and Technology, the College of Health Sciences, the College of Humanities and Social Sciences, the College of Natural Sciences, and College of Veterinary Medicine, Animal Resources and Bio-Security.

The top administrators of the colleges are charged with a duty to design and offer a variety of day, evening and external educational programmes to more than 30,000 undergraduates and 3,000 postgraduates (Tabaire & Okao, 2010). The designed programmes cover various educational disciplines in Arts, Business Administration, Commerce, Economics and Statistics, Education, Humanities (Social Sciences), Science (natural sciences), Sports, Technology, Medicine and others (Kasenene, 2011). Most of the university's departments are named after the educational programmes they offer and are located at the Main Campus. Also, the University has a School of Law and a University Library that has branches in all the colleges and which serves as the national reference library and the legal depository of all works published in Uganda. It is also a depository for the United Nations as well.

The University enrols students on both a residential and non-residential system of study. The residential system is based on eight halls of residence, namely Livingstone Hall, Lumumba Hall, Mitchell Hall, Nkrumah Hall, Nsibirwa Hall, and University Hall for resident male students; and Africa Hall and Mary Stuart Hall for resident female students. Complex Hall (CCE) accommodates both male and female students, and Galloway is the residential hall for students of medicine in their final years. Each of these halls has space that can be used as lecture rooms and common study rooms.

The College of Health Sciences has a branch at Mulago, which is about a kilometre from the Main Campus and the College of Agricultural and Environmental Sciences has a branch at Kabanyolo, which is 20 kilometres along Gayaza Road. The University also operates two new campuses. One campus is located in the city of Fort Portal, approximately 311 kilometres (193 miles) to the West of Kampala. This

campus offers academic programmes such as Bachelor of Commerce, Bachelor of Business Administration, and Bachelor of Science in Surveying, Bachelor of Science in Land Economics, Bachelor of Science in Conceptual Economics, and Bachelor of Science in Business Statistics. Another campus is located in the city of Jinja, approximately 86 kilometres (53 miles) East of Kampala. The following academic courses are offered at this campus: Bachelor of Science in Computer Science, Bachelor of Information Technology, Bachelor of Law, Bachelor of Development Studies, and Bachelor of Tourism.

It is important to note that this study was based at the Main Campus because the major ICT Centre and the Faculty of Computing were situated there. Therefore, all the information needed to accomplish the study was easily accessed at the Main Campus of the University, even if the information was about ICT facilities installed and enabled at the other campuses.

It is also important to note that although the study was conducted at the Main Campus of the University; only six out of the nine colleges were selected using simple random sampling method selecting the name of the colleges anonymously and randomly. The following six colleges were selected:

i. College of Business and Management Sciences
ii. College of Computing Information Sciences
iii. College of Education and External Studies
iv. College of Engineering, Design, Art and Technology
v. College of Humanities and Social Sciences
vi. College of Agricultural and Environmental Science

These six colleges constituted 75 percent, which was well above the proportion of 35 percent deemed by Saunders, Lewis and Thornhill (2003) to be adequate for attaining the necessary statistical representativeness of the total population of the colleges at the University. Simple random sampling was again used to select twelve schools from the six colleges participating in the study. The selection process explained above was repeated at the faculty and department levels in order to select

faculties and departments whose numbers were statistically representative of the selected colleges. To select lecturers and students from each school to participate in the study, stratified sampling technique was used.

3.7 STUDY POPULATION

Careful selection of the study population is an essential step towards realising the study objectives. The University has a vast population, however, operationally, the study population included students, lecturers, ICT administrators, educational services managers and officers of the University. A representative sample was drawn from the total population for this study.

3.8 SAMPLE STRATEGY

A sample refers to the number of respondents selected to provide data required to accomplish a study (Amin, 2005). The sample size was determined using Krejcie and Morgan's statistical table, which is recommended by Amin (2005:454). Based on Krejcie and Morgan's (1970) table for determining sample size, with a population 36,664, a sample of 817 would be ideal and representative enough for the study to provide enough accuracy to base decisions on the findings with the highest degree of confidence. The selected sample comprised of all the categories of respondents.

This table indicates both the population size and the corresponding minimum sample size needed to achieve statistical representativeness and generalizability of findings. The table recommends at least 30 respondents as a minimum for a sample of up to 1,000 respondents. For survey research, at least 100 subjects should be selected in each major sub-group, 30-50 for correlational research, 10-30 for ex-post-facto or causal-comparative and experimental research in each group to be compared (Amin, 2005). This means the sample size for this study was adequate. The table was used to determine the sample size as shown in Table 3.2.

Table 3.2: Sample size determination based on Krejcie and Morgan's Principles

Category of Respondents	Population Size	Expected Sample Size	Realised Sample Size	Justification
Lecturers	3,503	346	323	Krejcie and Morgan's (1970) Sample determination Table
ICT Administrators	35	26	28	Krejcie and Morgan's (1970) Sample determination Table
Students	33,000	380	374	Krejcie and Morgan's (1970) Sample determination Table
Educational Services Managers	123	57	42	Criterion and simple random sampling
University Managers	08	08	07	Purposive sampling
Total	**36,664**	**817**	**774**	

Source of population size: Uganda Bureau of Statistics. 2010.

Table 3.2 shows that the sample size was expected to be 380 students, but only 374 participated, 26 ICT administrators had been expected, instead 28 participated, an increase which resulted from the consideration given to ICT administrators from Human Resource Information System (HURIS), Academic Records Information System (ARIS), Financial Information System (FINIS), Directorate of Information and Communication Technologies (DICTS) and UNU University E-Learning Environment (NUELE). Also, 346 lecturers were expected, but only 323 participated. In the educational services managers sample (Principals, Deans, Heads of Department) 42 out of 57 participated, and eight University managers (officers of the university) had been expected to participate, but only seven did.

A sample strategy consists of the techniques used to select these respondents. Therefore, a sampling strategy helps to select participants in a study from a target population, which, itself, refers to the total number of potential respondents (Creswell, 2002). The population of this study consisted of all the valid members of the University registered at the time of data collection. Consequently, the sample of the study consisted of the University ICT administrators, lecturers, and students who were selected to provide the required data.

A sample strategy may be probabilistic or non-probabilistic (Creswell, 2003). A probabilistic sample strategy consists of all the unbiased sampling techniques used to select a sample whose size is statistically representative of the study population; examples of the techniques used in this strategy include simple random sampling, stratified sampling, and cluster sampling (Saunders, Lewis & Thornhill, 2003: 303). The probabilistic sampling strategy is often preferred in mixed methodology because of the insistence of this methodology to fulfil the requirement of statistical representativeness (Amin, 2005).

A non-probabilistic sample strategy consists of biased or judgemental sampling techniques such as purposive sampling, convenience sampling, and other non-random sampling techniques. A non-probabilistic strategy is used when statistical representativeness is not necessary or when special consideration is made to select respondents as key informants. This explains why only non-probabilistic sampling techniques were used to select the sample for this study, even when a positivistic methodology was mainly adopted and complemented by some aspects of a qualitative methodology. The selection was carried out as explained in the following paragraphs.

3.8.1 Quantitative Data Respondents

These two categories of respondents were selected using convenience sampling, and they included lecturers and students. This sampling technique was used to select respondents according to their availability and accessibility (Amin, 2005). Convenience sampling was the most appropriate sampling technique because

although the lists of both lecturers and students could be attained from the human resource management office (lecturers) and Dean of students' office, it was difficult to trace each respondent by name because of some reasons.

3.8.1.1 Selection of Lecturers

Lecturers tend to be available at campus only when they teach. Also, some lecturers have busy schedules, which could make participation difficult. The lecturers might not be able to participate, as they could be involved in or be unwilling to participate due to personal limitations. Also, lecturers selected by name could be found unavailable because of being sick, being on sabbatical leave, having gone for further studies abroad, are attending an international conference or a workshop outside Uganda or conducting field research.

Because of the above reasons, the researcher had to take into account that not all lecturers were in a position to participate effectively in the study. Therefore, only those who were willing, available, and accessible were selected.

3.8.1.2 Selection of Students

Students tend to be available at campus only when attending lectures. Students were selected using convenience sampling because they tend to be very mobile on campus because of being involved in many activities, including having lectures at different times of the day; consulting library services at different times of the day; getting involved in private revision in their bedrooms in halls/hostels, residents, common students rooms, dining halls, under tree shades, free lecture room, rest parks, and other places which they found it convenient to facilitate private reading; and participating in different social activities again at different times of the day.

Also, some students were working students, others were non-residents, others were on day programmes, and others on evening programmes. It would, therefore, not be possible for all the students to be traced to the university. Random selection was

hence very likely to lead to the selection of a student who could not be traced easily, and this was an issue that the researcher had to take into account.

3.8.2 Qualitative Data Participants

Purposive sampling and simple random sampling, as sampling techniques, were used because of their professed merits. The techniques allowed the researcher to reach people who are believed to be critical for the research. This was not only economical but also informative in a way that conventional probability sampling would not be. Zikmund (2003) notes that the process of sampling involves any procedure using a small number of items or parts of the whole population, in order to draw conclusions about the whole population.

3.8.2.1 Selection of ICT Administrators

ICT administrators were selected as participants using a non-probability sampling technique, purposive sampling, referred to as criterion-referenced sampling. According to Patton (2011), the sampling technique has the following advantages:

i To be sure to understand cases that are likely to be information-rich because they may reveal major system weaknesses that become targets of opportunity for programme or system improvement.

ii To add an essential qualitative component to a management information system or an on-going programme monitoring system.

iii To identify cases from quantitative questionnaires or tests for in-depth follow-up.

These respondents were selected using this sampling technique because they were considered as key informants in this study. As ICT administrators, they had the technical competency that placed them in a position to provide vital data regarding the types of hardware and software that had been installed and enabled in their respective units and at the University in general, to facilitate the management of educational services.

3.8.2.2 Selection of Educational Service Managers

As in the previous category of respondents, this category was also selected through simple random and criterion sampling. Educational Services Managers are acquainted with their role in the management of education services in the University, which was necessary for the study. The sample included Principals of colleges (criterion sampling), Deans of schools and Heads of Department (simple random sampling). All the six Principals in the colleges under study were selected. Two Deans were selected from each college making a total number of twelve Deans. The names of all the schools of the colleges selected for the study were anonymously and randomly chosen to result in two schools from each of the six colleges. As it was for the Deans, the Heads of department were selected using random sampling where any two were selected from each of the 19 colleges making a total of 38 respondents. These three groups play a dual role of teaching and supervising the teaching in their colleges, schools and departments respectively thus qualifying as respondents to provide data on ICT use in teaching/learning and administration in the units of their jurisdiction. This category was particularly difficult to access due to their busy schedules.

3.8.2.3 Selection of University Managers (Officers of the University)

As was the case with ICT administrators, these were selected using purposive sampling based on the following criteria. Because they constitute the management the University, all the eight were selected for the study so that they would provide data on how ICT has improved management in general besides the teaching and learning activities at the University. They included: The Vice-Chancellor, the Deputy Vice-Chancellor (Administration and Finance), the Deputy Vice-Chancellor (Academic), the University Secretary, the Academic Registrar, the University Bursar, the University Librarian and the Dean of Students.

3.9 DATA COLLECTION AND INSTRUMENTS

The data collected for this study and the instruments used are described in the following subsections.

3.9.1 Primary Data Collection

Primary data refer to all data collected from respondents targeted in a study either as individuals in the field or as subjects exposed to laboratory tests (Amin, 2005). Primary data are collected not for any other use but for the sole purpose of accomplishing an ongoing study (Creswell & Clark, 2007). Although the collected primary data were qualitative and quantitative, the dominant form was the quantitative data.

3.9.1.1 Quantitative Data Collection

Quantitative data were the main form of collected data because these data were needed to evaluate not only the contribution (effect) of the ICT installed and enabled at UNU University to (on) the effectiveness of managing educational services delivered to enrolled students, but also the magnitude and significance of this contribution (effect). Quantitative data are collected using positivistic research methods, which, according to Saunders, Lewis and Thornhill (2003), include surveys, and observations. The method employed in this study was the survey method, notwithstanding its cost, as observed by Amin (2005). The specifically adopted method was the cross-section survey because the required quantitative data were to be collected from a variety of University members. This method was also adopted because it facilitates administration of questionnaires and therefore, a collection of largely consistent and first-hand data from a relatively large sample. This kind of data is advantageous in that it makes data analysis relatively easy (Creswell, 2003).

The quantitative data collected in this study were in the form of first-hand perceptions of the selected lecturers and students about the nature of ICT tools installed and enabled at the University, the contribution of these tools to the management of

educational services at the university, and what needs to be done to improve this contribution. The perceptions were quantified using suitable Likert scales of responses (Trochim, 2006). The quantification involved designing an item and asking a respondent to indicate their perception by ticking a response that best matched their perception. The ticked response was considered to be the perception that a respondent held about the item. The response was assigned a code, which transformed it into a quantitative form. For instance, for a response scale running from strongly disagree through disagree to, not sure, agree and strongly agree, the first response was assigned code '1', the second was assigned code '2', third was given code '3', the fourth was assigned code '4', and the fifth response was assigned code '5'. The codes were then used to determine the perceptions that respondents held about each item quantitatively.

All the administered items were in the form of two semi-structured, self-administered questionnaires designed according to the research questions. One questionnaire was designed for lecturers and another for students to collect data because:

This type of questionnaire could accommodate both close-ended and open-ended questions, implying that it could collect all data required to accomplish a study by giving respondents the opportunity to answer questions intended to collect un-predetermined data in an unlimited manner (Amin, 2005).

This questionnaire also facilitates data collection from large samples made up of literate respondents (Trochim, 2006). They were, therefore, appropriate since the targeted were a large number of university students and lecturers who were literate enough to read, understand and respond to the questions in writing.

This type of questionnaire could also be completed by respondents themselves, which made data collection relatively easy. The questionnaires comprised mostly close-ended items, which also made data analysis relatively easy.

A copy of the questionnaire is available in the Appendices - see Appendix H for lecturer questionnaire and Appendix G for the student questionnaire. The designed

questionnaires had four sections. Section A in each questionnaire consisted of items designed to collect biographical information of respondents. For students, Section B contained four items that were intended to collect data on how the University has provided ICT equipment to be accessed and utilised in the management of educational services. The first item contained 34 statements, which had to be qualified, using the Likert scale ranging from not sure, strongly disagree, disagree, agree to agree strongly. An example of the statements to be qualified is: *Students with personal computers are enabled to use the PCs, access lecture notes, and any academic instructions from their lecturers.* The other three items were open-ended and an example is *Mention any other equipment (hardware) used to manage educational services at the University.*

Section C of this instrument was composed of items meant to help collect data about the perceived level of effectiveness of educational services management (planning, implementation, control of educational programmes and facilitating students' self-directed learning) at the University. This Section had one item with 27 statements to be qualified using the Likert scale ranging from not sure, strongly disagree, disagree, agree, to strongly agree. An example of a statement was: *Students have the competence needed to optimally use the ICT facilities installed at the University to support learning.*

Section D of the instrument was made up of two items requiring respondents to provide data regarding the strategies that could be adopted to ensure that ICT enables the management of educational services at the University to be as effective as expected. One of the items in this section was: *Mention the ways that can be used to improve the role of ICT in ensuring that the management of educational services at the University is as effective as expected.*

Section B for the academic staff had four items. The first item had 35 statements to be qualified using the Likert scale ranging from not sure, strongly disagree, disagree, agree to agree strongly. One statement to be qualified was: *The University has ICT-based sources of information that lecturers can use to access content needed to be included in the curricula of the academic courses offered by the university.*

An example of other items was: *Briefly explain how the ICT hardware and software mentioned above is used in the delivery of educational services at the University.*

In Section C, there was only one item consisting of 29 statements which had to be qualified using the Likert scale. One of the statements was: *Lecturers have the competence needed to optimally use the ICT facilities installed at the University to support teaching.*

In Section D, there were two items, of which one of them was*: Mention the factors that limit the role of ICT in improving the effectiveness of managing educational services at the University.*

Most of the items in both questionnaires were designed in such a way that they measured the variables of the study using Likert scales of responses as described by Trochim (2006). Likert scales were suitable for measuring the relevant characteristics of respondents and each variable. As such, respondents used the given response options to answer all closed questions. Responses of participants in interviews were mainly in words or passage form and had to be coded according to the themes they represented. These codes were analysed accordingly using EpiData software. Interviews were structured and analysed quantitatively, as when numeric data is collected or when non-numeric answers are categorised and coded in numeric form.

For example, the items soliciting responses from the students and lecturers were mostly closed-ended, and only a small number were open-ended, but these had to be quantified using EpiData which could be used to quantify them. The questionnaires were piloted to 10 students and ten lecturers who did not participate in the study. After that, editing of the questionnaires and development of the interview schedules was done in consultation with the supervisor.

3.9.1.2 Qualitative Data Collection

Qualitative data refer to texts, which cannot be quantified (Creswell & Clark, 2007). These data are usually collected as first-hand perceptions, views and opinions given by respondents in the form of narrative responses either orally or through writing (McMillan & Schumacher, 2010). Qualitative data are collected using interpretive methods, which include written or oral interviews that may be conducted by face-to-face encounters, writing, telephone, post office, or electronic mailing (Cohen, Manion & Morrison, 2007; Creswell, 2003).

Besides the questionnaires for students and lecturers, there were interview schedules which were constructed with the aim of answering the three research objectives on how educational services administrators perceived and experienced the effectiveness regarding the implementation of ICT at the University, how the adoption of ICT has improved university management and student learning at the University and some data on the nature of ICT installed for educational services management at the University. These were administered to ICT administrators, educational services managers (Principals, Deans, and Heads of department) and university managers (Officers of the University).

For this inquiry, the researcher used open-ended interviews to collect qualitative data. The data were collected in the form of first-hand views and perceptions that were reported by ICT administrators about the nature of ICT hardware and software installed and the effect it had on the University. The participant responses to the interview questions were either written or digitally recorded. ICT administrators were at liberty to write or answer orally because, by virtue of their jobs, they were literate enough to use any of the styles. In case a selected ICT administrator, educational services manager or university manager preferred to answer orally, the responses were recorded by the researcher using the copy of the interview schedule that the respondent would have filled if he or she had opted for writing.

Three interview schedules were used because they could accommodate both open and closed-ended questions, enabling ICT administrators, the educational services

managers, and University managers to answer some of the questions freely. They also enabled the researcher to conduct written or face-to-face interviews with the respondents depending on their preference; some preferred to write their answers rather than be recorded.

Interviews were, therefore, appropriate instruments to collect data from these key informants. As shown in Appendices I, J, and K, the first interview schedule had four sections. Section A consisted of items intended to collect biographical information of the selected ICT administrators. Section B contained items that were intended for data regarding how the University has provided access to ICT equipment to be utilised in the management of educational services at The University. There were altogether six items for this interview schedule. An example of the items is: *In your opinion, how can the factors be addressed in order to improve the contribution of ICT for effective management of educational services at The University?*

The second interview schedule was designed for the educational services managers (Principals, Deans and Heads of department) which was composed of items designed to help collect data about the perceptions and experiences of the effectiveness of ICT implementation at the University. Section A required respondent biographical information but Section B required data on how respondents perceived and experienced the effectiveness of the implementation of ICT at the University. There were altogether eight items in this interview schedule. One of the items in this interview schedule was: *What is your perception of the effectiveness of the implementation of ICT in the management of educational services at the University?*

The third interview schedule designed for University managers was composed of two sections. Section A of the instrument consisted of items intended to collect biographical information of the University Management (Officers of the University). Section B contained items that were intended for data regarding how ICT has improved the management and student learning at the University. There were altogether 11 items in the interview schedule. An example of the items in this interview schedule was: *What do you suggest as ways of improving ICT use by the*

University management? Table 3.3 below shows the research questions, and the tools meant to answer them.

Table 3.2: Constructs, research questions and the number of study items

Research Objective	Research Instrument	Respondent Category	Number of Items
1. To explore how UNU University has provided access to ICT and facilitated the management of educational services through ICT adoption	Questionnaire	Academic staff	07
	Interview schedule	ICT Administrators	06
	Questionnaire	Students	07
2. To understand the perceptions and experiences of education services managers on the effectiveness regarding the implementation of ICT at UNU University	Interview schedule	Educational services managers	08
3. To explain how ICT adoption has improved management and student learning at UNU University	Interview schedule	University managers	11
4. To propose ways by which ICT can be used to improve educational services at UNU University.	Interview schedule Questionnaires	ICT Administrators Students Educational services managers University managers	As indicated above- some items in all categories addressed this question in particular.

Source: Research Instruments

3.9.2 Secondary Data Collection

Secondary data refer to facts or information prepared in a published or unpublished form for other uses, but relevant for a study being carried out (Creswell, 2003:98).

Secondary data may be qualitative or quantitative, and they are collected using a method referred to as document analysis or review (Newhouse, 2002a; Newhouse, 2002b). This method facilitates the collection of data by reviewing or analysing already existing reports or documents containing information initially meant for other purposes, extracting data from reports or documents, which is considered relevant to a study (Cohen, Manion & Morrison, 2007).

The reports or documents could be institution financial reports and statements, employee records, strategic plans, or policy documents. These could also include country population census reports, national budget reports, or even a recorded autobiography (Sekaran, 2000).

In this study, the documentary analysis was done through examination of data that were collected from ICT documents such as UNU University Strategic Framework 2007/08-2017/18, UNU University ICT Policy (2005), and UNU University ICT Policy and Master Plan (2001). These documents were accessed from the office of the Principal of the College of Computing Information Sciences. Additional information was collected from published textbooks, journal articles, and online manuscripts. The data were collected for purposes of primary corroborating data collected from respondents.

3.10 DATA ENTRY AND ANALYSIS

Data entry template screen were created using EpiData software package, where all coded items were captured. Data from open-ended questions were coded for easy entry into the template. The study employed mixed methods, and thus both qualitative and quantitative data were collected. The collected data were analysed using different techniques of analysis, which included qualitative and quantitative techniques, as well as thematic content analysis. After collecting questionnaires from the respondents, these were compiled, sorted, edited and coded to have the required quality, accuracy and completeness. The coded responses were entered into EpiData and then exported to the Statistical Package for Social Scientists (IBM SPSS 22 programme). This package helped in the generation of the frequencies and

enabled cross tabulation, regression, and Pearson correlation coefficient to map the relationships between variables. Some ICT policies of the University and a Ministerial Statement on the State of Education for the year 2014/2015 in Uganda were analysed by use of thematic content analysis. Interpretations and generalised conclusions were drawn based on these analyses.

3.10.1 Quantitative Analysis

Quantitative analysis involves logical operations intended to summarise and organise numerical data in a way that facilitates drawing meaning out of it (Amin, 2005). These operations started with data coding and entry into EpiData software programme which was manipulated and commanded to carry out relevant data editing, screening, descriptive and inferential operations, thereby generating results that summarised and provided meaning to the data within the context of the research questions being answered or hypotheses being tested (Amin, 2005).

In this study, the quantitative analysis involved some operations. For purposes of avoiding repetitive reporting of qualitative findings, the themes developed using the qualitative analysis techniques explained above were assigned numerical codes as follows: For each variable, the first developed theme was assigned code ‘1’, the second theme was assigned code ‘2’, the third theme was assigned code ‘3’, and so on until all the developed themes were allocated codes. The codes were then entered into the Microsoft Excel programme. Whenever a response implied an already developed theme, the corresponding code was entered into the programme. Otherwise, another theme was developed and assigned a different code, which was also entered into the programme.

Also, all close-ended responses given by respondents in the administered questionnaires were also assigned the codes as shown below and entered into the programme according to how the respondents answered:

Code 0	Not Sure
Code 1	Strongly Disagree

Code 2	Disagree
Code 3	Agree
Code 4	Strongly Agree’

The IBM SPSS 22 programme was then used to analyse the data using its inbuilt quantitative techniques. The specific techniques used in the analysis included descriptive analysis, factor analysis, reliability analysis and multivariate regression analysis. These techniques used are explained below:

3.10.1.1 Descriptive Analysis

This is the discipline of quantitatively describing the main features of a collection of information or the quantitative description itself (Price & Chamberlayne, 2008). The analysis, as used in this study, describes information related to the use of ICT by students for learning (student learning), lecturers (for teaching), ICT administrators (for providing learning and teaching support to students, lecturers and administrators), educational services managers (for the management of colleges, schools and departments), and university managers (for university management in general) at the University. Descriptive statistics according to Price and Chamberlayne (2008) are distinguished from inferential statistics (or inductive statistics), in that descriptive statistics aim to summarise a sample, rather than use the data to learn about the population that the sample of data is thought to represent.

In this study, descriptive statistics were computed using SPSS programme to determine measures of central tendency such as mean; frequency distributions; and percentages and the results were presented using frequency distribution tables, pie-charts and bar graphs.

3.10.1.2 Factor Analysis

Exploratory factor analysis was used to identify the most critical elements of the study variables as summarised in the conceptual framework. As pointed out by Field (2009), factor analysis is used mostly for data reduction purposes. One of the

purposes of employing factor analysis is to extract a small set of variables (preferably uncorrelated) from a large set of variables (most of which are correlated to each other). Another purpose is to create indexes with variables that measure similar things (conceptually).

Factor analysis takes two forms namely exploratory factor analysis and confirmatory factor analysis. Exploratory factor analysis is employed when one does not have a predefined idea of the structure or how many dimensions are in a set of variables and confirmatory factor analysis when one wishes to test specific hypotheses about the structure or the number of dimensions underlying a set of variables. Kaiser-Meyer-Olkin measure of sampling adequacy (KMO) was computed for lecturers and student data before doing factor analysis. The KMO was intended to show appropriateness of factor analysis (Field, 2009). KMO statistics ranges between 0 and 1 in which values above 0.5 shows that factor analysis is appropriate and yields distinct and reliable factors.

Exploratory factor analysis was conducted using principal Component Analysis with varimax rotation. The Bartlett's test of sphericity was computed to establish if correlations between items were sufficiently large for PCA. Analysis involved computation of eigen values for each component of the data following Kaiser's criterion of 1. Factor loadings were generated after varimax rotation.

3.10.1.3 Correlation Analysis

Pearson Correlation Coefficient (r) was used to establish the association between ICT usage and effective management of educational services at UNU University. This test statistic assumes that sampling distribution is normally distributed. In this study, Composite variables of infrastructure, staff, communication, and management of educational services were generated using mean score scales before computing Pearson Correlation Coefficient.

The analysis was done using SPSS programme. Pearson correlation coefficient is used to measure the size of an effect and the interpretation is as follows: values of

±.1 represent a small effect, ±.3 is a medium effect, and ±.5 is a large effect (Field, 2009).

3.10.1.4 Multiple Linear Regression Analysis

Multiple Linear Regression Analysis is an inferential statistical technique used to analyse the prediction of the dependent variable(s) by the independent variable(s) (Shavelson & Towne, 2002). The prediction indicates the effect (contribution) of each independent variable to (on) the dependent variable.

Multiple linear regression analysis was conducted to establish the effects of ICT hardware and software on the effective management of educational services at UNU University. Multiple linear regression analysis is based on the following assumptions: a linear relationship between the dependent and independent variables; that residuals are normally distributed; it assumes that the independent variables are not highly correlated with each other; it assumes that the variance of error terms are similar across the values of the independent variables (Kothari, 2005).

Composite variables of infrastructure, staff, communication, and management of educational services run at correlational analysis were further analysed using multiple linear regression model. The method was adopted because it is dominant in determining effects by establishing, at once, how changes in the dependent variables are explained by the changes in the independent variables (Amin, 2005; Kothari, 2005). Accordingly, the coefficients were considered as indicators of effects of ICT variables on the effectiveness of managing educational services at the University. The use of this method was based on Newhouse's (2002b) framework for articulating the impact of ICT on learning in schools, which advances an assumption that ICT contributes directly to the effectiveness of managing educational services. Accordingly, the underlying standard regression model adopted from Kothari (2005) is given as follows:

$$y_i = \sum_{i=1}^{n} a_i x_i + e$$

Where: *i was the counter of the variables included in the model*

> *y_i represented the perceived levels of effectiveness of educational services management*
> *x_i represented independent and moderating variables,*
> *a_i represented the coefficient relating x_i to y_i. This coefficient gives the extent to which the independent variable (x_i) affects the dependent variable (y_i) (Amin, 2005). The larger the magnitude of the coefficient in absolute terms, the stronger is the effect considered to be.*
> *e is the error term.*

The error term was included to cater for the fact that all the independent variables considered in the study might not determine the effectiveness of managing educational services fully or perfectly (Kothari, 2005).

3.10.2 Qualitative Analysis

This type of analysis involved qualitative content analysis as described by Saldaña (2016), Graneheim and Lundman (2004) and Hsieh and Shannon (2005). Qualitative data was recorded and summarised according to the various themes and was consequently quoted in the results and discussion section.

3.10.3 Document Analysis

This technique of analysis was applied in the form of reviewing documents concerned with ICT at the University, and extracting data that were relevant to the study. The analysed documents included UNU University Strategic Framework 2007/08-2017/18, UNU University ICT Policy (2005), UNU University ICT Policy and Master Plan (2001), Uganda Vision (2025), Ministry of Education and Sports 2012 Ministerial Statement to Parliament about the State of the Education Sector in Uganda, and National Information and Communication Technology Policy designed by the Ministry of Works, Housing and Communications. The analysis involved a careful and critical review of each identified document with the intent to extract all data that was relevant regarding corroboration of the collected primary data.

This review process involved reading through the preamble of each policy document to identify the objectives of the policies. This was followed by critically reading the sections of each policy in order to identify as many ICT hardware and software tools adopted at the University to manage educational services as possible. This way, all data identifying the tools were extracted and incorporated into the findings of the study (Graneheim & Lundman, 2004).

3.11 METHODOLOGICAL NORMS AND QUANTITATIVE RIGOUR MEASURES

3.11.1 Quantitative Rigour

In quantitative methods, rigour or trustworthiness of the research instruments is measured using four significant ways which include objectivity, validity, reliability and generalizability (Amin, 2005).

3.11.2 Objectivity

The fundamental issue here can be framed as one of relative neutrality and reasonable freedom from unacknowledged researcher biases - at the minimum, explicitness about the inevitable biases that exist. The study's general methods and procedures are described explicitly and in detail. We can follow the actual sequence of how data were collected, processed, condensed, transformed, and displayed for specific conclusion drawing (Coll & Kalnins, 2009; Lincoln & Guba, 1989). In objectivity, the following characteristics apply:

1. Conclusions are explicitly linked with exhibits of condensed and or displayed data.
2. There is a record of the study's methods and procedures, detailed enough to be audited by an outsider.
3. The researcher has been explicit and as self-aware as possible about personal assumptions, values and biases, and affective states - and how they may have come into play during the study.

4. Competing hypotheses or rival conclusions have been considered. The plausibility of rival conclusions has been examined (Lincoln & Guba, 1989).

The study's data are retained and available for reanalysis by others (as allowed by institutional review board regulations and any researcher-participant agreements. In this study, the collected data were retained and are available for reanalysis by other independent analysts.

3.11.3 Validity

Validity is concerned with the degree to which a research tool or items of a designed research instrument measure precisely what they are supposed to measure. According to Amin (2005), validity refers to the ability of a research instrument or test to produce findings that are either in agreement with theoretical or conceptual values or are accurate. This scholar observed further that there are three types of validity, namely construct validity, which establishes the extent to which items of a designed instrument (such an aptitude test) is capable of being used to measure a concept (such as intelligence) and which cannot be measured directly; and surface validity– which measures the degree to which an instrument (such as a watch) looks the type that can really measure a variable (such as time). The third type of validity is the criterion-related validity, which is the degree of correspondence between scores on an instrument to be authenticated and is a given criterion variable.

The last type of validity is content validity, which refers to the degree to which each item of a designed or given research instrument is relevant enough to measure a given variable correctly. Amin (2005) emphasised that establishing the validity of research instruments is the most important idea to consider when preparing a research instrument to use. After all, convincing inferences cannot be made based on data collected using research instruments that do not serve the purpose for which they are intended. Realistic research should be based on data that accurately represents respondent opinions, perceptions, or facts from the field or laboratory experiments.

In this study of the above-defined types of validity, content validity was used to establish the validity of the research instruments designed to collect the needed primary data (Polit & Beck, 2006). Validity testing involved the researcher conducting pilot-testing by administering the designed instruments to 10 colleagues who have expert knowledge about the theme of the study and asking them to scrutinise the items of each instrument. The colleagues were asked to carry out item analysis by scrutinising and assessing each item in the instruments either as relevant (R) or irrelevant (IR). They were asked to rephrase and improve the items thought to be relevant but which had been poorly phrased. They were also asked to add any items that they thought were relevant but had been omitted or left out unintentionally. To ensure the validity of the research instruments, the researcher used expert raters and his supervisors from the University of South Africa (UNISA). After carrying out this process, the Content Validity Index (CVI) was computed for each instrument using the following formula adopted from Amin (2005):

$$CVI = \frac{R}{R + IR}$$

Where:

CVI is the content validity Index,

R is the number of relevant items and

IR is the number of irrelevant items.

The computations and the Content Validity Indices (CVIs) obtained for the t research instruments are summarised in Table 3.4.

Table 3.3: Content Validity Indices for the items in the Administered Research Instruments

Constructs Rated	Content Validity Index
Lecturer Questionnaire	
Teaching aid	0.78
Management	0.99
Assessment	0.88
Infrastructure	0.95
Overall CVI	0.90
Student Questionnaire	
Management	0.98
Infrastructure	0.74
Staff	0.89
Communication	0.97
Overall CVI	0.89

Table 3.4 indicates that the overall CVI for the constructs in the lecturer questionnaire was 0.90. The CVI of individual constructs for lecturer questionnaire were: teaching aid-0.78; management-0.99; assessment-0.88 and infrastructure-0.95.

On the other hand, the overall CVI for the constructs in the student questionnaire was 0.89. The CVI of individual constructs for student questionnaire were: management-0.98; infrastructure-0.74; staff-0.89 and communication-0.89.

These CVIs indicate that the instruments were a good measure of the validity of the instruments given that they were all above 0.7 as recommended by Amin (2005).

3.11.4 Reliability

Reliability refers to dependability, trustworthiness, credibility or the degree to which a research instrument measures the same construct or variable consistently across

different samples. According to Bless and Higson-Smith (2000), reliability also refers to the extent to which any measuring instrument yields the same results when it is used to measure a trait or concept on repeated trials. Reliability can refer to internal consistency or stability of a measuring instrument over time. Internal reliability is established based on simple descriptors using different respondents or informants; and it is investigated and established differently in quantitative and qualitative research (Amin, 2005).

In quantitative research, reliability may be established using the test-retest method– which is also called the stability test. It refers to the degree to which scores on the same test by the same individuals are consistent. It may also be investigated using the equivalent-forms reliability/parallel form or alternate forms reliability, which is a method that measures reliability by correlating scores obtained from two alternative tests administered to measure a similar construct or concept. The other method is the internal consistency measure operationalised using the split-half reliability, which establishes reliability by dividing/splitting an instrument into comparable halves and correlating the scores of one-half with those of another half. A high correlation implies high reliability and vice-versa. Other methods used to establish reliability in quantitative research include the method of rational equivalence, Kudar-Richardson formulas, Hoyt's analysis of variance procedure, scorer/rater reliability, and Cronbach's Alpha coefficient of internal consistency; and all these methods are inbuilt in the IBM SPSS 22 programme (Amin, 2005).

In this study, the reliability of the designed questionnaires was established using Cronbach Alpha coefficient of internal consistency as discussed by Field (2009) and after achieving the necessary level of validity as explained before. A pilot study was conducted involving ten lecturers and ten students selected at random from another university in Uganda, which was also using ICT in the management of its educational services. Selecting these respondents from another university was intended to avoid selecting the respondents at The University as these were expected to participate in the study. The selected respondents were asked to respond to all the items in their respective questionnaire as honestly as possible. The filled in questionnaires were then collected to investigate and establish their reliability. The responses were

entered in the IBM SPSS 22 programme following the scales that were used to measure the variables of the study. After that, reliability coefficients were computed for each scale using the Cronbach Alpha coefficient of internal consistency. The coefficients obtained are presented in Table 3.4.

Table 3.4: The Cronbach Alpha Coefficients of Internal Consistency

Questionnaire	Alpha
Lecturer questionnaire	0.79
Student questionnaire	0.71

Table 3.4 indicates that the Cronbach Alpha coefficient for the lecturers' questionnaire was 0.79 and that of the students' questionnaire was 0.71. These coefficients were all above 0.7 implying that the research instruments were reliable.

3.11.5 Generalizability

While generalizability was not the aim of the study, many of the quantitative procedures applied are used for the purpose of generalization. In particular, the requirement of statistical representativeness of the sample was met when determining the size of the sample. Also, the majority of the respondents (lecturers and students) were selected using simple random sampling, a probability sampling technique. According to Amin (2005), meeting these statistical and sampling requirements implies that the study findings can be generalizable to all the colleges and faculties of the University, even if not all participated in the study.

3.12 METHODOLOGICAL NORMS AND QUALITATIVE RIGOUR MEASURES

3.12.1 Qualitative Rigour

Some strategies can be used to generate meaning from qualitative data. Zucker (2009) observed that if a researcher is interested in finding out which data are similar in meaning, he/she can do this by using the following strategies: noting patterns, clustering, seeing plausibility, and taking note of theoretical connections in the given

qualitative responses. Tracy (2010) states that qualitative rigour enables the researcher to make smart choices about samples and contexts that are appropriate or well poised, to study specific issues. Others are making metaphors by bringing together the diverse pieces of data that seem to imply the same thing, sharpening the understanding of the implied message, building a logical chain of evidence reflected in the data, and making conceptual/theoretical coherence. These strategies help to make meaning out of data. In this study, qualitative rigour was addressed by noting patterns in the data, seeing plausibility, noting theoretical connections, building a logical chain of evidence reflected in the data, and making conceptual/theoretical coherence.

The traditional means of judging the quality or rigour of an educational research inquiry is by reference to four criteria: internal validity, external validity, reliability, and objectivity (Coll & Kalnins, 2009). Lincoln & Guba (1989) also propose four criteria for evaluating qualitative findings and enhancing trustworthiness. While each criterion had an analogous quantitative criterion, the list reflected the assumptions and epistemology underlying ICT and educational services management at the University. These criteria were incorporated into the research design and used to assess qualitative findings:

3.12.2 Credibility

Credibility focuses on the confidence in the truth of the findings. It brings about the question of how other researchers or participants recognise that the findings of the study presented were real and believable. How the participants recognise the meaning, they gave to a situation and how the researcher's interpretation of data is compatible with the perceptions of the study participants (Lietz & Zayas, 2010). To establish credibility in qualitative research, credibility is established through peer debriefing and member checks. According to Tracy (2010), credibility refers to the trustworthiness, verisimilitude, and plausibility of the research findings. In the current study, the assessments or comments of the supervisor and colleagues regarding the items in the designed interview schedule were used to improve the credibility of the items.

3.12.3 Transferability

This refers to the ability to transfer the study findings in one context to similar situations or participants. It also refers to the degree to which empirical findings support theoretical assertions (Opolot-Okurut, 2004). Transferability (in preference to external validity/generalisability) requires the researcher to provide sufficient data and context to enable the audience to judge whether the findings can be applied to other situations and contexts. Transferability is achieved when readers feel as though the story of the research overlaps with their own situation and they intuitively transfer the research to their own action (Tracy, 2010). In considering the transferability, there is a need to know whether the conclusions of a study, a mixed study, in particular, have any more substantial import. Are they transferable to other contexts? Do they fit? How far can they be generalised? Grounded theorists attest that the methodology develops concepts and abstractions at a level that supports their transferability to other populations and contexts (Glaser, 2005). Some methodologists purport that any transfer of a study's findings to other contexts is the responsibility of the reader, not the researcher. The generalisability of a study has been a contentious issue, ranging from the researcher's analytic ability to find levels of universality in the case (Spradley, 1979) to a frank admission that complex and site-specific contexts problematise the ability to construct theory and, thus, generalisation (Clarke, 2005).

Transferability in this study was assured by designing items in the interview schedules and questionnaires based on the indicators identified from the literature. The findings on the ICT adoption in the management of educational services at the University could be applied in or be transferred to another university, which adopted ICT in managing its educational services (Colls & Kanins, 2009; Malterud, 2001).

3.12.4 Dependability

Dependability is a systematic consistency and accuracy in the application of the canons of qualitative methodology. It is ensured by maintaining clear and logical connections between the research purpose and the research design and allowing

readers to evaluate the adequacy of the analysis by assessing whether the interpretations emerging from the research findings are logical and convincing within the context of the research (Opolot-Okurut, 2004). Dependability could also be conceptualised as the mirror image fit between what the researcher recorded as data and what happened in the setting.

3.12.5 Confirmability

Confirmability is a way in which the findings and conclusions of the study achieve the aim of the study and are not the result of just proving the researcher's prior assumptions and preconceptions (Saldaña, 2016; Bless & Higson-Smith, 2000; Lincoln & Guba, 1989). It refers to how the researcher maintains a clear distinction between his or her personal opinions and those of the participants through the use of reflexivity. Confirmability involved providing the exact observations in the final thesis and giving multiple explanations for the observations made during the study (Bless & Higson-Smith, 2000).

3.13 METHODOLOGICAL NORMS AND MIXED METHODS RIGOUR MEASURES

As cited earlier, the mixed methods research design is a combination of two methods. Therefore, its rigour measures include all those applicable in the qualitative and quantitative methods and these are confirmability, dependability, transferability, credibility, generalizability, reliability, validity, and objectivity. Creswell (2017) and Creswell & Tashakkori (2007), also point out other rigour measures of the mixed methods, which include complementarity and elaboration. In mixed-methods research, establishing validity is recurrent and continuous, throughout the entire research process. Data is being interpreted from the moment the first set of data is collected (Creswell &Tashakkori, 2007).

Considering rigour in the mixed methods research design, Teddlie & Tashakkori (2009) and Bryman (2012) emphasise inference quality, which is made up of design

quality and interpretive rigour. Regarding design quality, the following measures were identified:

3.13.1 Design Suitability

The appropriate mixed methods and design should be used (Creswell, 2017). The embedded/nested mixed methods research design was the right one and the interviews, questionnaires and document analysis done according to the variables on ICT use in educational services management at The University.

3.13.2 Design Fidelity

The methods and design should be implemented rigorously (Leech & Onwuegbuzie, 2009). The methods were strictly followed in the data collection from respondents who included the students, lecturers, ICT administrators, and university managers of The University.

3.13.3 Within-Design Consistency

The components of the design should fit together for example sampling appropriate to the type of research method (Teddlie & Tashakkori, 2009). The quantitative data collected through convenience sampling of students and lecturers, a random and purposive sampling of educational services managers and criterion sampling of the university managers at the University all were consistent with the research method and design.

3.13.4 Analytic Adequacy

The data analysis should be rigorous and appropriate to research questions. The data was analysed using the right tools for analysis and the data collected according to the research questions, which addressed the problem of ICT use in educational services management at the University. For interpretive rigour, the above measures were identified (Bryman, 2012; Teddlie & Tashakkori, 2009).

3.13.5 Interpretive Consistency

The inferences should be consistent with the data and research methods employed (Tashakkori & Teddlie, 2008). The inferences on ICT and educational services management at the University were consistent with the data collected and the research methods employed by the researcher.

3.13.6 Theoretical Consistency

The inferences should be consistent with theory and what is known (Johnson, Onwuegbuzie &Turner, 2007). The inferences were also consistent with the Adaptive Structuration Theory (AST) on which this study was based because there was an effect of ICT on educational services management at the University.

3.13.7 Interpretive Agreement

The other researchers should draw the same and consistent inferences with those of participants (Tashakkori & Teddlie, 2008). There was an agreement between the researcher and the respondents in most cases regarding the effectiveness of ICT in educational services management at the University.

3.13.8 Interpretive Distinctiveness

The inferences should be more plausible than other possible inferences (Tashakkori & Creswell, 2007). The inferences on ICT effectiveness in educational services management at the University were more plausible than others that were made on ICT effectiveness in the provision of other services.

3.13.9 Integrative Efficacy

The meta-inferences should incorporate inferences made in each component, and any inconsistencies in findings should be explored (Tashakkori & Teddlie, 2008). The data collected from students, lecturers, ICT administrators, educational services

managers and university managers at the University should be seen to be consistent lest the findings call for further research to clarify the inconsistencies.

3.13.10 Interpretive Correspondence

The inferences should correspond to the research questions, and the meta-inferences should meet the stated need for using a Mixed Methods design (Bryman, 2012; Teddlie & Tashakkori, 2009). The inferences regarding ICT and the management of educational services matched the research questions for instance on the type of ICT tools available at the University and the aggregation of these inferences justified the use of the nested/embedded mixed methods research design which the researcher employed.

3.14 ETHICAL CONSIDERATIONS

Ethics is generally concerned with beliefs about what is morally right or wrong. Opolot-Okurut (2004:103) observed, “In every research process, ethical issues and considerations must be addressed and adhered to”. In research, ethics focus on what is morally proper or improper when engaging with participants or accessing secondary data (McMillan & Schumacher, 2010). Ethics are emphasised in research because any study involves interaction with people or sensitive documents.

Some authors have discussed ethical issues and considerations in the literature (Tracy, 2010). These authors discuss ethical issues as matters concerned with respecting sources of data by seeking permission or authorisation to be permitted to access and to actually have access to respondents and/or secondary data or any form data access to which is restricted in some way, observing rights to privacy and voluntary participation, anonymity and confidentiality, debriefing, high quality practice and the responsibility to produce good quality research. They also maintain that ethical issues semantically vary and depend on the degrees of emphasis to which different researchers become accustomed (Opolot-Okurut, 2004).

In this study, the considered ethical issues included access, informed consent, attention to anonymity, confidentiality, and debriefing of respondents. In particular, a permission letter was sought from the Higher Degrees Committee of the University of South Africa to be used to back up the researchers' self-introduction to the University authorities and respondents. Further permission was sought from the University authorities to be allowed to conduct the study at the University by having access to the relevant documents and the University ICT administrators, educational services managers (principals, deans, and heads of department), University Managers, lecturers and students.

Finally, informed consent was sought from respondents before involving them in the study by administering an appropriate research instrument to them. Informed consent is defined as a process in which participants give their consent to participate in a research project after being informed of its intentions, risks, and benefits. McMillan and Schumacher (2010) added that researchers should generally be open and honest with participants about all aspects of the study. This usually involves the full disclosure of the purpose of the research. In the consent form, it was guaranteed that the participants were aware that their participation was voluntary and that they could withdraw at any time. The consent letter was also intended to ensure that respondents were well acquainted with the purpose and objectives of the research before accepting to participate. Respondents were also assured that they were free to make independent decisions about whether they wanted to continue participating or to withdraw at any point in the study without the fear of negative consequences.

According to McMillan and Schumacher (2010), confidentiality means that no one has access to individual data or the names of the participants except the researcher. Confidentiality was observed in this study by safely keeping the information that was obtained from the respondents away from people who were not part of the study until the information was used to write a research report. Respondents were also asked not to reveal their names in the research instruments administered to them. This was intended to observe the anonymity of the respondents. An effort was also made to report direct or quoted qualitative findings without revealing the names of the respondents who provided the data. Instead of names, position titles of the

respondents were used whenever the need arose. In some instances, complete anonymity was guaranteed by hiring research assistants to collect that data so that the principal researcher was in complete obscurity as far as knowing the respondents.

The respondents were also informed that participation was voluntary and that they were free to withdraw from the study at any time if they so wished. The respondents were assured that the collected data were to be used for purely academic purposes and that no unauthorised persons would be allowed access to the data. They were also assured that the researcher did not have any intention to have the data known or revealed to any person who was not a part of the study. This was intended to conform to the confidentiality of the information.

The debriefing was done at the end of the qualitative data collection and the rest of the research process. The respondents were informed that they would have access to the final report if they so wished; that this access would be maximised by disseminating the findings of the research through seminars, workshops and publications in the relevant peer-reviewed journals.

In summary, ethical standards were observed for purposes of ensuring that no one would suffer adverse effects or be harmed as a result of participating in the study. Prior effort was made to seek official authorisation to access the respondent and relevant information about ICT at the University. The purpose of the study was also explained to the respondents before asking them to participate. The effort was also made to seek the consent of all respondents before administering questionnaires. The names of the respondents were also omitted to avoid victimisation. All collected data were treated confidentially and presented in a manner that could not expose the University in a defaming manner. Also, not all information considered privy to only management was presented explicitly.

3.15 SUMMARY AND CONCLUSIONS

This chapter has covered the mixed methods research paradigm, research design and methodology employed to conduct this study. The various existing mixed methods research designs have been highlighted, including the embedded or nested research design being one adopted for this study. The study is situated explicitly among the concurrent mixed methods designs. The chapter also briefly discussed the rationale for this kind of study. Discussion of the study population was covered, and a discussion of the sampling strategy and sample size has also been presented, revealing that the sample was made up of ICT administrators, educational services managers (Principals, Deans and Heads of Department), lecturers, students and University managers selected from the University. The description of the research site followed this. The chapter further described the qualitative and quantitative data collected using interview schedules and semi-structured questionnaires, administered after being tested for validity and reliability. The interview schedule was designed and administered to ICT administrators, educational services managers and University managers as the key informants, and the questionnaires were administered to lecturers and students. The researcher, who was aided by field assistants, collected the data. Document review was also used to collect secondary data with intent to corroborate the collected primary data. The appropriate methodology was accordingly described outlining the quantitative, qualitative, and mixed methods methodological norms, which guided the study.

The chapter also explained the data analysis techniques employed in the study, including the computer programmes applied to analyse the data. The programmes included Microsoft Excel, EpiData and the IBM SPSS 22 programme. The methods employed in the analysis were identified and justified, including content analysis applied to analyse qualitative data and describe, factor and multivariate regression analysis techniques applied to analyse quantitative data.

Lastly, the chapter has also described the ethical considerations observed during data collection, including seeking permission from all relevant authorities, which included the University of South Africa and the University. Efforts were made to seek

the consent of respondents and to assure them of the necessary confidentiality and confidence that the data they provided was purely for academic purposes. The chapter indicated that respondents were also assured that their comments would be anonymous. The following chapter will deal with data presentation and analysis.

CHAPTER 4
PRESENTATION AND DISCUSSION OF QUANTITATIVE RESULTS

4.1 INTRODUCTION

The previous chapter dealt with the methodology of the study. This chapter presents and discusses the quantitative results of the study. The main research question, addressed by applying quantitative analysis, is an understanding of the nature of ICT adopted at UNU University and the role it has played in enhancing the effectiveness of educational services management. Data was collected from both lecturing staff and students of UNU University and then analysed using SPSS software. Descriptive statistics, factor analysis, correlations and regression analysis were performed, as detailed in Chapter 3.

The results are presented about the general objective and specific objectives of the study that were established in Chapter 1. A response rate of 96.0% was realised as shown in Table 4.1.

Table 4.1: Response rate for lecturing staff and students

Quantitative Data	**Sample size**	**Returned questionnaires**	**Response rate (%)**
Lecturing staff	346	323	93.3
Students	380	374	98.4
Total	**726**	**697**	**96.0**

In section 4.2, the background of the lecturing staff is provided while 4.3 presents the background characteristics of students that responded to the questionnaires. In additions, sections 4.3, 4.4 and 4.5 show factor analysis, correlations, and regression respectively.

4.2 BACKGROUND CHARACTERISTICS OF LECTURING STAFF

The study results in Table 4.2 indicate the different colleges where lecturers selected for the study were at the time employed. Lecturers were also selected from the six colleges under study, which included: Business and Management Sciences (17.3%), College of Engineering, Design, Art and Technology (17.3%), Agricultural and Environmental Sciences (16.1%), Computing and Information Sciences (16.8%), and Education and External Studies (16.4%). This implies that the sample population was diverse and comprehensive enough to provide adequate information about the ICT and Educational Services Management at UNU University.

Table 4.2: Percentage distribution of lecturer respondents by college

College	Frequency	Percentage (%)
College of Agricultural and Environmental Sciences	52	16.1
College of Business and Management Sciences	56	17.3
College of Computing and Information Sciences	54	16.8
College of Education and External Studies	53	16.4
College of Engineering, Design, Art and Technology	56	17.3
College of Humanities and Social Sciences	52	16.1
Total	**323**	**100.0**

Source: Primary Data

Results about the number of years lecturers have served at UNU University are presented in Figure 4.1. Results indicated that the majority of the lecturers (32.8%) had served at UNU University for 1-5 years, followed by almost a third (31.9%) who had served between 6-10 years and just under a quarter (22.9%) who had served 11 years and above. The least number of lecturers (12.4%) had taught at UNU University for less than a year. Most of the lecturers were in the age group of 30-50 years and were mostly males by gender categorisation.

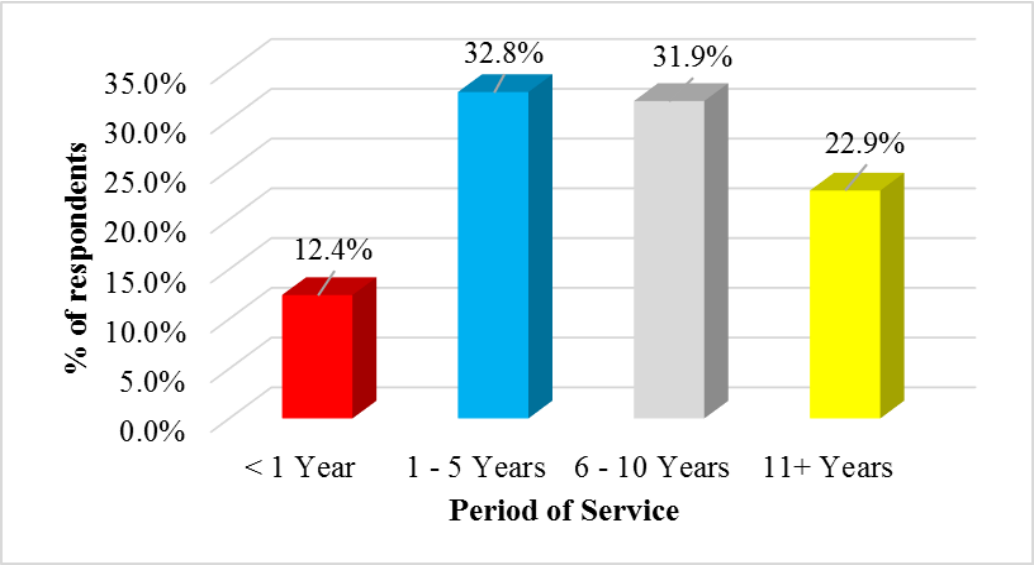


Figure 4.1: Distribution of lecturers by the period of service

Source: Primary Data

4.3 BACKGROUND CHARACTERISTICS OF UNU UNIVERSITY STUDENTS

During the study, students who participated in the study were sampled from different colleges, as presented in Table 4.3. Seventeen percent of the students were selected from the College of Humanities and Social Sciences. The remaining students were evenly spread across the five remaining colleges of Agricultural and Environmental Sciences, Business and Management Sciences, Computing and Information Sciences, Education and External Studies, Engineering, Design, Art and Technology (16.6% respectively).

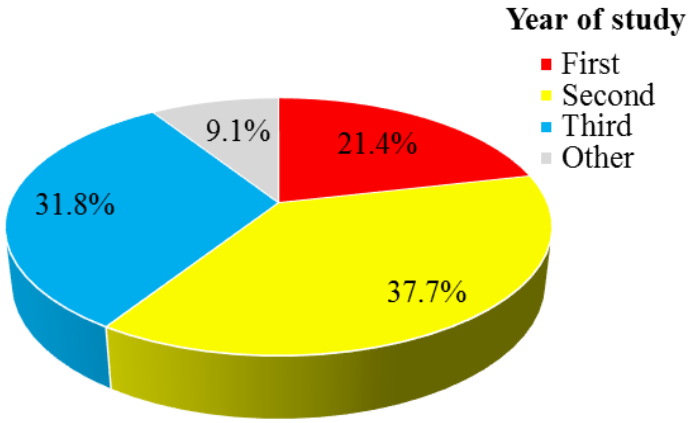
Table 4.3: Percentage distribution of student respondents by college

College	Frequency	Percentage (%)
College of Agricultural and Environmental Sciences	62	16.6
College of Business and Management Sciences	62	16.6
College of Computing and Information Sciences	62	16.6
College of Education and External Studies	62	16.6
College of Engineering, Design, Art and Technology	62	16.6

College of Humanities and Social Sciences	64	17.0
Total	**374**	**100.0**

Source: Primary Data

The study results indicated that the majority of the respondents (37.7%) were in the second year, followed by those in the third year (31.8%) while 21.4%) were still in the first year. It was reported that students, in all the years, were using ICT for their studies (see Figure 4.2). Most of the students who responded to the study were in the age group of 20-24 years with the majority being male by gender.



Source: Primary Data

Figure 4.2: Percentage distribution of students by year of study

4.4 FACTOR ANALYSIS OF INDEPENDENT AND DEPENDENT VARIABLES

This section presents the factor analysis of independent and dependent variables for both lecturing staff and student datasets. Section 4.4.1 provides the factor analysis for the lecturing staff at UNU University, as detailed in Chapter 3.

4.4.1 Factor Analysis of Lecturing Staff Data Variables

As described in Chapter 3, Table 4.4 presents the exploratory factor analysis of UNU University lecturing staff data variables. A Principal Component Analysis (PCA) was conducted on the 15 items with varimax rotation. The Kaiser-Meyer-Olkin (KMO) measure verified the sampling adequacy for the analysis, KMO=.609 ('mediocre' according to Field, 2009). The Bartlett's test of sphericity indicates that correlations between items are sufficiently large for PCA (χ^2=735.346, df=105, *p<.001*).

An initial analysis was run to obtain eigenvalues for each component in the data. It was found that four components had Eigen values over Kaiser's criterion of 1 and in combination, explains 49.70% of the variance. Table 4.4 shows the factor loadings after rotation. The items that cluster on the same components suggest that component 1 represents teaching aid, component 2 educational management, component 3 assessment, and component 4 infrastructure.

Table 4.4: Factor analysis of lecturing staff data variables

Items	Rotated Factor Loadings			
	Teach-ing aid	**Manage-ment**	**Assess-ment**	**Infra-structure**
Lecturers can deliver lectures to students via online teaching-learning facilities	**0.802**			
Lecturers email lecture notes to students	**0.750**	0.126	0.195	-0.160
Lecturers use internet facilities to deliver lectures to students	**0.722**			
Students with internet facilities nearby can access the needed library services wherever they are	**0.594**	-0.125		
Lecturers use ICT to monitor student academic progress		**0.886**		
University administration use ICT to monitor lecturers to establish whether they are doing their work or not		**0.833**	-0.235	

Items	Rotated Factor Loadings			
	Teach-ing aid	**Manage-ment**	**Assess-ment**	**Infra-structure**
The university games and sports facilities are sufficient for all enrolled students		0.413	0.265	-0.129
Students can interact academically with their lecturers through virtual teaching and learning			**0.719**	-0.119
Lecturers can administer the end of semester exams through a computerized evaluation programme			**0.673**	-0.133
Lecturers can email course works and testing exercises to students if they choose to		-0.217	**0.614**	0.151
Students' with personal computers are enabled to access lecture notes and any academic instructions	0.160	0.112	0.456	0.180
Lecturers supervise students who do research well			0.120	**0.706**
The science laboratory facilities provided by the university are up-to-date		-0.171	-0.162	**0.654**
Lecturers administer all the tests (course works) that students should do every semester	-0.108			**0.582**
The conditions of examining students at UNU University are convenient to the examiners	0.129	-0.164		**0.539**
Eigen Values	**2.28**	**1.99**	**1.71**	**1.48**
% of variance	**15.19**	**13.24**	**11.40**	**9.87**
Cummulative %	**15.19**	**28.44**	**39.83**	**49.70**

Extraction Method: Principal Component Analysis. Rotation Method: Varimax with Kaiser Normalization. Rotation converged in 5 iterations.

Note: Factor loadings over .50 appear in bold.

Source: Primary Data

4.4.2 Factor Analysis of Student Data Variables

Table 4.5 presents the exploratory factor analysis of UNU University student data variables. Similarly, Principal Component Analysis (PCA) was conducted on the 12 items of student data using Varimax rotation. The Kaiser-Meyer-Olkin (KMO) measure verified the sampling adequacy for the factor analysis, KMO=.628 ('mediocre' according to Field, 2009). The Bartlett's test of sphericity indicates that correlations between items are sufficiently large for PCA (χ^2=383.245, df=66, *p<.001*).

An initial analysis was also run to obtain Eigen values for each component in the data. It was found that four components had Eigen values over Kaiser's criterion of 1 and in combination, explains 50.24% of the variance. Table 4.5 shows the factor loadings after rotation in which items clustered on four components: educational management, infrastructure, staff and communication.

Table 4.5: Factor analysis of student data variables

Items	Rotated Factor Loadings			
	Management	**Infrastructure**	**Staff**	**Communication**
Students with mobile phones are enabled to access lecture notes and any academic instructions from their lecturers	**0.697**			-0.152
Lecturers use desktops when delivering lectures in classrooms	**0.668**	-0.139		0.336
The ICT facilities used in the delivery of academic instructions are enough to satisfy all the learning needs of students	**0.559**		0.108	0.276
Lecturers use the intranet to interact with students academically	**0.545**	0.172		-0.127
Lecturers email lecture notes to students	0.493	0.286		
Lecturers record lecture notes on flash disks which they give to students to use and learn what the lecturers have prepared	-0.146	**0.751**		

Items	Rotated Factor Loadings			
	Management	**Infrastructure**	**Staff**	**Communication**
UNU University has ICT facilities that support the delivery of recreational services to students	0.407	**0.530**	0.115	
Library services provided to students are computerised to easy their access and use	0.165	**0.529**	-0.214	
Lecturers have the competence to optimally use the ICT facilities at UNU University to support teaching			**0.787**	0.152
There are no delays in the delivery of lectures at UNU University	0.117		**0.734**	-0.184
Students with personal computers are enabled access lecture notes and any academic instructions from their lecturers	0.236	-0.234	-0.11	**0.723**
Radio facilities are used to facilitate the delivery of academic instructions from lecturers to students	-0.203	0.329		**0.642**
Eigen Values	**2.23**	**1.40**	**1.26**	**1.14**
% of variance	**18.55**	**11.67**	**10.51**	**9.51**
Cummulative %	**18.55**	**30.22**	**40.73**	**50.24**

Extraction Method: Principal Component Analysis. Rotation Method: Varimax with Kaiser Normalization. Rotation converged in 9 iterations.

Note: Factor loadings over .50 appear in bold

Source: Primary Data

4.5 ICT TOOLS INSTALLED AND ACCESSED AT UNU UNIVERSITY

Results on the ICT tools installed and accessed at UNU University are presented in Table 4.6. The study results indicated that majority of the lecturers (19.6%) responded that whiteboard was the most accessed and installed hardware across campus since it was almost found in all lecture rooms, except the lecture rooms

where there are dashboards, particularly in ICT lecture rooms. Also, it was discovered that (16.5%) of the lecturers cited desktop computer as the most accessed and installed hardware while 10.9% referred to laptops.

Table 4.6: Hardware used in managing educational services at UNU University

Hardware used in managing educational services at UNU University	Frequency	Percentage (%)
Desktop computer	53	16.5
Servers	30	9.30
Laptops	35	10.9
Projectors	32	10.0
Loudspeakers	45	14.0
Screens	25	7.80
Photocopiers	22	6.90
Printers	16	5.00
Whiteboards	63	19.6
Total	**321**	**100.0**

Source: Primary Data

4.6 APPLICATIONS TO MANAGE EDUCATIONAL SERVICES AT UNU UNIVERSITY

Lecturers reported on the applications used to manage educational services at UNU University, and the results are presented in Table 4.7. A large percentage of the lecturers (19%) indicated that they use Microsoft Access, while (15.3%) mentioned Result Management System as the application mostly used at the University. Followed by 14.3% who referred to Microsoft Word, 12.1% said NUELE was accessed and installed, while 11.5% cited the Internet.

Table 4.7: Applications to manage educational services at UNU University

Applications to manage educational services at UNU University	Frequency	Percentage (%)
Academic Records Information System (ARIS)	16	5.00
Microsoft Access	61	19.0
Microsoft Excel	26	8.10
Microsoft Word	46	14.3
Internet	37	11.5
Result Management System	49	15.3
Online Registration System	19	5.90
UNU University E-Learning Environment NUELE	39	12.1
Statistical Package for Social Scientists (SPSS)	19	5.90
EpiData	9	2.80
Total	**321**	**100.0**

Source: Primary Data

4.7 PERCEPTIONS OF UNU UNIVERSITY LECTURERS ON ICT ACCESS AND UTILISATION

Academic staff expressed their perceptions about ICT access and the utilisation policy. The results, presented in Table 4.8, indicate that the majority of the respondents 297 (91.3%) agreed that UNU University has ICT-based sources of information that lecturers can access for content included in the curricula of the academic courses offered by the University. The least number of respondents, comprising only three, (0.9%) strongly disagreed with the statement. This means that the lecturer sample felt that UNU University had a stable ICT-based source of information available to lecturers.

The results indicate that the majority of the respondents 297 (92.5%) agreed that UNU University has online facilities which lecturers can access for necessary curriculum updates. The least number of respondents (0.9%) were not sure whether UNU University had online facilities to access for help in designing appropriate

curricula for their academic programmes. The same number (0.9%) strongly disagreed. This, therefore, implies that there is certainty among lecturers that UNU University has adequate online facilities, which allow lecturers to access necessary curriculum updates.

The field results indicated that the majority of the respondents, comprising 288 (89.1%) agreed that UNU University has Internet facilities that support searching relevant curriculum materials via the World Wide Web. The least number of respondents (6 or 1.9%) were not sure if or not UNU University has Internet facilities that sufficiently support searching relevant curriculum materials via the World Wide Web. This therefore indicates that lecturers at UNU University tend to agree that the University has Internet facilities, which support their search for relevant curriculum materials via the World Wide Web.

According to the results, the majority of the respondents (292 or 90.4%) agreed that UNU University has online facilities for lecturers to network with other universities for purposes of internationalising the curriculum content delivered to students. Very few respondents were in disagreement; only 14 (4.3%) strongly disagreed. Results obtained, therefore, indicated that among that category, some respondents were uncertain as to whether or not UNU University has online facilities for lecturers to network with other Universities.

Table 4.8 reveals that the majority of respondents (178 or 55.1%) disagreed that lecturers use ICT to monitor student academic progress. This implies that most lecturers do not use ICT to assess student academic progress.

Table 4.8: Perceptions of UNU University lecturers on ICT access and utilisation

Perceptions of UNU University lecturers on ICT access and utilisation	NS (%)	SD (%)	D (%)	A (%)	SA (%)
	0	1	2	3	4
There are ICT-based sources of information to access content to be included in the curricula of the academic courses	1.9	0.9	5.3	78.0	13.9
The University has online facilities by which lecturers can access curricula modules	3.4	7.7	7.4	65.6	15.8
There are online facilities by which lecturers can access the necessary curriculum updates	0.9	0.9	5.6	80.7	11.8
The University has internet facilities that support searching relevant curriculum materials	1.9	5.3	3.7	71.5	17.6
There are online facilities by which lecturers can network with Universities for purposes of internationalising the curriculum content.	1.9	4.3	3.4	67.8	22.6
Lecturers use ICT to monitor students' academic progress.	0.6	23.8	31.3	43.0	1.2
University administration use ICT to monitor lecturers to establish whether they are doing their work or not	0.3	-	27.0	71.1	1.6

Note: *NS=Not sure, SD= Strongly Disagree, D= Disagree, A= Agree, SA= Strongly Agree*

Source: Primary Data

4.8 UTILISATION OF ICT HARDWARE AND SOFTWARE IN DELIVERY OF EDUCATIONAL SERVICES AT UNU UNIVERSITY

The lecturers were asked to highlight ways in which they have managed to utilise ICT services. The results are presented in Table 4.9.The study results indicated that the majority of the lecturers (16.9%) said that ICT is used for registering students, followed by 36 (11.3%) respondents who said that ICT was used for sending lecture notes via e-mails to students, while 34 (10.6%) of lecturers mentioned that ICT is used for data entry with a minority of 3 (0.9%) reporting that they use ICT to do word processing.

Table 4.9: Utilisation of ICT hardware and software in the delivery of educational services at UNU University

The utilisation of ICT hardware and software in delivery of educational services	Frequency	Percentage (%)
Using Information Technologies like graphics	36	11.3
Storing students records especially academic	23	7.20
Lecturing	31	9.70
Sending lecture notes	36	11.3
Registering continuing students	54	16.9
Uploading learning materials	23	7.20
Uploading results	25	7.80
Entering data	34	10.6
Word processing and data analysis	03	0.90
Photocopying hard notes	06	1.80
Printing notes	19	5.90
Accessing students results	30	9.40
Total	**320**	**100.0**

Source: Primary Data

4.9 HOW ICT ADOPTION HAS IMPROVED UNIVERSITY MANAGEMENT AND STUDENT LEARNING AT UNU UNIVERSITY

Results on how ICT has improved management and student learning at UNU University are presented in Table 4.10. It was revealed that the majority of the respondents (278 or 74.4%) agreed that library services provided to students are computerised to ease their access and use, this implies that computerisation of library services has eased access and use. Various information sources have indicated that ICT is paramount in student learning and reports indicate that students can also use appropriate ICT tools to effectively facilitate their self-directed learning such as private reading, revision and further desk research instead of converging in one physical library building to access needed library services manually (Aguti & Fraser, 2006; Ajayi, 2001; Akinsende, 2002; Itohowo, 2005; Madu, 2004). The

adoption of ICT at UNU University would therefore address the issue of strain on the available physical library facilities.

Furthermore, the results in Table 4.10 indicate that the majority of the respondents (217 or 58.5%) were not sure if lecturers assigned to supervise students on research programmes use e-mail to facilitate their supervisory interaction with the students. This, therefore, implies that since supervision was a private issue between the student and the supervision, then students were not sure if all supervisors preferred using emails while interacting with their students.

The results also showed that majority of the respondents (249 or 66.8%) agreed that the ICT facilities used in the delivery of academic instructions are adequate to satisfy student learning needs. This implies that there is substantial input of ICT use in student learning at UNU University.

Table 4.10 reveals that the majority of the students (219 or 58.5%) disagreed that lecturers deliver lectures to students through online teaching-learning facilities. This, therefore, implies that ICT infrastructure at UNU University is not fully developed to provide online learning particularly as only a few online courses are at present running at the University.

Results in Table 4.10 also showed that the majority of the respondents (297 or 92.5%) agreed that UNU University has online facilities, which allow lecturers to access curricula modules needed to help them design appropriate curricula for the academic programmes. It was also discovered that the majority of the respondents (288 or 89.1%) agreed that UNU University has internet facilities that support searching relevant curriculum materials via the World Wide Web.

Table 4.10: Improvements in management and student learning at UNU University

Responses to management and student learning	NS (%)	SD (%)	D (%)	A (%)	SA (%)
	0	1	2	3	4
The University library services provided to students are computerised.	2.4	3.7	19.5	47.9	26.5
Lecturers use email to facilitate the supervision of students	58.5	13.2	23.7	4.6	-
The ICT facilities used in the delivery of academic instructions are enough	-	15.5	62.5	4.3	17.7
Lecturers can deliver lectures through online teaching-learning facilities	5.9	18.0	40.5	34.3	1.3
There are online facilities by which lecturers can access the necessary curriculum updates	0.9	0.9	5.6	80.7	11.8
UNU University has internet facilities that support searching relevant curriculum materials	1.9	5.3	3.7	71.5	17.6
The lectures delivered to students contain up-to-date content	2.2	3.1	5.9	62.8	26
There are no delays in the delivery of lectures at UNU University	0.6	4.7	27	54.7	13
The University games and sports facilities are sufficient for all enrolled students	6.2	8.0	16.1	51.7	18
Lecturers administer the end of semester examinations to students as expected	1.2	2.8	5.9	63.4	26.7
The university has sufficient facilities to support student academic research	0	4.3	13.9	51.7	30

Source: Primary Data

4.9.1 Types of ICT Tools installed and accessed at UNU University to support Student Learning

The ICT tools installed to enhance teaching and learning at UNU University are presented in Table 4.11. As previously reported, the majority of the respondents (292 or 90.4%) agreed that UNU University has online facilities which allow lecturers to

network with other universities for purposes of internationalising the curriculum content delivered to students.

Results indicate that majority of the respondents (276 or 86.0%) agreed that lecturers use projectors to deliver lectures to students in classrooms, as well as lecturers making use of microphones when delivering lectures to students. This, therefore, implies that the University had provided ICT infrastructure like buying projectors and microphones for teaching and learning, which aids teaching and learning, particularly with large numbers of students attending lectures. Also, it was discovered that the majority of the respondents (85.7%) agreed that lecturers deliver computer-based programmed lectures to students, thus utilising ICT.

The study results (see Table 4.11) show that that the majority of the respondents (214 or 76.2%) strongly disagreed that lecturers use desktops when delivering lectures in classrooms. This, therefore, implies that very few lecturers use desktops when delivering lectures in classrooms perhaps because they are now outdated and are now being replaced with more modern ICT.

The majority of the respondents 269 (83.2%) agreed that students with mobile phones can use their phones to access lecture notes and any academic instruction from their lecturers on email or world wide web.

The results indicate that the majority of the respondents (257 or 80.1%) and (276 or 85.7%) respectively disagreed that television and radio facilities are used to facilitate the delivery of academic instruction. This result indicates that the use of television in lecture rooms has been adopted only to a very small extent, whereas it seems that radio facilities are rarely used.

Results in Table 4.11 showed that the most significant number of respondents (284 or 88.5%) disagreed that lecturers record lecture notes on flash disks for student learning. This implies that flask discs are hardly used by lecturers. Also, 264 (82%) respondents disagreed that lecturers record lecture notes on Compact discs (CDs). There were 28 respondents (8.7%) who were not sure whether or not lecturers

recorded lecture notes on CDs, which they give to students to use and learn what the lecturers have prepared.

Table 4.11: Types of installed ICT tools at UNU University to support student learning

Responses on ICT tools installed to support student learning	NS (%)	SD (%)	D (%)	A (%)	SA (%)
	0	1	2	3	4
The University has online facilities for lecturers to network with universities for purposes of internationalising.	1.9	4.3	3.4	67.8	22.6
Lecturers use desktops when delivering lectures in classrooms.	2.5	63.8	12.4	7.4	13.9
Lecturers use projectors to deliver lectures to students in classrooms	2.8	5.3	5.9	75.4	10.6
Lecturers make use of microphones when delivering lectures to students.	2.5	3.7	8.4	61.6	23.8
Lecturers deliver computer-based programme lectures to students.	2.2	3.7	9.0	67.1	18.0
Students' with mobile phones are enabled to access lecture notes and other academic instructions.	8.0	5.3	3.4	72.1	11.1
Television facilities are used to facilitate the delivery of academic instructions.	11.8	12.5	67.6	5.3	2.8
Radio facilities are used to facilitate the delivery of academic instructions.	9.0	15.5	70.2	3.7	1.6
Lecturers record lecture notes on flash disks which they give to students to use and learn	10.3	16.2	72.3	1.2	-
Lecturers record lecture notes on CDs, which they give to students to use.	8.7	14.6	67.4	8.1	1.2

Source: Primary Data

4.9.2 Modernity of the ICT Tools installed at the University to Enhance Student Learning

The lecturers were asked to justify the modernity of the tools installed at the university to enhance student learning and results are presented in Table 4.12.

Results showed that majority of the respondents (198 or 61.5%) agreed that students with personal computers are enabled to use their PCs and access lecture notes and any academic instructions from their lecturers; however, 120 (37.3%) respondents disagreed with the statement. This indicates that access to electronic notes, lecture notes and any academic instruction from their lecturers was available for students with PCs. Results also showed that the majority of the respondents (307 or 95.4%) agreed that lecturers use internet facilities to deliver lectures to students. Also, the majority of the respondents (295 or 91.7%) agreed that lecturers use the intranet to interact with students academically. Only 4 (1.2%) were not sure, and the same percentage strongly disagreed, while a minority number of respondents 5 (1.6%) were not sure if the lecturers were using the intranet to interact with students academically. There was a high usage of internet facilities and high usage of intranet where both students and lectures interacted on academic issues, received lecture notes and were guided to research new notes used in tutorials. The use of e-mail is also seemed in a favourable light with 242 respondents (74.4%) agreeing that lecturers e-mail lecture notes to students; however, 24.5% disagreed with the statement while only 0.3% were not sure. These results indicate that ICT usage, in certain areas, has been adopted to facilitate teaching and learning at the University.

Regarding access to library services, students have two ICT tools, their personal computers and mobile phones. A majority of 292 respondents (90.7%) agreed that students with personal computers can use their PCs to access needed library services. This implies that students with personal computers were not restricted at all in accessing library materials using their personal PCs; this would then enhance their learning while 260 respondents (81.7%) agreed that students with mobile phones are enabled to use the devices to access needed library services, followed by 56 (17.6%) who disagreed with the statement. The least number of respondents 2

(0.6%) were not sure or not that students with mobile phones are enabled to use the phones and access needed library services. This implies that students with PCs and modern phones can use this ICT tool to access needed library services and enhance their learning.

ICT use has also been evident in laboratories. Some 262 respondents (82.4%) agreed that lecturers use ICT facilities when guiding students through laboratory experiments, followed by 54 (17.0%) respondents who disagreed with the statement, with only (0.6%) was not sure if or not. This implies that lecturers have accepted ICT facilities when guiding students through laboratory experiments.

Table 4.12: Modernity of ICT tools at UNU University to ease student learning

Response to ICT tools installed to ease student learning	**NS (%)**	**SD (%)**	**D (%)**	**A (%)**	**SA (%)**
	0	**1**	**2**	**3**	**4**
Students with personal computers are enabled to access lecture notes and any academic instructions	1.2	1.9	35.4	59.0	2.5
Lecturers use internet facilities to deliver lectures to students	1.2	1.2	2.2	75.2	20.2
Lecturers use intranet to interact with students academically	1.6	3.4	3.3	75.2	16.5
Lecturers email lecture notes to students	0.3	0.9	23.6	53.7	21.4
Students' with personal computers are enabled to access needed library services	-	-	9.3	7.3	17.1
Students with mobile phones are enabled to access needed library services	0.6	0.6	17.0	74.2	7.5
Lecturers use ICT facilities when guiding students through laboratory experiments	11.8	12.5	67.6	5.3	2.8

Source: Primary Data

4.10 CORRELATION ANALYSIS

Pearson Correlation Coefficient (r) was used to establish the association between ICT usage and effective management of educational services at UNU University. Correlational analysis was performed on infrastructure, staff, communication, and management. The analysis was suitable because the nature of data analysed was numerical in the form of means.

Composite variables of infrastructure, staff, communication and management of educational services were generated using mean score scales. The infrastructure variable was aggregated from the mean of three statements*: Lecturers record lecture notes on flash disks which they give to students to use and learn what the lecturers have prepared, UNU University has ICT facilities that support the delivery of recreational services to students* and *Library services provided to students are computerised to ease their access and use.*

Staff variable comprised of the mean for two variables: *Lecturers have the competence needed to optimally use the ICT facilities installed at UNU University to support teaching,* and t*here are no delays in the delivery of lectures at UNU University*.

The communication variable comprised of the mean of two items: *Students with personal computers are enabled to use the PCs, and access lecture notes and any academic instructions from their lecturers* and *Radio facilities are used to facilitate the delivery of academic instructions from lecturers to students, notes and any academic instructions from their lecturers. Lecturers use desktops when delivering lectures in classrooms, the ICT facilities used in the delivery of academic instructions are enough to satisfy all the learning needs of students,* and *Lecturers use the intranet to interact with students academically.* The details of the evaluation criteria are in Chapter 3.

Findings show that there was a moderate positive correlation between ICT usage and effective management of educational services at UNU University. In particular,

there was a moderate positive correlation between infrastructure and management of educational services at UNU University (**r=.152****). In addition, the results show that there was a moderate positive correlation between communication and management of educational services at UNU University (**r=.153****). However, there was a weak positive correlation between staff and management of educational services at UNU University (r=.089) which was also statistically insignificant at 99% confidence interval.

On the coefficient of determination (**r^2**), the results show that infrastructure accounts for 2.31% change in the effective management of educational services at UNU University (**r^2=0.0231**). Similarly, communication accounts for 2.34% change in the effective management of educational services at UNU University (**r^2=0.0234**). This implies that only 2.34% of effective management of educational services at UNU University can be attributed to communication while 97.66% is attributed to other factors. The results are presented in Table 4.13.

Table 4.13: Correlations between ICT usage and the effectiveness of managing educational services at UNU University

Correlations		Infrastructure	Staff	Communication	Management
Infrastructure	Pear. Corr(r)	1.000			
	Sig. (2-tailed)	0.000			
	N	374			
Staff	Pear. Corr(r)	0.014	1.000		
	Sig. (2-tailed)	0.787	0.000		
	N	374	374		
Communication	Pear. Corr(r)	0.051	-0.010	1.000	
	Sig. (2-tailed)	0.325	0.842	0.000	
	N	374	374	374	
Management	Pear. Corr(r)	**.152****	0.089	**.153****	1.000
	Sig. (2-tailed)	0.003	0.084	0.003	0.000
	N	374	374	374	374

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

Source: Primary Data

4.11 MULTIPLE LINEAR REGRESSION

Results in Table 4.14 present multiple linear regression results on the effects of ICT hardware and software on the effective management of educational services at UNU University. Multiple linear regression analysis was used because it is a powerful tool in determining effects by establishing changes in the dependent variable as explained by the changes in the independent variables (Amin, 2005; Kothari, 2005). Furthermore, the analysis is appropriate because the nature of data is numerical regarding means. The details of the evaluation criteria are in Chapter 3.

Composite variables of infrastructure, staff, communication and management of educational services that were generated using mean score scales and run at correlational analysis, were further analysed at a multivariate level as shown in Table 4.14.

Table 4.14 shows that ICT usage had a significant effect on the effective management of educational services at UNU University (**F=6.771, Sig. =0.000***). Given the fact that R^2=0.052, it can be concluded that ICT usage explains 5.2% variation in the effective management of educational services at UNU University.

On the coefficients, it should be noted that the size of the coefficient for each independent variable gives the size of the effect that a variable has on the dependent variable, and the sign on the coefficient (positive or negative) indicates the direction of the effect. To this end, therefore, infrastructure had a moderate positive effect on the effective management of educational services at UNU University (**β=0.137**). This implies that a 13.7% increase in university infrastructure will bring about a 13.7% increase in the effective management of educational services at UNU University, and vice versa.

Similarly, communication had a moderate positive effect on the effective management of educational services at UNU University (**β=0.152**) implying that a 15.2% increase in communication will bring about a 15.2% increase on the effective management of educational services at UNU University and vice versa.

On the level of significance, the effect of infrastructure (**p=0.005*<0.05**) and communication (**p=0.004*<0.05**) on the management of educational services at UNU University were statistically significant except staff (**p=0.08>0.05**) where p-value was greater than the critical value of 0.05 at 95% confidence interval.

Table 4.14: The effect of ICT usage on the effective management of educational services at UNU University.

	Unstandardized Coefficients		Standardized Coefficients		
Model	**B**	Std. Error	Beta	t	p-value
(Constant)	1.519	0.206		7.368	0.000
Infrastructure	0.137	0.049	0.143	2.822	**0.005***
Staff	0.085	0.048	0.089	1.757	0.080
Communication	0.152	0.053	0.146	2.889	**0.004***

Dependent Variable: **Management of educational services at UNU University**

R=**1.228**

R Square=**0.052**

Adjusted R Square=**0.044**

Std. Error=**0.629**

F=**6.771**

Sig.=**0.000**

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

Source: Primary Data

4.12 CHALLENGES OF ICT-USE AT UNU UNIVERSITY

Results on the challenges faced in the implementation, installation and usage of ICT services is presented in Table 4.15. Results indicate that the largest number of respondents (23.6%) reported that their main ICT challenge was lack of knowledgeable technical staff on ICT. Other staff (18.9%) reported that limited ICT tools were their main challenge. Some 11.8% of respondents said that most students joining the University did not have a strong ICT background, with 11.2% respondents reporting that they lacked hardware and software. A minority of respondents (0.9%)

reported that they lacked sensitisation and awareness on ICT. This means that ICT implementation and usage need more time to be fully integrated into educational services management at the University.

Table 4.15: Factors that limit ICT utilisation in managing educational services at UNU University

Factors that limit ICT utilisation in managing educational services	Frequency	Percentage (%)
Bandwidth	10	3.1
Inadequate software and hardware	36	11.2
Lack of knowledgeable technical support to enable the use of ICT	76	23.6
Most students join a university with a poor ICT background	38	11.8
Not all lecturers are well trained on the use of ICT	11	3.4
Limited ICT tools are available	61	18.9
Load-shedding has affected the use of ICT	19	5.9
Awareness and sensitisation are low	28	8.7
Low investment in ICT by University Management	3	0.9
High interconnection rates	16	5.0
Lack of power supply	24	7.5
Total	**322**	**100**

Source: Primary Data

4.13 PROPOSED WAYS FOR IMPROVEMENT OF ICT USAGE AT UNU UNIVERSITY

Results on the proposed ways of improving ICT usage at UNU University are presented in Table 4.16. Results indicated that a substantial number of UNU University academic staff 65(20.2%) believed that refresher courses in the latest ICT applications for ICT lecturers were proposed as one way to improve the role of ICT in the management of educational services at UNU University. 48 (14.9%) respondents

opted for continuous training and providing computers to every student, while 31 (9.6%) respondents suggested hiring a committed and competent staff.

Table 4.16: Proposed ways for improvement of ICT usage at UNU University

Proposed ways for improvement of ICT usage	Frequency	Percentage (%)
Training continuously	48	14.9
Upgrading software and hardware facilities	26	8.1
Hiring competent and committed staff	31	9.6
Refresher courses for lecturers in ICT especially the latest ICT applications	65	20.2
Providing standby generators to colleges without any	25	7.8
Purchasing enough ICT tools	11	3.4
Capacity building on both students and lecturers on how to use ICT tools	19	5.9
Providing computer to every student	48	14.9
Enforcing the ICT policy in teaching	06	1.9
Setting up computer laboratories	15	4.7
Providing internet connection in the whole University	28	8.7
Total	**322**	**100**

Source: Primary Data

4.14 CONCLUSION

In this chapter, data arising from the four objectives of the study have been presented. The presentation was done by research question as addressed by quantitative data. The data arising from the first research question focused on the nature of ICT tools installed and access to these tools at UNU University for management of educational services.

The second research question addressed itself to the perceptions of UNU University staff and students on the effectiveness of the implementation of ICT at UNU

University**.** The third research question dwelt on data on the effect of ICT on the management of UNU University and the effect of ICT on student learning.

Lastly, the chapter concluded the data presentation with the research question, which sheds light on whether or not the ICT tools installed at UNU University for purposes of educational services management were useful as expected by the stakeholders. The following chapter deals with the qualitative data findings of the thesis.

CHAPTER 5
QUALITATIVE DATA FINDINGS

5.1 INTRODUCTION

The previous chapter presented the quantitative results of the study, which were obtained from questionnaires. This chapter presents qualitative data from interviews, which were conducted with ICT administrators, educational services managers, and University managers referred to in the study as officers of the University. The findings are based on the four study objectives:

i To explore how UNU University has provided access to ICT and facilitated the management of educational services through ICT adoption

ii To understand the perceptions and experiences of educational services managers on the effectiveness regarding the implementation of ICT at UNU University

iii To explain how ICT adoption has improved management and student learning at UNU University

iv To propose ways by which ICT can be used to improve educational services at UNU University.

The researcher analysed the empirical qualitative data using in vivo process and descriptive coding (Saldaña, 2016). Codes are most often a word or short phrases that symbolically assign a characteristic for a portion of language-based data. These codes were categorised to theme the data, presented in Table 5.1, which serves as an overview of the development of the themes and their alignment to the research objectives. The data findings have been discussed by invoking relevant literature. At the end of the chapter, the theoretical framework has been visited to nest the research findings.

Table 5.1: Thematic Areas and Research Objectives

OBJECTIVE	THEME	SUB-THEMES	CATEGORIES	CODES
1. To establish how UNU University has provided access to ICT and facilitated the management of educational services through ICT adoption	1. Provision of access to ICT and facilitation of educational services management	1. Type of ICT tools provided	ICT tools for teaching	1. Projectors 2. Computer 3. Microphones 4. UNU University E-Learning (NUELE)
		2. ICT access to students for learning	ICT tools for learning	1. Internet 2. Software 3. Microsoft Office 4. Adobe 5. LAN
		3. Facilitation of educational services management	ICT tools for University Management	1. ARIS 2. HURIS 3. LIBIS 4. FINIS 5. DICTS 6. KOHA 7. SAGE PASTEL 8. PEOPLE MANAGER
2. To establish the perceptions and experiences of educational services managers on the effectiveness	2. Perceptions and experiences of the effectiveness of ICT	1. Views of educational services managers on the effectiveness of ICT implementation	1. Perceptions of College Principals, Deans of Schools, and Heads of Department 2.Perceptions of ICT administrators	1. It is a novel idea/tool 2. Quite effective 3. Implementation capacity of ICT has improved 4. There is much effort put in

OBJECTIVE	THEME	SUB-THEMES	CATEGORIES	CODES
regarding the implementation of ICT at UNU University				ICT training
		2. Educational services managers' interface with ICT tools	1. Experiences of College Principals, Deans of Schools, and Heads of Department 2. Experiences of ICT administrators	1. Some University activities are still done manually Bandwidth is still a problem 2. ICT projects have been funded 3. Staff training in ICT has been offered.
3. To establish how ICT adoption has improved management and student learning at UNU University	3. Improvement of University management through ICT adoption	1. ICT contribution to University planning	ICT use by University Secretary in University planning	1. Managing University assets 2. Managing University human resource
		2. ICT contribution to University organisation	ICT use by Academic Registrar in University organisation	1. Teaching timetable 2. Examination timetable 3. Student admissions 4. Grading student scores
		3. ICT contribution to University	Use of ICT by DVCA for academic	1. Supervision of lecturers

OBJECTIVE	THEME	SUB-THEMES	CATEGORIES	CODES
		supervision	supervision	2. Supervision administrative staff
	4) Improvement of student learning through ICT adoption	1. ICT contribution to self-directed learning	1. ICT tools that enhance self-directed learning	1. Wireless 2. Personal 3. laptops 4. Internet
		2. ICT contribution to lifelong and distance learning	2. ICT tools that enhance lifelong learning and distance learning	1. UNU UNIVERSITY website 2. NUELE 3. Personal e-mail addresses 4. LIBIS 5. DICTS
		3. ICT contribution to research	3. ICT tools that enhance research	1. Laptop 2. Internet 3. Statistical packages 4. Subscribed journals

5.2 THEME 1: PROVISION OF ACCESS TO ICT AND FACILITATION OF EDUCATIONAL SERVICES MANAGEMENT

5.2.1 Sub-Theme 1: Type of ICT Tools Provided

The documents analysed in the study revealed that the UNU University ICT Policy and Master Plan 2001 specified amongst other things, providing data communication requirements for the University. These requirements include database systems, full

data connectivity to all users, internal and external email as well as web-based information services.

UNU University ICT Policy and Master Plan 2001 also proposed availability of standard office applications such as word processing, spreadsheet processing, and access to databases at all workplaces. It also included an Integrated Library Information System (LIBIS), Integrated Academic Records Information System (ARIS), Integrated Finance Information System (FINIS), Integrated Human Resource Information System (HURIS) and applications for learning and education such as NUELE and MOODLE. Other authors who delved into the study of the nature of ICT installed and accessed in institutions like those mentioned above to manage educational services include Dooley (1999); Spotts (1999); and Sprague, Kopfman & Dorsey (1999). These scholars contend that software and hardware tools help in managing educational services through teaching, lecturing, research, and provision of library information.

Another document analysed in this study was the UNU University Strategic Framework 2007/08-2017/18. In the discussion on the situation of Science and Technology in Uganda, this strategy addresses the importance of ICT in teaching and learning by stating that the ICT revolution is centred on the Internet (UNU University, 2007). It points out that the Internet has radically changed the mode of acquiring, transmitting, storing, and applying knowledge. As a corollary, the strategy indicates that both instructional processes and the teaching or training subject matter rely on ICT. The strategic plan further argues that intellectual inquiry has also not escaped the revolutionising effect of rapid advances in ICT and that ICT is now becoming a vehicle for teaching and distance education delivery to the extent that universities can reach out to as many learners as possible irrespective of space.

The Strategic Plan identifies UNU University as the University with an Information Communication Technology (ICT) master plan and a fully-fledged department that coordinates and supports ICT initiatives (DICTS). There is a vast ICT campus network, with the optical fibre backbone covering the main campus, Faculty of

Medicine, UNU University Agricultural Research Institute, Kabanyolo (NUARIK) and UNU University Business School (NUBS).

According to the Strategic Plan, UNU University has a University Library with the aggregate space of 12830 sq. metres. The library has an Electronic Document Delivery Service (EDDS), three networked computer laboratories and other server points, with one laboratory reserved for students with disability and a diversified stock of books and the book bank (UNU University Strategic Plan 2010). The Strategic Plan, in discussing rapid technology advances in the world, states that the advances in technology provide a chance for UNU University to utilise ICT to not only deliver an excellent learning experience for its learners but also to extend the provision to different geographical settings at both national and international levels. As an opportunity for UNU University, the plan indicates that the Construction of East African Submarine System (EASSY), which is the projected coming on-line of this system in the next three years that offers the University an opportunity to apply flexible learning approaches such as e-learning both within the country and beyond (UNU University Strategic Plan 2010).

The 2012 Ministerial Policy Statement of the Ugandan Minister of Information and Communication Technology (MoICT), another document reviewed in this study, indicates the Tele-Medicine Centre at Mulago Hospital, the teaching hospital for UNU University, and the Tele-Education Centre at UNU University as some of beneficiaries of the Information and Technology and Management Services Directorate vote for the year 2012/13 budget. This conforms to the fact that among the activities in the statement is the provision of ICT laboratories and facilities in schools and health centres. This Ministerial Policy Statement in Uganda is in support of the studies conducted by Jacobsen (1998); Parisot (1995) and Schmidt (1995). These studies confirm that the adoption of ICT in higher education and educational environments helps to achieve desired outcomes of these institutions.

The Policy documents indicate that ICT provision at the University is vital for many reasons, to facilitate education services management as well as enhance the teaching and learning.

The findings on the nature of ICT established and located at UNU University are consistent with other studies, for instance, Baryamureeba (2010), Aginam (2006), Curtain (2004) and Eggleston *et al.* (2002). The nature of this ICT refers to all forms of hardware and software tools and applications that electronically facilitate the creation, processing, storage, transmission, retrieval, and utilisation of information for purposes of educational services planning, delivery regarding teaching and learning and control, specifically monitoring and evaluation. Newhouse *et al.* (2002) defined ICT as all technologies used for the collection, storage, manipulation, and communication of information.

Information and Communication Technology (ICT) administrators at UNU University were asked about the ICT tools the University has provided in the adoption of ICT for both teaching and management functions. Just as Baryamureeba (2010) and MacCallum (2010) reveal the central role of ICT installation and access in educational institutions in their studies, the study findings from an ICT Administrator of College of Computing and Information Sciences at UNU University indicated that ICT had been implemented, and much has been achieved mainly as the University has installed a number of ICT tools that have facilitated the educational services management at UNU University.

In the case of the School of Computing and Informatics Technology, the following ICT tools have been put in place: Sun Systems, which are of great value in accounting and The International Business Management (IBM) servers, which are gadgets that are useful in managing and computing-intensive workloads and business applications. Hewlett-Packard (HP) servers provide infrastructure to support the objectives of the school. The Unix/Linux operating systems are useful in conducting multiple tasks and have been installed at the University. Other common ICT tools known as Windows Microsoft Operating Systems were also reported to have been installed.

UNU University was also reported to have developed Information Systems and they include: Human Resource Information System (HURIS) which is used in managing human resource; Academic Records Information System (ARIS) for academic

records management; the Financial Information System (FINIS) for the management of finances and the Library Information System (LIBIS), which is primarily for managing the library services. The University was reported to have computers and projectors among other ICT tools that had been installed and accessed at the institution and these have played an immense role in educational services management. This is in line with the contribution made by Barreket *et al.* (2009) and Aginam (2006). Barreket, Scott and Payne (2009) considered at the capacity and cost efficiency of the ICT tools installed to manage educational services. Aginam (2006) listed some ICT facilities that improve on the quality of learning in universities in Nigeria such as Local Area Network (LAN) and Wireless Area Network (WAN), Domain Name Service (DNS), proxy servers, firewall, email connectivity, and e-learning programmes.

Another ICT administrator provided information from the College of Humanities and Social Sciences (CHUSS) indicating that some tools have been installed:

> *"Our school is adapting to the use of ICT tools to facilitate the management of educational services. In so doing, the School has computer laboratories where students can go and use the computers at their free will. There are wireless connectivity and the internet at the School. We also have projectors in some of the lecture rooms, and this has eased lecturing"*.
> (ICT Administrator, College of Humanities and Social Sciences)

Carlsson (2006), Stead *et al.* (2006) are among the scholars that contribute to the body of knowledge on ICT tools used in the management of educational services. Their research has a bearing on the current study because UNU University has tried to provide colleges with ICT tools that are relevant to specific interests within the college. For instance, an ICT administrator in the School of Library and Information Sciences, College of Computing and Information Science reports that at their College many ICT tools has been installed to facilitate the management of educational services. These tools include An E-learning website, computer laboratories, availing of software to the students, Academic Records Information System (ARIS), Human Resource Information System (HURIS), Financial Information System (FINIS), and Library Information (LIBIS). This is an indication

that the installation of ICT may play a role in enhancing teaching and management at the East African School of Library and Information Science (EASLIS).

Information gathered from the College of Engineering Design, Art and Technology (CEDAT), indicated that some advanced ICT tools were provided, showing a high-level commitment from University administration to incorporate ICT into teaching particularly using ICT in engineering courses.

> "*There have been advanced ICT tools put in place to facilitate our education services. For example, we have: Computers, Projectors, Switches, I-max Printers, Publisher, Metrics, Tectonics, Fiber Optics, Visual Studio, Python, MySQL, Workbench, PHP, and Adobe".*
> (ICT Administrator CEDAT, Margaret Trowel School of Industrial and Fine Arts)

There was strong support from participants, such as the ICT Administrator from School of Built Environment, in the College of Engineering, Design, Art and Technology (CEDAT) who reported that the University provided ICT tools to facilitate management of educational services. These tools included hardware such as computers, projectors, printers, and scanners. On the other hand, the software installed include tools such as: wireless access points, UNU University E-Learning Environment (NUELE), which enables interaction between lecturers and students, the Directorate of Information and Communication Technologies (DICTS) which coordinates all ICT tools, Human Resource Information System (HURIS), Academic Resource Information Resource (ARIS), Financial Information System (FINIS) and Library Information System (LIBIS) at the University. He elaborated that the University had acquired software used for the management of academic records sourced from South Africa, which is used in student admission, registration, and mark calculation of Grade Point Average (GPA) and Cumulative Grade Point Average (CGPA). This implies that the introduction of ICT has played a key role in accomplishing some administrative tasks.

The Director of UNU University E-Learning (NUELE) stated that the University has put in place many ICT tools to facilitate educational services for both lecturers and

students. The Director's view of the crucial part that ICT plays in the running of affairs in educational services management concurs with the views of Ashton *et al.* (2005). He also highlighted the provision of ICT tools to promote e-learning as well. These are hardware such as computers, projectors, printers, and scanners. He reiterated that software such as the Directorate of Information and Communication Technologies (DICTS), which coordinates all ICT systems like the Human Resource Information System (HURIS), Academic Records Information System (ARIS), Financial Information System (FINIS) and Library Information System (LIBIS) has also been of value. LIBIS is a system for managing the library services, and in discussing employing ICT in the library, the works of Odey (2009); Madu (2004), Okon & Jacob (2002) find a meeting point with the findings of this study.

Also, wireless access points are available throughout the University as well as the UNU University E-Learning Environment (NUELE), which is a platform meant to enable interaction between lecturers and students. This implies that there is a strong commitment from the University to promote ICT and usage since e-learning can only be implemented through advanced ICT technology as attested to by Brockman (2005) and Sharples *et al.* (2005). For example, according to Brockman (2005), ICT has significantly improved the effectiveness of managing library services using online catalogue management to facilitate reading for a better understanding of taught concepts but also as references to support academic research.

This was evident in the School of Liberal and Performing Arts:

> *"Okay, we have electronic boards in all our lecture theatres these days, and this is a step in the right direction. There is also Moodle which is a platform used in UNU University to conduct a class on the internet. Others tools are computers and projectors".*
> (ICT Administrator School of Liberal and Performing Arts)

The School of Food Technology, Nutrition and Bio-Technology, also reports on the provision of ICT in their area:

> *"The University started the UNU University E-Learning Environment (NUELE) to aid e-learning as one of the ICT tools to*

> *help facilitate the management of educational services. This tool has helped both the students and lectures in studying. There is the presence of ICT laboratories in all colleges and with computers. We also have few projectors in some lecture theatres".*
> (ICT Administrator Food Technology, Nutrition, and Bio-Technology)

The School of Business, College of Business and Management Sciences (CoBAMS) also reported that ICT had been applied in both management of educational services and administrative work executions.

> *"Yes, there is some ICT application which includes installation of computers in all the laboratories in the Colleges. I think there is no College in this University, which you will find without a computer laboratory. There are also LCD projectors that have been installed in most lecture rooms at the school. To add to that, we have also installed Information Systems, for example, the Human Resource Information System, Academic Records Information System at the University. These systems have played a huge role in the management of educational services at the University".*
> (ICT Administrator School of Business, CoBAMS)

This was also reported by the ICT administrator working at the East African School of Library and Information Science (EASLIS), College of Computing and Information Sciences:

> *"Yes, the school has computers, projectors among others. Then there are the Academic Records Information System (ARIS), Human Resource Information System (HURIS), Financial Information System (FINIS), and Library Information System (LIBIS) that we use to facilitate management of educational services at our school. The systems are however managed centrally by the Directorate of Information and Communication Technologies (DICTS)".*
> (ICT Administrator, EASLIS, CoCIS)

Such reporting by the colleges emphasises how ICT is used in managing library information, which this confirms the views of authorities such as Bennett and Bennett (2003), Finley (2003) and Less (2003). These authors recognised the way ICT increased the flexibility of delivering educational services to enable learners access

knowledge anytime and from anywhere. This consequently enhances the quality of lifelong learning and prepares learners better.

In support of the opinions of scholars in the field like Martin (2003) who examined factors influencing faculty adoption of Web-based courses in teacher education programmes within the State University of New York, findings revealed that some ICT tools were used in the School of Distance and Lifelong Learning at UNU University. The ICT administrator reported that:

> *"There exist some of them. One is that we have a fully-fledged computer laboratory and a robust internet. The University also has developed E-learning platforms like UNU University E-Learning Environment (NUELE), which is very instrumental for instruction. Others include University Information Systems like Human Resource Information System (HURIS) and Academic Records Information System (ARIS). We also have projectors in a few lecture halls".*
> (ICT Administrator, Distance, and Lifelong Learning)

In line with the studies carried out by scholars such as Casmar (2001) who indicated that an innovation grows slowly and gradually in the beginning, Hoerup (2001) claims that dependence on ICT actions helps to support the delivery of educational services in society and academia. McKenzie (2001) asserts that ICT tools are essential in facilitating the management of educational services. The information provided by ICT Administrator in the School of Economics showed that ICT tools have also been applied in their school:

> *"There is the file server (where Human Resource Information System sits)-It is under control of Directorate of Information and Communication Technologies (DICTS), but Human Resources Information System (HURIS) also uses it. We also have others such as computers, projectors, printers, and scanners. For the software, we have the following: Academic Records Information System (ARIS), Financial Information System (FINIS). Lastly, there is the Library Information System (LIBIS)".*
> (ICT Administrator, School of Economics)

Eggleston *et al.,* (2002) in their studies on the nature of ICT tools installed and accessed for educational management purposes, concur in principle with the findings at UNU University.

Curtain (2004) and Akinsende (2002) share their views on the nature and importance of ICT tools, mentioned in the above discussion, which are used in educational services management. They also report on how the relevant and appropriate ICT tools enhance the effectiveness of educational services management. These studies show that ICT is in the form of hardware and software tools and applications that electronically facilitate the creation, processing, storage, transmission, retrieval, and utilisation of information. This consequently helps in educational services planning, delivery regarding teaching and learning and control regarding monitoring, and evaluation.

The study findings showed that some ICT facilities had been installed in different academic units of the university. Some of these ICT services are used in teaching among lecturers, learning among students as well as in the administration within the University. Some of the ICT materials used in teaching include projectors, laptops, I-max Printers, Publisher, MySQL, and Adobe. Students use ICT facilities such as laptops, mobile smartphones, SPSS software, and wireless internet to support their studies at the University. Carlsson (2006) in a previous study confirmed that mobile ICT facilities like mobile telephone sets had made a great contribution to teaching and learning. In the administration, some ICT facilities are used for instance UNU University E-Learning Environment (NUELE), Human Resource Information System (HURIS), Academic Records Information System (ARIS), Financial Information System (FIS) and Library Information System (LIBIS).

UNU University has established numerous computer laboratories per school in all the colleges of the university. Free wireless internet is also provided to all lecturers and students with laptops. The University offers online library catalogues in which students within the University campus can access and use for their academic programmes. The UNU University E-Learning Environment (NUELE) has also been a useful platform in which students and lecturers can interact through computerised

lectures. The platform enables lecturers to update their teaching; students download assignments and submit course works for examination. Much as the studies conducted by the many scholars mentioned in the review of the literature, concerned themselves on ICT adoption and particularly the nature of tools installed and accessed, they fell short of examining the effectiveness of ICT implementation, particularly at UNU University except for researchers such as Baryamureeba (2010); Kasenene (2012); Matovu (2009) and Nabayego (2011).

5.2.2 Sub-Theme 2: ICT Access to Students for Learning

The University managers were asked to ascertain whether there have been attempts to provide ICT access to students for learning. The University Secretary reported that the University provides ICT access to students for learning, mainly since computer laboratories have been stocked with modern computers

> *"The University has made sure that computer laboratories have been set up in all colleges at the University. Computers are used for e-learning and teaching at all the colleges, and even the library has computers where students can access e-resources".*
> (University Secretary, UNU University)

The comment by the UNU University Secretary is in tandem with the findings of authors in the field such as Akubuilo (2007) who conducted a study in tertiary institutions of Nigeria about how effective the utilisation of ICT in the management of science instruction at the tertiary level. He found out that this utilisation was not as effective as expected and that there were some factors that inhibited it, the significance of which included low user knowledge on the use of ICT, lack of ICT training and installation of poor-quality ICT.

The field findings at UNU University further indicated that the University Librarian was full of praise for the University Management that had provided ICT access to University students for learning by ensuring that computer laboratories exist in all University colleges. She further mentioned that mechanisms had been put in place to have computers where students can access e-resources as suggested by Aguti and Fraser (2006); Darlan and Anani (2006) as well as Muyimbwa (2004). Computers are

used for e-learning, and it is believed that this has been introduced in all colleges. She asserted that:

> *"The University has now made sure that computer laboratories exist in all University colleges. As a University library, we have made sure; we have computers where students can access e-resources. Computers are used for e-learning I think in all colleges now".*
> (University Librarian, UNU University)

The University Bursar, holding an administrative position at the University, seemed to be knowledgeable on how ICT has been accessed by students and concurred that at some point she was aware that some computers had been procured and were for educational purposes. However, she could not speculate on the effectiveness of the intervention since she rarely associated with students who were learning using ICT. The Academic Registrar also indicated that students at UNU University were quick to access ICT because students, who owned laptops, were allowed access to the Internet at all times. This was thought to have had an impact on student learning since students would have ready access to a variety of international online educational materials. For example, Ajayi (2001) noted the need to build capacity for ICT utilisation in African Universities especially in their management.

The Academic Registrar went on to state that computer laboratories have been stocked across the university, and are fully operational. It was believed d that even students who did not own personal computers had the opportunity to use university-installed computers:

> *"I wish to let you know that computer laboratories now exist in all colleges and they are functional. The libraries as well have computers where students access e-resources to support the hard copies of books there. Computers are used for e-learning here"*.
> (Academic Registrar, UNU University)

The UNU University ICT policy 2005-2009 was reviewed to showcase the role of ICT in the management of educational services at UNU University. The policy states that the University has over the years harnessed ICT to enhance the learning experience

of students. Use of mobile phones and social media are examples of how this has been carried out to promote practical experience and peer-to-peer learning.

Among other initiatives designed to realise the intentions of ICT implementation in teaching and learning at UNU University as per the ICT Policy and Master Plan (2010-2014) of UNU University are:

> ***Mobile distance learning:*** In Open, Distance, and e-Learning, a collaborative virtual mobile learning platform was designed to be piloted under the mobile distance learning project which aims at developing applications meant to increase student support and attain higher retention and pass rates in the External Degree Programmes. So far, the two programmes being run through distance learning are Bachelor of Commerce (BCom) and Bachelor of Education (BEd). The College of Education and External Studies (CEES) has used the mobile learning platforms during admissions (student support) and in learning.
>
> ***Peer learning through Social Media:*** Following the technological trends, the College of Health Sciences (CHS) has adopted the social media technologies (Facebook and Twitter) and creatively turned them into learning platforms. Various Facebook pages have been created with the intention of promoting student learning; for example, the student Community-Based Education Research and Service (COBERS) experience page, where students share their findings with the community and exchange knowledge, hence learning amongst peers.
>
> ***Student-centred learning:*** Adopting a blended learning format, the College of Health Sciences (CHS) has explored a wide range of e-Learning modes both teacher and student-centred. The College has established the appropriate e-learning infrastructure (a video conferencing auditorium, multimedia studio and relatively good internet connectivity both wired and wireless) to support medical education.

Student recordings: Through the CHS student initiative, students have identified various study areas in which they have made recordings. These recordings are made available on the college portal (mesau.mak.ac.ug) for download — some of these target first-year students as one way of orienting them to a particular study topic.

COBERS experience course: The COBERS experience course in CHS is an online course being designed for first-year students who work with the communities. The course is intended to capture and share students' experiences while in the community and promote reflective learning. The course will be uploaded on the University's e-Learning environment (http://nuele.nab.ac.ug) for access to all CHS students. In the College of Engineering Design Art and Technology (CEDAT), the iLabs programme has expanded access to academic resources. The college now has over 30 iLabs (internet laboratories) through which students can conduct experiments. Students of Computer Engineering, Telecommunications Engineering, and Electrical Engineering are benefiting from these i-labs.

The increase in ICT access and resources at the College are further demonstrated by a general increase in the use of the wireless network by students since this facility is now available around CEDAT. There is also online access to examination results and coursework by students, use of improved audio and video systems during PhD Viva Voce, and the use of Geographical Information System (GIS) in research using the new GIS Lab at CEDAT especially by the graduate students. Also, the use of UNU University E-Learning Environment (NUELE) in teaching and Learning, use of the DropBox, Workspaces for teaching purposes and E-learning Platform has demonstrated an increase of ICT use.

At the University level, there is a steady improvement in the use of the E-learning platform NUELE. There are 471 active online courses presently, an increase from 456 in 2012. The College of Computing and Information Science (CoCIS) has the most significant number of uploaded courses at 283 compared to the School of Law (SoL), which has the least number of courses. This role of ICT in enhancing student

learning and educational services management, in general, is a matter of interest to scholars such as Darlan & Anani (2006) who emphasised the use of ICT in the planning of educational programmes and its delivery to learners. Kasenene (2012) also looked at the use of ICT in designing timetables used by both lecturers and students in delivering desired teaching programmes at the university.

5.2.3 Sub-Theme 3: Facilitation of Educational Services Management

The UNU University Strategic Framework 2007/08-2017/18 is one of the documents that was reviewed in connection with facilitation of the management of educational services at the University. This strategic framework for UNU University was designed not only to address the core activities of teaching, research and outreach but also other cross-cutting issues like quality assurance, ICT, human resource development, library services, and physical infrastructure as well as gender mainstreaming (UNU University, 2007). Among the objectives of this framework also are the integration of ICT and gender into teaching and learning, provision of high quality and a variety of relevant and up-to-date teaching and learning materials and promotion of open and distance learning (UNU University, 2007).

Some of the measures of success are spelt out in the UNU University Strategic Framework 2007/08-2017/18 and include: increase in the use of technologies in teaching and learning, an increased number of programmes offered using Open and Distance e-Learning (ODeL) approaches, increase in the number of E-Journals in use as part of communication strategy, development of interfaced and fully operationalised information systems, development of a fully operational library information system, increment in the number of branch libraries automated and linked to the main library and finally, the UNU University Main Library linked electronically to other university and public libraries and increment in the number of e-journals and e-books acquired per student (UNU University, 2007).

There have been educational services in many ways, which help students become familiar with ICT:

> *"Basically, it has enabled teaching by helping students who do not know the computer to understand software and hardware."*
> (ICT Administrator, School of Liberal and Performing Arts)

The School of Computing and Information Sciences reported that that ICT had facilitated management of educational services in their school, which has had a positive effect:

> *"We have KOHA; an online open-source integrated library service that avails students with an online portal for them to access notes. This has reduced the burden on lecturers since the students acquire knowledge from KOHA. Also, the UNU University E-Learning Environment (NUELE) helps lecturers to update notes for their respective course units, and students can download assignment results at their convenience and also upload assignments".*
> (ICT Administrator, School of Computing and Information Sciences)

At the College of Humanities and Social Sciences, the ICT Administrator agreed that students have been able to have their research done, conduct online education, submit coursework, and access information on various subjects because of ICT adoption. A comment by the ICT reiterates how ICT has facilitated management of educational services:

> *"There has been a big contribution of ICT to the learning of students at the University. Students have been able to have their research conducted, conduct online education, submit coursework, and access information of all kinds".*
> (ICT Administrator, School of Education)

Kankunda (2009) and Wilen *et al.* (2000) in their studies discuss the process involving actual teaching through giving notes, conducting tutorials, holding discussions with students by encouraging them to ask questions for better understanding, and giving them classroom exercises through the use of ICT. In line with these studies, information provided by the Department of Networks, College of Computing and Information Sciences indicated that ICT is the bond that makes their daily work successful, especially with the increase in student population. Therefore, it seems that ICT has played a role in improving educational services management:

> *"Okay, I can say ICT has contributed to effectiveness in managing educational services at this University. For example, the UNU University E-Learning Environment (NUELE) which facilitates knowledge sharing through forum discussions and avails students with reading materials. Also delivering coursework to students has reduced the burden of lecturers since there is a big population of students"*.
> (ICT Administrator, CoCIS)

The Margaret Trowel School of Industrial and Fine Arts has also acknowledged how ICT is improving its educational services management:

> *"Yeah, students with the help of ICT tools now find notes, coursework online and they easily reach their lecturers through e-mail and in case the lecturer is not present, he can upload assignments."*
> (ICT Administrator, Margaret Trowel School of Industrial, and Fine Arts)

In the School of Women and Gender Studies, technological advancement has been realised because the staff has utilised a variety of ICT tools ensuring significant ICT progress:

> *"UNU University has a digital library and other online resources like international journals. There is also use of You-tube for classes by some staff".*
> (ICT Administrator, School of Women, and Gender Studies)

Other scholars whose works are in agreement with these findings provided by the ICT administrators at UNU University are Frederiksen (2006); Luyiga (2011); Nanteza (2000). Frederiksen (2006) dealt with off-campus library services, Luyiga (2011) analysed the management of library services in primary education schools in Masaka municipality while Nanteza (2000) focused on management of library information in Uganda secondary schools. The findings, for example, an ICT Administrator School of Food Science, Nutrition, and Biotechnology agreed that ICT had facilitated educational services management at the school especially reaching large student numbers who are not geographically present:

> *"The introduction of e-learning has greatly made easy delivery of some courses, and the number of students reached. Many students can now be reached instantly".*

(ICT Administrator, School of Food Science, Nutrition and Biotechnology)

The researcher discovered through the ICT Administrator in the School of Built Environment and at the East African School of Library and Information Science (EASLIS) that ICT has dramatically helped in addressing educational services management within the school and library:

> *"Students at UNU University have been able to carry out research related to their fields of study as well as easy communication through the UNU University website. The students have also used e-mail accounts as one reliable source of information".*
> (ICT Administrator, School of Built Environment)

> *"I would say that students have received much help in research, E-learning, and coursework. Lecturers, on the other hand, have been aided in computing students' marks, setting coursework, and communicating with the students. Sharing communication with colleagues in different ways among students and staff has been eased".*
> (ICT Administrator, East African School of Library and Information Science (EASLIS))

These views are confirmed by the scholarly works of Layzell (2003) who observed that the internet supplements education; for instance, the use of internet facilities in accessing academic materials such as reference books, journals, periodicals and newspapers. However, the School of Liberal and Performing Arts has reported that there has not been an improvement in the management of educational services at UNU University with the adoption of ICT, particularly as the increasing numbers of the students has not matched the supply of ICT facilities:

> *"I think ICT has not improved teaching because of the issue of numbers like you find a class of 120 students sharing 20 computers in the laboratory. It is one in front of the computer who can benefit"*.
> (ICT Administrator, School of Liberal and Performing Arts)

The literature reviewed from the different authors looked at how ICT facilitated management of educational services at educational institutions outside the University and the country as well. This study focused on Documentary analysis of documents on ICT and research conducted at UNU University. The discussion involves the way this literature relates to the qualitative and quantitative data collected at UNU University.

5.3 THEME 2: PERCEPTIONS AND EXPERIENCES OF THE EFFECTIVENESS OF ICT

5.3.1 Sub-Theme 1: Views of Educational Service Managers on Effectiveness of ICT Implementation

The University, since 2001, has embraced an ICT policy, which has brought about a deliberate utilisation of ICT in all administrative and academic units of the University. The researcher, as part of the qualitative study interviews educational services managers, to ascertain their perceptions of educational services on the effectiveness of the implementation of ICT in the University. Studies carried out by Zahra, 2013; Buabeng-Andoh, (2012); Deaney et al. (2003), Ruthven & Hennessy (2003) are of paramount importance as points of reference.

The Principal of the College of Education, and External Studies (CEES) has identified the importance of ICT implementation, perceiving that:

> *"There has been quite effective ICT implementation at UNU University and I would say my perceptions are that first of all it is a novel tool and UNU University has embraced ICT because of its importance. The UNU University E-Learning Environment (NUELE) has been started to enable teaching and learning".*
> (Principal, College of Education and External Studies)

The Principal of the College of Business and Management Sciences (CoBAMS) on the ICT implementation, gave credit to the University:

> *"UNU University has embraced ICT, and it is imperative in the running of the University. There are many ways that ICT has been used effectively at UNU University. Here, we use the Statistical Package for Social Scientists (SPSS), Epidata, Epi Info, and Stata programmes to analyse socio-economic data and write reports. Our students use these programmes to write their dissertations and theses".*
> (Principal, CoBAMS).

These comments by college principals are in agreement with the study findings of Afshari *et al.,* (2010) and Nyambane and Nzuki (2014) who report on the perceptions of educational services managers on the effectiveness of the implementation of ICT in educational institutions. Afshari *et al.* (2010) noted that there was no significant improvement in the use of computers in administration and instruction of students by secondary school principals despite significant expenditure of funds by the Ministry of Education of Iran. According to Nyambane and Nzuki (2014), the success of integration and effective adoption of ICT was not dependent on the availability or absence of one individual factor, but was determined through a dynamic process involving a set of interrelated factors among which were the negative perceptions of these teachers, administrators and policymakers on the new technology. Among other educational services managers, the Head of Department Distance and Lifelong Learning had his perceptions regarding ICT implementation, pertinently remarking that there is still much to do to ensure its effectiveness:

> *"My perception is that ICT has played a big role in the effectiveness of learning at UNU University. Much as it is a new idea, but it is crucial for teaching and learning. UNU University has embraced ICT, but there is still much to do to make it very effective. UNU University E-Learning Environment (NUELE) was established to enable teaching and learning".*
> (Head of Department, Distance, and Lifelong Learning)

The University of Kabianga, ICT Strategic Plan (2014-2018); E-Learning Nordic (2006); Václav, Antonín, & Petra (2011) discuss perceptions of the effectiveness of ICT implementation in the educational services management and the findings of the researcher finds relevance in them. They presented performance drivers and ICT tools in human resource management. For instance, the Dean School of Education

shared her perceptions of continued ICT progress even in the light of challenges, stating that:

> *"Generally speaking, the implementation of ICT has been good because different colleges have ICT facilities functioning independently. The University ICT implementation capacity has improved a lot regardless of the few challenges faced. There has been a milestone since the time ICT was fully adopted in UNU University, for instance, UNU University E-Learning Environment (NUELE) platform has been introduced. The University ICT is now advanced because students have access to wireless for surfing within the school building. The staff has access to wireless internet, and this has been helpful in doing administrative work and teaching. On an individual basis, some of our staff own education software to assist them in teaching".*
> (Dean, School of Education)

The works of Krishnaveni and Meenakumari (2010), Mishra, and Akman (2010) are essential in studying the perceptions of educational services managers in the effectiveness of ICT implementation in educational institutions. Their studies confirm the researcher's findings. Their studies looked at perceptions and experience of educational services managers regarding ICT implementation, how they feel about the effectiveness of the ICT implementation and how much ICT they should use or use in their daily tasks of educational services management. For example, Krishnaveni and Meenakumari (2010) found out that ICT contributed significantly to higher learning and teaching as follows: use of internet to supplement book information (96.5%), use of ICT-based communication among faculties and students (69.2%), use of PowerPoint slides for delivery of lectures (89.5%), evaluation of test, assignments and publication of results done electronically (55.6%), usage of technology for research work and for expert discussions (84.9%), use of virtual library and e-learning (62.2%) and usage of computers for multimedia-based delivery (76.7%).

The researcher's study findings indicate that the use of advanced ICT programmes is a sign of the effectiveness of ICT implementation at UNU University:

> *"For us, here in Forestry, Gen-Stat, Forest Metrics, as well as SPSS programmes, have been used by some students in undertaking their academic research."*

(Dean, School of Forestry, Geography, and Environmental Sciences)

The views gathered from the Dean School of Library and Information Sciences on perceptions conform to those of other scholars such as Hamdane et al. (2013) who researched on the level and efficiency of ICT implementation in educational institutions, being dependant on the perceptions of the principals of the educational institutions. Song and Kang (2012) concentrated on evaluating the impact of ICT use, employing a multi-level analysis with hierarchical linear modelling. According to the findings, the use of ICT explained a significant portion in the overall variance in mathematics achievement at the elementary school level, at the middle school level, and the high school level, respectively. Information communication and transactions, a component of ICT literacy, has negative impacts on mathematics achievement, and ICT self-efficacy is more likely to result in academic achievement than other background and processing variables. In this study, some variables were seen to affect the level and efficiency of ICT implementation. The Dean School of Library and Information sciences highlighted the need for ICT training to ensure ICT is used effectively in teaching and learning:

> *"The University has tried to put much effort into ICT training to improve its implementation at Makerere. Throughout the years, there has been an improvement in the teaching of ICT at UNU University, and we as a University have seen an increase in the need for ICT to be taught in all the colleges. For the different colleges, however, what is important to them is using ICT to teach their content. At the School of East African School of Library and Information Science we, have made sure that all programmes have at least one course unit on ICT".*
> (Dean, School of Library and Information Sciences)

The Dean, Margaret Trowel School of Industrial, and Fine Arts reported that in the past they had relied on manual drawing in the art and design work but latterly can develop graphics with the help of ICT. Alharbi and Drew (2014); Althobeti (2013); and Umeagukwu and Ngozi (2014) raise the argument that ICT should be seen as an effective and efficient teaching and learning tool, as perceived by the Dean:

> *"For a long time, we have been using our hands to attach meaning to life situations, however; now we have developed programmes in graphics, cartoon and logo making, movies, cloth styling that require the use of ICT. Overall, many lecturers, and even students have embraced ICT facilities including laptops, tablets, and Smartphone. Here at UNU University, graphic art software, cartoon maker, and Microsoft publishers are widely used by both the academic staff and our students. We also still use desktops although they are improved ones with flat screens".*
> (Dean, Margaret Trowel School of Industrial, and Fine Arts)

Nyambane and Nzuki (2014) report that the success of the integration and effective adoption of ICT is determined through a dynamic process involving a set of interrelated factors among which are positive perceptions and ongoing training. In line with their arguments, the Dean has reiterated the need for ICT training of all first-year students:

> *"The University has gone into ICT training to improve ICT implementation. For some years now, teaching has had an improvement due to ICT at UNU University. Quite obviously, we as a University see the need for ICT to be taught in all first-year courses at the University. The School of Food Technology, Nutrition, and Bio-Engineering follow suit by ensuring we have one course unit on ICT use. This indicates that a lot more is still needed to improve ICT adoption at UNU University".*
> (Dean, School of Food Technology, Nutrition, and Bioengineering)

The Dean, East African School of Higher Education and Development also shared his perceptions of the effectiveness of ICT implementation. These are in line with the views of Ali *et al.* (2013) that various levels of leadership such as principal, administrative leadership and technology leadership influence the successful use of ICT in schools.The Dean had this to say:

> *"The University ICT resource has been developed because students have access to wireless for surfing within the school buildings. Almost all the staff also have access to wireless internet, and it has helped them to carry out administrative work and teaching. The effectiveness of the implementation of ICT is in my view good because different colleges have ICT facilities functioning independently. The University ICT implementation capacity has improved a lot though some challenges are still*

> *being faced. Since ICT was adopted in UNU University, many gains have been made for instance UNU University E-Learning Environment (NUELE) platform has been introduced for purposes of teaching and learning. ICT is a very important asset for this college because we carry out much educational research for Masters and Doctoral students".*
> (Dean, East African School of Higher Education and Development)

The Dean School of Computing and Information Sciences believed a milestone has been achieved with the implementation of ICT, and particularly as courses have been developed to suit the current ICT needs:

> *"The University has put in much effort in teaching ICT since courses have been developed already awaiting implementation. There is much still needed in ICT sector because no policy of online courses is yet developed though promoted. UNU University has taken up ICT, and the evidence is this School that has been modernised to provide ICT training in the region. We stand out as a state-of-the-art college in East Africa".*
> (Dean, School of Computing and Information Sciences)

These findings tie-up with the report of E-Learning Nordic (2006) and the study of Grainger and Tolhurst (2005) on the importance of getting full support of leaders managing the educational services with the help of ICT in the institutions under their leadership.

Effective ICT implementation at UNU University is evident with the installation of both wireless Internet and Local Area Network to execute administrative work such as in the management of financial records in the university using Financial Information System (FINIS).

The study findings also reveal how ICT had helped in settling complaints among students as soon as possible for instance financial management aspects, updating of students' results, tracking the academic progress of students, as well as printing of testimonials among others. Reports of class group e-mails being mandatory to all students for them to have updates were revealed during the study. Research supervision and online feedback to students are timely. Quite a significant number of

lecturers were utilising ICT in teaching and research. It was also reported that ICT had attracted sponsorship of projects to enhance its implementation, for instance, the Swedish Programme for ICT in Developing Regions (SPIDER) project. The Norwegian Agency for Development Cooperation (NORAD) also gave aid in the supply of powered whiteboards stationed in different colleges of UNU University.

The Head of Department Agricultural and BioSystems Engineering (ABE) agreed that ICT was quite useful though some challenges still existed. The Head of the Department of Distance and Lifelong Education mentioned that ICT had played a significant role in the effectiveness of learning even though it was a new idea but it was imperative for teaching and learning.

UNU University had embraced ICT, but there was still much to do to make it very efficient. The University had entered a new era in managing educational services at the University, making the operations in the schools smoother than they used to be before. Communicate with other schools, mother College and other University departments, as well as communication with Senate and University Management had been simplified through ICT, which offered them a better system of administration. Although research has shown that for effective ICT implementation, transformational leadership drives the implementation and utilisation (Crawford, 2001; Walsh, 2002; Williams, 2010; and Yee, 2000).

The literature reviewed by the researchers such as Barta *et al.* (1994) and Carter and Burger (1994) shows the inevitability of ICT use in managing modern educational institutions a point supported by the Dean of the School of Business. He stressed that now one rarely finds a school at the University operating without computers, the Internet, projectors, or ICT tools as ICT plays a central role in both administration and teaching. He revealed that ICT had enabled them to link the school to other schools at UNU University, University Management, and universities abroad online. He pointed out that one is right to consider ICT as an enabler of school activities without which life becomes tough.

The Dean of the School of Built Environment's perception of the effectiveness of ICT implementation is that ICT is a blessing during this time of technological advancement in all fields (North *et al.* 2000). He said that one would be lying to himself to say that he is an engineer but does not need ICT in his work. He went further to state that the equipment that they require in Built Environment Engineering could not be divorced from ICT in any way. He lastly pointed out that ICT was vital to them as engineers and made their teaching effective because they taught both traditional and modern construction methods and those methods require the use of CDs, the internet, and online surveys.

The Dean of the School of Liberal and Performing Arts stated that the school could not be an exception to the global trend of ICT adoption in the education field ICT, can enhance real-world experiences through collaborative communities of practice. The development in ICT created new and exciting approaches to arts teaching and learning that have never been experienced before. Through ICT, he asserted that opportunities for sharing arts-making processes with others involved in similar endeavours could be availed to students. He said, so far, they were not doing very poorly at UNU University with the implementation of ICT, as it was useful to some degree.

The Principal of the College of Computing and Information Science (CoCIS) said that there had been very useful ICT implementation more especially in their College of Computing and Information Science. He, however, conceded that not all activities at the college applied ICT but most of the work used ICT, and it had become effective and quicker to perform different tasks, a viewed shared by Telem (2001). The Principal pinpointed the financial system, which used ICT efficiently with a few hiccups, but raised the point that ICT had helped them for effective reporting. It seemed though, at that time that for general administration, ICT use was minimal, as they still had to perform some tasks manually.

In his submission on the perceptions, he had on the effectiveness of ICT implementation, the Principal of the College of Humanities and Social Sciences stated that it was a necessary tool in education but specifically in Social Science

research. He mentioned that UNU University had adopted ICT and had relied on it for operations. He pointed out that the University was making great strides in ICT development naming the UNU Institute of Social Research (NISR) where ICT was vital to the research being conducted there, citing how ICT has the ability of transforming organisations (Afshari *et al.* 2010; Kirimi 2014). The research institute is renowned not only in the country but also worldwide in conducting doctoral research. He went on to cite the UNU University E-Learning Environment (NUELE), which had been developed to enable teaching, learning, and research as well. Lastly, he talked about projects that had been funded to install ICT and conduct other research through collaboration with the University of Columbia in the United States of America.

5.3.2 Sub-Theme 2: Educational Services Managers' Interface with ICT Tools

There are many experiences shared by educational services managers on the effectiveness of ICT implementation in the literature reviewed. Some of them though, paint a different picture, like Afshari *et al.,* (2010) who looked at the effect of ICT on educational services management in schools in Iran. Similar views were expressed about the impact of ICT in Kenyan schools where the new technology was not a very welcome idea (Nyambane & Nzuki, 2014). The standard view, however, among literature reviewed is that ICT plays a decisive role.

The Principal of the College of Computing and Information Science at UNU University shared his experience with ICT implementation. Among other comments, he said that ICT has helped in speedily dealing with student administration:

> *"I would say the financial aspect is well managed by ICT. In 5-10 minutes, a transaction can be completed in such a short time. The processing of results is done well too. This has helped in handling complaints and updating students' results in time. The tracking of what goes on in the students' academic progress takes very little time. For instance, student testimonials are easily tracked for printing in case a student comes back demanding them".*
> (Principal, College of Computing and Information Science)

The Dean, School of Education, credited UNU University for the ICT implementation since it was applied and relevant to all students and administrative staff. This is a sign that University management supported ICT implementation (Mingaine, 2013).

> *"The lecturers have gained ICT experience given the years they have been working in the University but students especially those who have just joined the university do not have much knowledge on ICT. There is difficulty in teaching these students even at Master's degree level due to lack of ICT skills. At UNU University these days, lecturers have to start by teaching ICT introductory course units to enable students to understand and get to know how to access materials through ICT. In a bid to enhance ICT usage among students, class group e-mails are mandatory to all students to motivate them to be computer literate, and that is where they receive some course materials. Some lecturers in my school make sure that assignments are administered online so this encourages students to be ICT friendly because it becomes a must for them to use the internet when submitting the assignments. ICT implementation has simplified doing work, for instance, supervision is done to a large extent online and meeting students under supervision face to face is done only when there is a great need".*
> (Dean, School of Education)

The Dean, School of Languages, Literature, and Communication commented on the effectiveness of using ICT but did reiterate the fact that some students still lack the necessary ICT skill. He said that:

> *"The lecturers try but students do not have much knowledge on ICT, and there are innovations now and then in the field. There is difficulty in teaching these students even at Master's degree level due to lack of ICT skills, and this is a big challenge. Lecturers have to start by teaching ICT and how to access materials using ICT because some were not exposed before. Class group e-mails are mandatory to all students, and every student must have an e-mail to get updates. The feedback provided to students online in some cases is timely because students and lecturers access free internet. Research supervision is done to a large extent on line and meeting student under supervision is done only when there is a great need to do so hence helping lecturers to cope with big numbers of students to supervise".*
> (Dean, School of Languages, Literature, and Communication)

Scholars like Crawford (2001); Yee (2000); Barta *et al.* (1994); Carter and Burger, 1994) report on the experiences of educational service managers on the effectiveness regarding ICT implementation. Crawford (2001) points out how online conferencing worked for those educational services managers who were involved in the study. He showed how ICT played a role in providing them with support, affirmation, and direction for their leadership. Barta *et al.* (1994) and Carter and Burger (1994) show the inevitability of ICT-use in managing modern educational institutions, a point supported by the Dean of the School of Business.

According to the Principal, College of Humanities, and Social Sciences (CHUSS), the college has registered a positive experience in the effectiveness of ICT implementation:

> *"A good number of lecturers have now picked up the use of ICT in teaching; I would say that about 80% of the lecturers effectively use ICT for teaching using Powerpoint. This has helped improve on the teaching and research techniques".*
> (Principal, College of Humanities and Social Sciences; CHUSS).

The Head of Department Adult and Community Education revealed that both students and lecturers had received substantial ICT training and are skilled enough to execute their academic duties:

> *"I think both lecturers and students have substantial knowledge on the application of ICT in doing their educational assignments. Now, no lecturer can accept handwritten coursework but rather it must be typed and well formatted if one is to earn good marks. These days, lecturers and instructors send course notes and assignments to student e-mails hence it is a requirement for every student to open an e-mail address and this is a good sign that ICT is very effective in the management of educational services. Feedback provided to students online in some cases is timely because students and lecturers access free internet".*
> (HOD, Adult, and Community Education)

The interview conducted with the Principal, College of Education and External Studies CEES), revealed that ICT has attracted sponsorship of projects to enhance its implementation:

> *"A good number of lecturers have now picked up the use of ICT in teaching; I would say that about 80% of the lecturers effectively use ICT for teaching using Powerpoint. This has helped improve the teaching techniques. Projects have been written and funded to install ICT through Swedish International Corporation Agency (SIDA) particularly under the Swedish Programme for ICT in Developing Regions (SPIDER) project. Teaching/Pedagogy training offered to four staff in the college to study Diplomas in pedagogy through the use of ICT at the University of Cape Town in South Africa. Every semester 20% of staff get some training in ICT pedagogy locally. Norwegian Agency for Development Cooperation (NORAD) gave aid regarding powered whiteboards stationed in different colleges".*
> (Principal, Education and External Studies)

The Head of the Department of Distance and Lifelong Education gave his ICT experience in the department and indicated the following:

> *"ICT is used in administration in processing student records, student registration online, access of results online, teaching through the computer, for example, PowerPoint for the Bachelor of Commerce and Bachelor of Education which is an external academic programme. Every semester 20% of staff get some training in ICT pedagogy locally. The Norwegian Agency for Development Cooperation (NORAD) gave aid regarding powered whiteboards stationed in the department promoting ICT use. I also wish to say that some lecturers use old pedagogy like giving handouts. Other lecturers use PowerPoint for teaching, especially the young ones".*
> (Head of Department, Distance and Lifelong Education)

Some converse comments did emerge during the field work. The Principal College of Business and Management Sciences (CoBAMS) commented that some of the old staff have no motivation to take ICT courses due to lack of adequate orientation in the field and having specific fears, while the young ones look at the money element before considering taking up ICT training (Nyaga, 2010). In sharing, the views on ICT experience, the Principal said:

> *"I should say very many lecturers have embraced ICT and used PowerPoint for teaching. The senior lecturers are however still holding on to the old ways of teaching without computers. The College of Business and Management Sciences (CoBAMS) has one of the best computer facilities only second to the College of*

Computing and Information Sciences (CoCIS). It is notable that all staff have access to computers. There is access for all staff to print their work".
(Principal, CoBAMS)

Mingaine (2013) revealed that the educational services managers in Kenya, despite the Government National Policy on ICT implementation, have not yet entirely taken it up. In a study carried out by ImpaCT2 (2002) in England which involved 60 schools, educational services managers found ICT provision inadequate to meet the demands of ICT-discrete sessions and the use of ICT in the curriculum, with subject work which should be using ICT, mainly losing out. The field findings from an interview conducted with Head of Department, Social Sciences and Arts Education resonated with these views, which indicated that lecturers had not been provided with laptops and in most cases, used personal laptops for University work:

"There are group e-mails for different classes which have been opened and students find it convenient to use them. Most laptops are personal, and the university has not provided free laptops to the staff, and this slows down the pace of work since not all staff have the laptops. The teaching of online courses is something being developed though not yet fully implemented".
(Head of Department, Social Sciences and Arts Education)

The Head of Department, Economics Theory and Analysis expressed his experience and an interesting one since some lecturers still use old pedagogy:

"I can say that every semester, 20% of staff get some training in ICT pedagogy locally. Most of the lecturers still use the old pedagogy, for example, giving handouts and students need to make copies of that handout. A few younger lecturers use PowerPoint for teaching".
(Head of Department, Economics Theory and Analysis)

In conclusion, therefore, the findings bring out the experiences of educational service managers in their interface with ICT tools. It was revealed that ICT had helped in the management of financial services at UNU University thereby saving on both lecturers and students time. It was also noted that some programmes had been put in place to enhance ICT skills of both lecturers and students.

5.4 THEME 3: IMPROVEMENT OF UNIVERSITY MANAGEMENT THROUGH ICT ADOPTION

The University managers were asked about their opinions on how ICT adoption has improved management at UNU University. The researcher concentrated on management functions such as planning, organisation, supervision, direction, coordination, and budgeting function.

5.4.1 Sub-Theme 1: ICT Contribution to University Planning

In discussing the planning function of ICT in educational institutions, The Deputy Vice-Chancellor, in-charge of Academics expressed of credit to UNU University for ICT adoption and believed it has been instrumental in networking with other universities, both local and international to ensure best practices:

> *"ICT particularly the internet helps our University in coping with other universities in the world. Through it, we learn a lot about what for example is done elsewhere, and from that, we see what best practice we can bring to our institution here. Through ICT, we develop tools used for planning in academic affairs".*
> (Deputy Vice-Chancellor, Academics, UNU University)

Similarly, the Deputy Vice-Chancellor in charge of Finance and Administration gave his opinions on how ICT has contributed to the planning function in UNU University stating thus:

> "*We use ICT in the use gadgets like telephones for communication with staff to plan activities such as meetings with colleges, Bursar's Office or University Secretary. ICT plays a big role in the generation of data, and it is central in helping in coping with other universities. We are also able to benefit from the development of tools used for planning financial and administrative affairs in my case. We learn from each other as you know. ICT even assists us to gain easy access to student financial records, even those of staff discipline, etc."*
> (Deputy Vice-Chancellor, Finance and Administration, UNU University)

As pointed out by Eguavoen (2011), ICT plays a central role in the management of libraries. He noted significant and fast changes occurring in librarianship, where digital and electronic libraries are being established to complement, and in some cases, to completely replace, the traditional libraries. His views corroborate those of the UNU University Librarian. Given the application of ICT across sectors, the University Librarian offers his perspective of ICT in planning in his area:

> *"You see, ICT makes it very easy access to library records in all College Libraries and the University Library. When some books are in short supply, we can easily tell by the use of information provided through ICT use. ICT is very important in generation and storage of accurate data that we rely on managing library services here. Another way of using ICT is that we use telephones for communication with staff to plan activities such as meetings with College library staff. Through ICT, we are also helped to follow trends in libraries of other universities in the world, and we are exposed to ways of planning library requirements".*
> (University Librarian, UNU University)

According to the University Secretary, with the help of ICT, activities are planned such as meetings with human resource staff, University Management, University Council by e-mail, alerts, and short text messages on phone and voice calls He went on to say:

> *"We also use ICT to photocopy, scan documents like work plans which show what we intend to do as University Secretary's office. ICT is useful in making estimates, calculations, tabulating information in programming activities for the department like information on when an employee's leave is due or expiring, etc. ICT helps us to compare with other universities and the development of tools used for planning human resource requirements. We have easy access to human resource records and generate accurate human resource data".*
> (University Secretary, UNU University)

The Academic Registrar also shared his perspective on how ICT has been key to planning:

> *"For us in Academic Registrar's department, we find ICT now as something we cannot do without because it helps us in diverse*

ways. One way is that we use it to generate data and ensure the accuracy of this data".
(Academic Registrar, UNU University)

Finally, confirming the works of Apeanti (2014), and Bora and Teki (2013) the Dean of Students conceded in his submission that ICT has been so helpful in planning:

"First of all, ICT assists us to compare ourselves with other universities and development of tools used for planning student support. We use ICT to draw our programmes for student support in the semester or even year. Additionally, UNU University Guild activities are planned through establishing the number of students at the University in a semester, and we cannot ignore ICT in doing this. Another important use of ICT is that it helps us to establish how much money is available on the guild bank account, and then we say, we can do so much this semester regarding student activities within and outside the University. When it comes to the provision of medical services, we use an electronic card to identify our patients at the University Hospital. In this way, we can say we establish how many students fall sick in a semester or a year on average and be able to stock drugs to meet the patient number. ICT also helps us to determine the number of students to be accommodated in the male and female halls of residence. This is done in conjunction with the Assistant Academic Registrar in charge of admissions. This makes planning for beds, meals and sanitary facilities easy."
(Dean of Students, UNU University)

In conclusion, it can be seen that ICT has been instrumental in supporting planning at UNU University, particularly in communicating to staff and students about meetings but also the generation of data for planning purposes at University level in order to help compete with other universities.

5.4.2 Sub-Theme 2: ICT Contribution to University Organisation

ICT has contributed to UNU University organisation in some ways; The Deputy Vice-Chancellor in charge of Finance and Administration says:

"*ICT ensures speedy management of information and its reliable storage. You must have heard about the ICT systems at the University namely: Financial Information System (FINIS), Human Resource Information System (HURIS) and others. These two*

> *have particularly made things much easier for us in finance and administration. I can receive and send e-mails to the colleges in the office only. It would be prudent if the wireless could be extended home as well so that we can communicate 24/7. The University has so far taken care of my telephone calls whether I am here or abroad. It can still do more. More to that, the University secured modules used for management of financial and administrative records from South Africa that have been very handy of late. There are those that have also been used in the management of academics, library affairs, etc.".*
> (Deputy Vice-Chancellor, (Finance and Administration, UNU University)

The University Bursar had no reservations about the effectiveness of ICT usage in the organisation of University affairs, and she asserted that the University had acquired a module used for management of financial records sourced from South Africa, used in managing student financial information, asset management, and payroll management using packages like PEOPLE MANAGER. PEOPLE MANAGER, she reported, can also provide information on employee date of birth, date of recruitment, and retirement. She further revealed that Microsoft Office Excel is crucial for all reporting because it is accurate and makes computations easy. She pointed out that her office uses ICT in the management of ledger works through which the financial system produces final accounts like balance sheet, cash flow statement and statement of net equity. Accordingly, ICT ensures speedy management of information and has reliable storage (Omona *et al.,* 2010).

She revealed that there is what is called the Navision Financial System, which produces project reports and bank reconciliation statements. In her view, this would not be possible without the support of ICT. Packages like SAGE PASTEL are used to receive and spend money. She further reiterated that ICT systems, notably Financial Information System (FINIS), make work of the University Bursar effortless these days. ICT, she stressed, has also made it easy to transact business like fees payment by students where the student pays, and the information is picked online. She indicated that the student could also access his financial account in the system for details using his/her student number.

The Deputy Vice-Chancellor, in charge of Academic Affairs, mentioned some ways to which ICT contributed in organisation function. He reported that the saviour of many departments had been the introduction of the ICT systems. The University has ICT systems developed, i.e. Financial Information System (FINIS), Academic Records Information System (ARIS), Human Resource Information System HURIS) and Library Information System (LIBIS) have made things easy.

The University Librarian was in support of the University introducing ICT because of its purposes:

> *"Students and staff benefit from e-resources like journals and books at their convenience. This makes things quite easy for everybody. We are also able to process, store and disseminate information through ICT use. ICT helps the University Librarian to receive and send e-mails to the college libraries in the office. The UNU University library has also used the module sourced from South Africa for management of library records. It ensures speedy management of information and its reliable storage. The student or any other user can also access information from the library from any point in the University".*
> (University Librarian, UNU University)

Nchunge, Sakwa and Mwangi (2012) reported on the importance of ICT use in making decisions using the Executive Information Systems (EIS) across organisations in Mexico, Sweden, and the United States. In conformity with these views, the UNU University Secretary said that ICT had helped so much in the organisation function:

> *"I think ICT does a lot in processing, storing and disseminating information. The University Secretary can receive and send e-mails to the colleges in the office. This is very convenient for my operations. The University also secured a module used for management of human resource and financial records sourced from South Africa which is being used in managing human resource and financial information".*
> (University Secretary, UNU University)

The Dean of Students was full of praise for ICT adoption in carrying out the organisation function as reported thus:

> *"You see, now the various ICT systems at the University have organised it into management zones like Financial Information System (FINIS), Academic Records Information System (ARIS), Human Resource Information System (HURIS), and Library Information System (LIBIS), etc. It has made it easy to manage and access services like books in the library. ICT also assists in establishing the number of students to be catered for regarding medical services and staff in the Dean of Students' office like nursing officers, custodians, cleaners, sports coaches and sports tutors, etc."*
> (Dean of Students, UNU University)

The findings showed that ICT has contributed to university organisation particularly in the management of information with its reliable storage, payroll, assets, academic records and management of student financial records.

5.4.3 Sub-Theme 3: ICT Contribution to University Supervision

The University Secretary shared his views on how ICT is applied in the supervision of University matters, leading to accountability, saying:

> *"ICT can help to establish who is doing what, at what time and where using the staff database. It also enables communication with staff to determine their whereabouts. One can do things at his or her pace. It allows the University Secretary to get information regarding the Human resource matters at the colleges and staff issues at the different colleges. There exist some tools for supervision-ensuring accountability regarding university human resource management affairs. ICT enables easy access to information on human resource affairs from various University colleges and departments".*
> (University Secretary, UNU University)

The Deputy Vice-Chancellor in charge of Academic Affairs also found ICT beneficial in its supervision function:

> *"There exist some tools for supervision, ensuring accountability regarding University academic affairs. For example, ICT enables easy access to information on academic affairs from different university colleges, and it enables the Deputy Vice-Chancellor in charge of academic affairs to get information regarding the*

> *academic matters at the colleges and students' academic records and make a follow up where necessary*".
> (Deputy Vice-Chancellor, Academic Affairs, UNU University)

According to Kyakulumbye, Olobo and Kisenyi (2013) and Davis (1993), the level of ICT acceptance in the organisation relies heavily on how the top management views the technological innovation. If it takes it up with open hands, it is likely to be adopted in the organisation, but if it is hesitant to embrace it, the reverse will be true. The UNU University Secretary found ICT vital in running his tasks and outlined some ways ICT has been helpful in doing his work.

> "*We find ICT very useful in our business and there exist some tools for supervision-ensuring accuracy and audit trail. The package called SAGE PASTEL makes supervision in finance very easy because you can use it to detect who is responsible for a mistake in any transaction. SAGE PASTEL also assists in telling the number of transactions executed in a day".*
> (University Secretary, UNU University)

The Academic Registrar also had observed on several occasions ICT being applied in supervision, commenting that ICT plays an important role not only in teaching and learning but also in quality assurance as well as in safety and security:

> *"Yes, there exist some tools for supervision. We gather data on lecturers and courses and analyze it. This contributes greatly to quality assurance within the university. ICT enables access to data and other research resources.*
> *Furthermore, it enables the Academic Registrar to get information regarding the academic matters at the colleges and student issues. The ICT resources available complement teaching/learning and supervision function. Sooner or later, we shall install cameras to enable us to see what goes on in every office under the Academic Registrar's department and so for all other departments as well".*
> (Academic Registrar, UNU University)

The Deputy Vice-Chancellor in charge of Finance and Administration expressed how ICT has effectively been applied in the supervision and control of financial affairs at the University:

> *"We have some ICT tools for supervision to ensure the smooth running of the University regarding finance and administration.*

> *ICT enables easy access to information on finance and administration from different colleges, for example, I can establish how much money comes to a particular college at the University by a click of a mouse"*.
> (Deputy Vice-Chancellor, Finance and Administration, UNU University)

When asked by the researcher to highlight some of the areas where ICT has been applied in supervision, UNU University Librarian responded as follows:

> *"When using ICT, one can do things on his or her own. So, it encourages self-supervision, though you may have some other person to check what you have done eventually I mean, one chooses a pace of carrying out a task by use of ICT. There exist some tools for supervision-ensuring accountability regarding university library management affairs. ICT enables easy access to information on library affairs from different university college libraries. You know, it gives us the ability to network and it allows the University Librarian to get information regarding the library matters at the colleges and student issues at the different college libraries…."*
> (University Librarian, UNU University)

From the above, it can be noted that ICT has been vital in university supervision, particularly with staff accountability and control of finances.

5.4.4 Sub-Theme 4: ICT Contribution to University Direction

Effective communication is vital in a large organisation such as a university, and it is here that ICT also plays a critical role. The University Secretary agreed that ICT is instrumental in communication and direction:

> *"ICT enables the University Secretary to communicate information from the office to colleges quite easily. Staff gets information concerning their needs and welfare like payments, leave and contracts by use of PEOPLE MANAGER in conjunction with Bursar's office. Circulars can easily reach staff not only in the University Secretary's office but also the entire University and even the Council in one second"*.
> (University Secretary, UNU University)

The Deputy Vice-chancellor in charge of Finance and Administration also was in strong agreement that ICT adoption was important in giving direction. ICT is crucial at the University because they prepared policies using it. He pointed out that the University had recently passed 42 policies to provide direction to the University and ease the administration of the University, emphasising that this would not have been possible without ICT. Additionally, he mentioned that ICT makes the Deputy Vice-Chancellor (F/A) able to keep in touch with college principals on a routine basis in as far as finance and administration are concerned.

The researcher probed the Bursar on the importance of ICT in giving direction:

> *"Yes, err….I cannot fail to say that ICT enables the University Bursar to communicate student information, especially regarding finance with college registrars quite easily easing the flow of information to and fro. Students also get information on their fees status; they can tell if they owe the University any fees or not. The ICT system has also been of great value to this office because it enables the division of labour in activities like posting receipts, posting expenditure, reconciliation through FINIS (Financial Information System*)".
> (University Bursar, UNU University)

The Academic Registrar also shared his views on the importance of ICT in giving direction saying that ICT enables the Academic Registrar to communicate student information with college registrars. He stated that through ICT use, students also get information on their registration status, fees status and academic progress status (Adesoji, 2012).

The findings above underscore the role of ICT in giving direction to UNU University, mainly in fostering communication to all its colleges, students and academic staff.

5.4.5 Sub-Theme 5: ICT Contribution to University Coordination

Coordination of University affairs is fundamental to the efficient running of the University. The Bursar agreed that ICT had been applied in many ways in coordinating University activities.

> *"At least here, the department provides internet to all units in the Bursar's office so one can reach them as well as they can reach the Bursar's office. More to that, ICT has created firm contact with the various University units, for example, the Dean of Students, Vice Chancellor, University Secretary and Deputy Vice-Chancellors (DVCs), etc."*
> (University Bursar, UNU University)

The University Secretary, at the centre of coordinating University activities, has reaped significant benefit from the implementation of ICT regarding coordinating his daily work. His views on the importance of ICT use in coordination are supported by the work of Kyalo and Nzuki (2014) and Carnoy (2004) who view ICT as a tool that enhances performance.

> *"The provision of an intranet at UNU University has been key for student and staff to use. The cost of sending and receiving documents has been cut because of using e-mails. The University provides Internet to the Office of the University Secretary and human resource staff, and this makes linkages with the various University departments like estates making it easy to e-mail information and documents. Sending information is faster, one mail to many people at once. Even when we write circulars and memos in hard copy, we still use ICT. Then there is the use of phones to arrange meetings and meet appointments with colleges and members of the management, University Council, etc."*
> (University Secretary, UNU University)

The librarian, regarding coordination of activities in the University Library, is supported by Adeyemi (2011) who reports on the effectiveness regarding the implementation of ICT understanding it as central to the effective functioning

> *"The cost of sending and receiving documents has been cut tremendously. Sending information is faster, one mail to many people at once... you see. Use of the phone to arrange meetings and meet appointments with college librarians in the main library or college librarians has eased operations. The University provides Internet to the office of the University and College librarians. We have linked to the various University library units e.g. librarians of colleges".*
> (University Librarian, UNU University)

The information provided by the Academic Registrar indicated that ICT had helped in bridging the gap between different University departments and this made information sharing so easy. He presented the following views on the use of ICT in the coordination of University activities:

> *"Through ICT, we create linkages of the various university units, e.g., finance department, colleges, Dean of Students, Vice Chancellor, University Secretary, and Deputy Vice Chancellors. This office can also establish the number of students who have not cleared their tuition fees among other types of information. The Academic Registrar's department provides internet to all units in the office so can reach them as well as they can reach the Academic Registrar's office*".
> (Academic Registrar, UNU University)

In conclusion, therefore, the findings above indicate that ICT is crucial in coordinating UNU University with other university units.

5.4.6 Sub-Theme 6: ICT Contribution to University Budgeting

Moyle (2006) discusses the role of ICT in university management of which the librarian is a member. Specifically, on the administration of libraries, Krubu and Osawaru, (2010) underscore the impact of ICT in Nigerian university libraries. The researcher's findings indicated that a university manager, University Librarian was aware of the importance of ICT in budgeting:

> *"We use computer-aided budgets to develop spreadsheets. There exists software for budgeting purposes by the different college libraries in the University. The college libraries enter information into the system, and it is used for budgeting purposes by the University Librarian's office".*
> (University Librarian, UNU University)

The University Bursar found her work of budgeting becoming more accessible with the introduction of ICT. The University has software for budgeting purposes by the different colleges in the University:

> *"Actually, there exists software for budgeting by the units in the University Bursar's office. I may not exhaust these now but you see the colleges enter information into the system and it is used as an aggregate for budgeting purposes by the University Bursar's office*".
> (University Bursar, UNU University)

Ujunju *et al*. (2012) evaluated the role of ICT in the management of institutions of higher learning used mainly in the context of running different campuses of the same learning institution. This would translate into running various colleges at UNU University main campus and its satellite campuses. It is in this light that the Deputy Vice-Chancellor, in charge of Academic Affairs, shared his views on how ICT has been applied in budgeting:

> *"We use the bottom-up system of budgeting where departments or colleges are asked to put together their budgets and send to the Bursar's office. This is again through the ICT system I mentioned earlier. ICT helps us in using the budget frame to fit into government financial limits".*
> (Deputy Vice-Chancellor (Academic Affairs), UNU University)

Regarding the documents reviewed during the study, the UNU University Strategic Framework 2007/08-2017/18 made a tremendous contribution to the management of the University in general terms. Its specific objectives included: harnessing ICTs to improve teaching, learning, research and outreach, increasing access to ICT facilities in the University, improving the capacity of staff and students in ICT use, developing an ICT sustainability strategy for the University, providing faster access to internet services, harnessing ICTs to improve administration and management and leverage ICT to improve marketing and public relations (UNU University, 2007).

As its measure of success, the strategic plan developed the following benchmarks:

- improved staff and student ratios to computers,
- 24hour access to computers and the internet,
- optimal availability of computers determined based on use per unit time,
- ICT facilities accessible and utilised on a regular basis,
- increased number of staff and students with ICT skills,

- number of staff accessing revolving loan for computers/laptops,
- gender mainstreamed in all ICT services,
- ICTs acquired for people with disabilities,
- Academic Records Information System (ARIS),
- Financial Information System (FINIS),
- Human Resource Information System (HURIS),
- automation of all academic and non-academic support services,
- increased use of Information System (IS),
- evidence-based decision making,
- number of technical support trained,
- all units with technical and end-user support and
- Directorate of Information and Communication Technologies Support (ICTS) established.

The other benchmarks of UNU University Strategic Framework 2007/08-2017/18 included increased bandwidth, a cross-cutting course on introduction to computing implemented, number of staff and students trained in ICTs, all staff and students operating with an institutional e-mail account, ICT sustainability strategy developed and operationalised. Also, the staff and students exhibit a high level of motivation for access to Information and technology use, an increased number of courses integrating e-learning modes, ICTs incorporated into distance learning, improved UNU University ranking and increased donations and endowments (UNU University, 2007).

The Ministerial Statement on ICT 2012, which was another document, analysed in the study, identified the following as goals to achieve in the ICT sector in the financial year 2012/2013. These include policies, laws, regulations, and strategies to be developed, policies, laws, regulations and strategies to be implemented/ disseminated and operationalised, implementation of adopted policies, procedures, and regulations as well as promotion and expansion of the ICT project activities. At UNU University specifically, the statement points out government interest in the promotion of the hardware and software development industry through coordinating

and promoting the establishment of the United Nations Industrial Development Organization (UNIDO), Microsoft Incubation Centre for Software Development at the University.

The Ministerial Statement on ICT 2012 indicates that one of the targets for the Ministry for the Financial Year 2012/13 was to achieve last mile connectivity to Ministries, Departments, and Agencies (MDAs), Local Governments (LGS), and priority target user groups (universities, research institutions, hospitals.). The plan also takes care of the Human Resource needs of the country in as far as ICT is concerned through the development of minimum standards for two courses of study in Information Technology (IT) and computing for two undergraduate programmes, including Bachelor of Software Engineering and Bachelor of Computer Science. The statement reports that 548 IT laboratories were completed in higher learning institutions in Uganda by the end of June 2011.

The findings above stress the contribution of ICT in university budgeting in different colleges of UNU University. The documentary review also stresses the contribution of ICT in the development of the country as elaborated by the ministerial statement on ICT 2013 in which the government of Uganda planned to connect ICT in all ministries, departments, agencies, local governments and user groups such as universities and hospitals.

5.5 THEME 4: IMPROVEMENT OF STUDENT LEARNING THROUGH ICT ADOPTION

5.5.1 Sub-Theme 1: ICT Contribution to Self-Directed Learning

The information from the University Librarian reveals that ICT adoption had significantly improved student learning since they can access e-resources:

> *"The University has now made sure that computer laboratories exist in all university colleges. As a University library, we have made sure we have computers where students can access e-*

resources. Computers are used for e-learning I think in all colleges now".

(University Librarian, UNU University)

The Deputy Vice-Chancellor, in charge of Administration, also recognised the contribution of ICT adoption in improved student learning:

"*The main and college libraries have computers where students can access e-resources. Of course, more should be done in this area. Computers are very much used for e-learning; some of the lecture rooms have mounted projectors. Computer laboratories are in every college at the university now. This is very different from what used to be the case 5 years ago".*

(Deputy Vice Chancellor in charge of Administration and Finance)

Findings further indicated that Deputy Vice-Chancellor, in charge of academics, also agreed that the university had provided access and student learning was significantly improved:

"It is done in some ways, but quickly I can tell you that our library has computers where students can access e-resources, making their learning easier. Computers are used for e-learning in almost all lecture halls, and computer laboratories are in every college at the University now".

(Deputy Vice-Chancellor in charge of Academics)

This section indicates that ICT has contributed to self-directed learning among students of UNU University. It was revealed that students were able to access electronic resources for their further reading, which uplifted their academic standards. The University Administration indicated that UNU University had also invested resources in equipping of computer laboratories to facilitate student engaged in self-directed learning using ICT.

5.5.2 Sub-Theme 2: ICT Contribution to Lifelong and Distance Learning

During the interviews, the Academic Registrar shared his view about ICT adoption and its effect on student learning:

> *"I wish to let you know that computer laboratories now exist in all colleges and they are functional. The libraries as well have computers where students access e-resources to support the hard copies of books there. Computers are used for e-learning here".*
> (Academic Registrar, UNU University)

The information provided by the Dean of Students indicated that the introduction of ICT much had been achieved in terms of improving delivery of teaching and learning:

> *"This has been done in some ways. University Management has ensured that computer laboratories exist in all colleges now. The library has computers where students can access e-resources. Computers are used for e-learning in lecture rooms, and some lectures are projected".*
> (Dean of Students, UNU University)

In agreement with scholars like Chee (2006) who presented the implications of advances in ICT for universities in Singapore; Kalema (2013) on ICT utilisation in university enrolments; Osakwe (2013) on impact of ICT on teacher education and professional development; Oviawe and Oshio (2011) on ICT on transforming organizations, the empirical findings from educational services managers at UNU University indicated that ICT had improved student learning because both lecturers and students acquired and developed new skills:

> *"It is very high because lecturers are fully involved in promoting ICT and making students like it also. The University has ensured that computer use or training is compulsory for all first-year students in the first semester such that they learn ICT introductory courses to enable them to be confident ICT users. All assignments are typed and printed or sent in soft copies, no handwritten ones are accepted anymore by some lecturers. E-mail addresses are a must for the all classes, and all academic communication is passed through that from lecturers to students. The class e-mail has a password accessible to students for academic work like coursework and assignments. This I think is a good level of preparedness".*
> (HOD, Nutrition and Food Technology)

The Head of Department African Languages reported that ICT had helped students adopt new ICT technologies, such as social media, that they use on a daily basis

exposing them to current events both locally and internationally. ICT adoption and usage in many forms are reflected in the work of Adeyemi (2011); Daouk (1995) and Goyalet *et al*. (2010). Of interest was the number of staff members accessing online courses:

> *"The students are going into ICT through Twitter, WhatsApp, Facebook and other platforms and they are generally updated on issues. The level of staff preparedness is moderate though increasing because more investments have been made in the area of ICT at the University. A good number of staff are doing online courses to upgrade their studies from outside universities, and this has increased the number of Doctorate degrees".*
> (HOD, African Languages)

The Head of Department Philosophical Studies said that new students received ICT training as well as the lecturers. He, however, cited that some staff were reluctant to take part in ICT training:

> *"Both students and lecturers are prepared on the overall. They all take part in training willingly except in some cases where the staff is reluctant. Introduction to the ICT course is compulsory for all first-year students at UNU University while the lecturers receive refresher training".*
> (HOD, Philosophy and Development Studies)

Nyaga (2010) reports that there is still a keen perception, especially by the older generation, that computers require highly skilled personnel to operate them. However, with ongoing training, the acquiring and developing of ICT is known to enhance the performance of both students and staff.

This section presents the contribution of ICT to lifelong learning and distance learning of students and even university staff. It was revealed that ICT had improved the modes of delivering lectures at UNU University and that the students had also adopted new ICT technologies including social media to be updated on local and international events. There were, however, some academic staff still reluctant to adopt new ICT technologies.

5.5.3 Sub-Theme 3: ICT Contribution to Research

The information provided by the ICT Administrator College of Education and External Studies confirmed that ICT has dramatically improved student learning at the university. These views are anchored on the works of Oguta *et al.,* (2014) and Oluoch and Osida, 2014) who share their findings on the support that ICT provides to students as they learn. The ICT administrator reported that:

> *"There has been a big contribution of ICT to the learning of students at the University. Students have been able to have their research conducted, conduct online education, submit coursework and access information of all kinds".*
> (ICT Administrator, College of Education and External Studies)

Giusy (2007); Oluoch and Osida (2014) and Sarkar (2012) state that ICT adoption benefits students since it contributes to their learning. An ICT administrator in the College of Computing and Information Sciences (CoCIS) shares this view because NUELE helps in knowledge sharing and in supporting lecturers with an increase in student population. He stated thus:

> "*Okay, I can say ICT has contributed to effectiveness in managing educational services at this University. For example, the UNU University E-Learning Environment (NUELE), which facilitates knowledge sharing through forum discussions and avails students with reading materials. Also delivering coursework to students has reduced the burden of lecturers since there is a significant population of students*".
> (ICT Administrator, CoCIS)

The ICT administrator in CEDAT said that ICT had facilitated the sharing or exchanging of reading materials, with the automation of most library services (Krubu & Osawaru, 2010).

> *"Students with the help of ICT tools now find notes, coursework online and they easily reach their lecturers through e-mail and in case the lecturer is not present, he can upload assignments."*
> (ICT Administrator, CEDAT)

In conclusion, therefore, the findings have indicated that ICT plays a vital role in research in that: it improves student research and learning; it facilitates in e-learning and teaching; it helps students in sharing notes, coursework online and accessing emails hence helping students improve their learning and research skills.

5.6 THEORETICAL INTERPRETATIONS OF THE RESEARCH FINDINGS

In this section, two theories - Technology Acceptance Theory (Davis et al., 1989) and Adaptive Structuration Theory (DeSanctis & Poole, 1994) - were adopted to interpret the research findings on ICT and educational service Management at UNU University. These theories show the process by which an innovation such as ICT is widely spread and used in a certain social system (community, organisation or group) to effect desired changes (Sahin, 2006) especially in the management of its specific components, like the delivery of educational services (Surendra, 2001; Zakaria, 2001).

The first theory, Technology Acceptance Theory is one whose primary aim is to assess the perceived ease of use and the perceived usefulness of ICT as a basis for determining its adoption (MacCallum, 2010). The theory was developed by Davis, Bagozzi, and Warshaw (1989) as an adaptation of the theory of reasoned action, explicitly tailored to explaining user acceptance of information technology. It posits that two particular beliefs perceived usefulness and perceived ease of use are of primary relevance for computer acceptance behaviours (Bruner & Kumar, 2005; Davis *et al.,* 1989). The perceived usefulness belief shows that people tend to use or not to use an application depending on how they believe it will help them perform their job better (Huang & Liaw, 2005). Also, perceived ease of use approach posits that even if potential users believe that a given application is useful, they may, at the same time, believe that the adopted ICT is too hard to use and that the effort of using it outweighs the performance benefits of usage. To this end, therefore, in addition to perceived usefulness, usage is theorised to be influenced by perceived ease of use (Chang & Cheung, 2001).

The Technology Acceptance Theory maintains that innovation should be easy to use, to translate into the desired results (Lee, Lee & Kwon, 2005). The theory asserts, therefore, that acceptance of ICT is vital because the expected benefits such as usage and gain in efficiency, effectiveness, or productivity, cannot be realised if individual users do not accept ICT for task performance (Bhattacherjee & Sanford, 2006). Technology Acceptance Theory has been widely used in the educational setting to determine the adoption of instructional technology by educators and students (Huang *et al.,* 2007). This theory relates to the findings of the study in a way that most of the educational services managers point out that ICT has eased their operations regarding reducing effort in delivering messages from office to office. The University Librarian, for example, does not have to send hard copies of memoranda to the senior or junior offices, she can use email. Additionally, the technology helps in keeping in touch with other universities globally so that UNU University continues to be in tandem with them in all aspects of university library business.

The second theory adopted for the study is the *Adaptive Structuration Theory (AST)* postulated by DeSanctis and Poole (1994). The theory was based on the tenets of structuration theory by Giddens (1984). The Adaptive Structuration Theory posits that a social system (such as an organisation like a university) can be understood based on the analysis of the nature of its structure and agency (Giddens, 1984; Pavlou & Majchrzak, 2002; Workman et al., 2008).

The Adaptive Structuration Theory (AST) is essential in understanding how a social system changes because of the interaction of its structure and agency. Social systems often change because of member use of rules, procedures, processes, and resources in interaction (MacCallum, 2010; Stillman, 2006). To this end, therefore, AST was applied to study the changing structure and agency of UNU University since the introduction of the use of Information Communication Technology (Wang *et al.,* 2010).

The Adaptive Structuration Theory argues that organisations that adopt ICT for their work, dynamically create perceptions about the nature and utility of the selected ICT

(Zhu & Kraemer, 2005). These perceptions influence the way technology is used, thereby affecting the outcomes of the technology. The impressions are created by the type and usefulness, or contribution of the introduced ICT to the human activities carried out in a social system (Matovu, 2009; Rao & Perry, 2003). The perceptions are also based on the technological context of the social system and indicate the level of satisfaction that the adopted ICT yields to the members of the social system as far as realising expected changes in the system's processes and outcomes are concerned (Stillman, 2006).

5.6.1 Theme 1: Provision of Access to ICT and Facilitation Of Educational Services Management

The Technology Acceptance Theory has been widely used in the educational setting to determine the adoption of instructional technology by educators and students (Huang et al., 2007). This theory relates to the findings of the study. One example is the submission of the Coordinator of the UNU University E-Learning Environment, who is considered as an ICT administrator in this study. He testifies that the University has in place hardware, which includes computers, projectors, printers, and scanners, and software, which includes Wireless access points, (NUELE), all of which enable interaction between lecturers and students. He further mentions the Directorate of Information and Communication Technologies (DICTS), which coordinates all ICT tools such as Human Resource Information System (HURIS), Academic Resource Information System (ARIS), and Financial Information System (FINIS) at the University. Also, there is the module used for management of academic records sourced from South Africa, used in admission, registration and marks, calculation of GPA and CGPA as proposed in the Technology Acceptance Theory. Finally, UNU University has adopted Information System software such as Library Information System (LIBIS) used in handling an educational service and managing the library services.

On the other hand, Adaptive Structuration Theory (AST) was applied to the study due to the changing structure and agency of UNU University. This is because UNU University was able to introduce ICT and scale it up in various colleges and

administration blocks (Wang *et al.,* 2010). This is evidenced and well stipulated in the UNU University ICT policies for 2005-2009 and that of 2010-2014. According to the tenets of Adaptive Structuration Theory (AST), UNU University educational service managers have understood the role of technology and consequently, have adopted it in automation of specific functions within the university system (Poole & DeSanctis, 2004; Zhu et al., 2006). For instance, UNU University management has changed the way it conducts certain operations. Many services such as communication, administration of tests, establishing account bank balances, checking student progress to mention, but a few have been significantly simplified.

5.6.2 Theme 2: Perceptions and Experiences of the Effectiveness of ICT Implementation

The Adaptive Structuration Theory used the perceptions of organisational members who interacted with the introduced ICT to analyse its (ICT's) role from two perspectives:

1) the types of ICT equipment (hardware) and programmes (software) adopted to automate the structure of an organisation and
2) how the selected ICT was used and how it enabled members to realise expected outcomes (Matovu, 2009).

This way, AST establishes the role of ICT regarding the installed ICT equipment and programmes, the ICT services that the adapted equipment and programmes are perceived to provide, and the perceived contribution of these services to the likely improvement in organisational processes and the outputs (Janardhanam *et al.*, 2011). AST advances further that the findings obtained from the conducted analysis can then be used to develop strategies regarding how members may use ICT better for better ends (Stillman, 2006).

In this case, the Adaptive Structuration Theory helps us to look at how UNU University has changed positively in the way that it conducts its operations due to the adoption of ICT. The Principal of the College of Business and Management Sciences

(CoBAMS) says that although the adoption of ICT was a novel idea, UNU University embraced it. He pointed out that the UNU University E-Learning Environment (NUELE) was boosting the teaching and learning process in his college. The Principal in his submission boasted about his College as one of the best computer facilities only second to the College of Computing and Information Sciences (CoCIS) at the University. He revealed that all staff at his college had access to computers and could print their work. He also added that the Norwegian Aid in Development (NORAD) had given aid regarding powered whiteboards stationed in different schools.

The researcher identified these benefits of ICT innovation through his interaction with the various officers of the University and educational services managers. Taking the above into account, the theory was selected by the researcher as the best to underpin this study.

5.6.3 Theme 3: Improvement of University Management through ICT Adoption

Technology Acceptance Theory is of paramount importance regarding the way in which the adopted technology, that is, ICT is used to improve an organisation's or university's management. The institution's or university's management, if it deems the technology necessary to ease the institution's or university operations, will embrace it but if it does not, will reject it and this will have an adverse effect on the institution's or university operations (MacCallum, 2010; Bruner & Kumar, 2005; Davis *et al.,* 1989). It is quite clear that the management activities of an institution or indeed of a university in today's world will demand some automation in order to ease, if not speed up, the activities that are carried out on a daily basis. These activities range from planning, organising, supervising, coordinating, directing, and budgeting.

For instance, University Managers especially the Academic Registrar, University Secretary, and the University Bursar now use ICT in university planning, budgeting, and supervision. Telephones and emails are used to communicate with staff to plan for activities and meetings. ICT is used in staff payroll management, and it makes

supervision easier since it shows where the staff are, what they are doing and at what time. Similarly, Technology Acceptance Theory helps to explain how ICT is used by the Dean of Students to draw student programmes for the academic years as well as establishing student numbers to be accommodated and fed in the halls of residence at UNU University.

As for the Adaptive Structuration Theory, which underpins the study, its focus is on the perceptions of the technology adopters. These perceptions influence the way technology is used, thereby affecting the outcomes of the technology (Matovu, 2009; Zhu & Kraemer, 2005; Rao & Perry, 2003). The views of the Deputy Vice-Chancellor (Academics), Deputy vice-chancellor (Finance and Administration), the University Librarian, the University Secretary, the Academic Registrar, and the Dean of Students all testify to this fact.

5.6.4 Theme 4: Improvement of Student Learning through ICT Adoption

Both Technology Acceptance Theory and Adaptive Structuration Theory explain how ICT adoption has brought about an improvement the student learning at UNU University. Firstly, the Technology Acceptance Theory considers the way in which an adoption is accepted by an institution, and this is relevant to the improvement of student learning.

In this aspect, students at UNU University undergo ICT training in their first year of university education, they then continue to be taught through ICT, are examined using ICT and regularly present their assignments by typing in Microsoft word and sending it to their lecturers through email for them to read and mark (Davis *et al.,*1989).

On the other hand, the Adaptive Structuration Theory, which deals with perceptions of the technology adopters, also explains how ICT adoption has brought about an improvement in the student learning at UNU University. Evidence from the qualitative data collected showed that ICT adoption enabled student learning. For example, the Head of the Department of Nutrition and Food Technology testified that students and

lecturers for sending and receiving work continually, use ICT for research. The ICT administrator from the College of Computing and Information Science states that KOHA, an online library service avails student with an online portal for them to access notes. He also adds that UNU University E-Learning Environment (NUELE) helps lecturers to update notes for their respective course units and students can download at their convenience, upload assignments, and download assignment results. Also, the UNU University Librarian in her submission to the researcher's question, states that students and staff benefit from e-resources like journals and books at their convenience making things quite easy for everybody. According to her, the student or any other library user can access information from the library from any point in the University.

5.7 CONCLUSION

The chapter began with an introduction to the objectives captured in the qualitative data collection. The chapter then presented details of the interviews, which the researcher conducted with the ICT Administrators, Heads of Department, Deans of Schools, Principals of Colleges and the University Management referred to as the Officers of the University. These interviews were mainly aimed at depicting the ICT tools that UNU University has installed and are being accessed in the management of educational services. Also, perceptions and experiences on the effectiveness of ICT implementation at the University and suggestions on ways of improving ICT use to make it as useful as expected were also sought. The findings from the interviews with the officers of the University also referred to as University Management, showed how the University Management and delivery of student learning had improved due to the adoption of ICT at the University.

The chapter further presented an embedded analysis of documents regarding the Information and Communication Technology Policies and Master Plan Phase 1 and Phase 2 (2005–2009) and the ICT Policy and Master Plan (2010-2014) of UNU University. It also presented analysed information from the UNU University Strategic Framework 2007/08-2017/18, UNU University Information and Communication Policy and Master Plan of 2001 as well as the Ministerial Statement from the Ministry

of Information and Communications Technology 2012/13. These policies and statement were discussed along with the themes of the study, together with the qualitative data derived from the interviews.

CHAPTER SIX
RECOMMENDATIONS AND CONCLUSION

6.1 INTRODUCTION

The purpose of this study was to analyse the contribution of ICT to the effectiveness of the management of educational services at UNU University (pseudonym). The chapter presents a summary of the research design, methodology, conceptual framework, results, and findings. It also presents reflections on the methodology, recommendations, and scholarly contributions of the study as well as the conclusion, recommendations and suggestions for further research.

6.2 SUMMARY OF RESEARCH DESIGN AND METHODOLOGY

This study adopted a nested mixed methods study design by combining both quantitative and qualitative data collection methods. This study design is hinged on the rationale of eclecticism and pragmatism in that it permits the use of multiple methods of data collection and analysis. It further dispels methodological orthodoxy and advocates for methodological appropriateness and triangulation as the basis for judging methodological quality. It, therefore, supports the use of pluralistic research methods and strategies, thereby facilitating the researcher to overcome the inherent weaknesses of using any one method (Willis, 2014). The design is in conjunction with the rationale of Newhouse's (2002b) framework for articulating the impact of ICT adoption in the management of universities.

6.3 SUMMARY OF THE CONCEPTUAL FRAMEWORK

A schematic framework for ICT adoption in university management by Newhouse (2002b) was adopted. This framework was used to analyse the contribution of ICT to the effectiveness of the management of educational services at UNU University. The following dimensions guided it; students' dimension, learning environment/pedagogic practices, lecturer/manager professional ICT attributes university ICT capacity and university environment. Primary data on each of the above dimensions were

collected using questionnaires (for lecturers and students) and interview schedules (for ICT administrators and educational services managers). Also, review of relevant ICT documents such as the UNU University Strategic Framework 2007/08-2017/18, the University ICT Policy (2005), and University ICT Policy and Master Plan (2001).

6.4 SUMMARY OF RESULTS AND FINDINGS

This section deals with both summaries of quantitative and qualitative data. The study aimed at establishing the following: nature of ICT installed and accessed at UNU University, the perceptions and experiences of educational services managers on the effectiveness regarding ICT implementation, the effect of ICT on management and student learning at UNU University and the suggestions by stakeholders on how to make ICT as efficient as expected by them. The study had two main research questions;

1. What is the nature of ICT adopted at UNU University?
2. What role does ICT play in enhancing the effectiveness of educational service management at UNU University?

The two key research questions were approached by answering the following specific research questions:

1. What is the nature of ICT adopted at UNU University and to what extent has it facilitated the management of educational services?
2. How do educational service managers perceive and experience the effectiveness regarding the implementation of ICT at UNU University?
3. How has ICT adoption improved management and student learning at UNU University?
4. How can ICT be used to improve the management of educational services at UNU University?

Data collection was done among 374 students, 323 lecturers, and 57 critical informants among ICT administrators, educational services managers and university

managers. Students and lecturers were selected from six colleges: College of Business and Management Sciences (CoBAMS), College of Engineering, Design, Art and Technology (CEDAT), College of Agricultural and Environmental Sciences (CoAES), Computing and Information Sciences (CoCIS), College of Education and External Studies (CEES). The results and findings of the study are summarised under each research question as indicated below.

6.4.1 Specific Question 1: The Nature of ICT Installed and Accessed at UNU University

The study results indicated that provision and access to ICT equipment had been considered vital in UNU University; for instance, 75.4% of the lecturers interviewed said that they used ICT projectors while lecturing. Results from descriptive data for students indicated that the whiteboard (19.6%) was the most accessed and installed hardware across the University. Most lecturers used Microsoft Access (19.0%) and Result Management System applications to manage educational services (15.3%) at the University. Similarly, scholars have asserted that ICT is crucial in the delivery of lectures, giving coursework and testing exercises to students, directing student research, and preparing them for an internship (Nabwire, 2008). From the field results, the majority of the respondents (75%) agreed that lecturers use internet facilities to deliver lectures to students. Likewise, Layzell, (2003) confirms that academia and internet are mutually related since internet supplements education; for instance, use of internet facilities helps in accessing academic materials such as reference books, journals, periodicals, and newspapers.

Some scholars have asserted that computers and the internet complement each other to form powerful and essential educational tools, which have made teaching and learning virtual, secure and efficient (MacCallum & Jeffrey, 2009; Pedersen, 2003). This was in agreement with the study findings, where 45% agreed that students could interact academically with their lecturers through virtual teaching and learning at UNU University.

The results showed a majority of the respondents (72.1%) agreed that students with mobile phones are enabled to use the phones, access lecture notes, and any academic instructions from their lecturers. Likewise, some studies conducted indicated that mobile ICT facilities like mobile telephone sets have made a significant contribution to teaching and learning through accessibility (Carlsson, 2006).

Results showed that the majority of the respondents (58.5%) were not sure if lecturers assigned to supervise students on research programmes use e-mail to facilitate their supervisory interaction with the students. In contrast, the reviewed literature indicated that ICT is used in supervising, overseeing and following up the execution of planned tasks, programmes, responsibilities, and activities to ensure that they are conducted as per plan (Gomez-Mejia *et al.,* 2008; Kasenene, 2003).

According to the qualitative findings, the ICT tools provided by UNU University were used for both teaching and management functions. It was found out that some ICT tools have been adopted in various academic units of the university; that is, the installation of software for teaching and others for administrative functions. According to the findings, it was clear that ICT had improved management of educational services in UNU University. It has helped to teach students with no prior computer knowledge to acquire and develop skills. In addition, through online services students accessed notes, lecturers updated notes, while students downloaded assignment and results. Students also used the Internet for research, conducting online teaching and submission of coursework.

The study findings revealed that UNU University adopts several ICT tools for both teaching and management functions. For instance: Sun Systems, International Business Management (IBM) servers, Hewlett Packard (HP) servers, Unix/Linux operating systems, Microsoft Windows Operating Systems, UNU University E-Learning Environment (NUELE), Human Resource Information System (HURIS), Academic Records Information System (ARIS), Financial Information System (FINIS), Library Information System (LIBIS), Computers, Projectors, Switches, I-max Printers, Publisher, Metrics, Textonics, Fiber optics, Visual Studio, Python, MySQL, Workbench, PHP and Adobe.

These ICT tools are developed to facilitate the management of educational services such as teaching, lecturing, research, provision of library information, and others that support learning (James & Hopkinson, 2009; Bennett & Bennett, 2003). Examples of ICT tools reported in the literature include Data Communication (DC) tools, Electronic Performance Support Software (EPSS), Computer Managed Learning (CML) systems, and personal computers such as laptops, monitors, desktops and CPUs. Other ICT tools included: databases, CD-ROMs, MS internet information server, electronic mailing, networked information services and Universal Resource Locators (URL).

According to a number of studies, ICT tools can also include access from home, shared curriculum resources, video-conferencing facilities, handheld mobile telecommunications facilities, library services management, personal digital assistants, mobile telephones and MP3 players and radio, television (Carlsson, 2006; Kwon & Chidambaram, 2000; MacCallum & Jeffrey, 2009).

A review of various studies suggests that installing ICT facilities such as internet-connected desktop computers and institutional cyber cafes, Local Area Network (LAN) and Wireless Area Network (WAN), Domain Name Service (DNS), proxy servers, firewall, e-mail connectivity, and e-learning programmes improves the quality of learning in universities (Akubuilo, 2007;Akuegwu *et al.,* 2011; Bassey, Akuegwu & Udida, 2009).

6.4.2 Specific question 2: Perceptions and Experiences of Educational Services Managers on the effectiveness of ICT Implementation at UNU University

On the perceptions of the University lecturers towards ICT access and utilisation at the University, results revealed that most of them (78.0%) agreed that ICT-based sources of information are in place, 80.7% believed that UNU University has online facilities, while 71.5% reported that internet facilities that support searching through World Wide Web, and (67.8%) said that there are online facilities by which lecturers can network with Universities for purposes of internationalising the curriculum

content. According to the Head of Department in the School of Distance and Lifelong Learning, there was a definite perception that ICT had played a prominent role in the effectiveness of learning at UNU University. It was, however, noted that there is still much to do to make it useful. The Dean School of Education shared her perceptions on the ICT progress indicating that the implementation of ICT has been successful in various colleges since the ICT facilities function independently. The Dean, Margaret Trowel School of Industrial, and Fine Arts noted how ICT had helped them to develop graphics to ease the art and design work instead of manually creating the graphics.

The Dean, School of Food Technology, Nutrition, and Bio-Engineering observed that UNU University had undergone ICT training to improve ICT implementation; for instance, it was made compulsory to teach all first-year students computer techniques. Besides, the Dean School of Computing and Information Sciences believed a milestone had been achieved, and courses had been developed to suit the current ICT needs. There was, however, no policy yet on online courses by UNU University, although it had been proposed.

The Head of Department in the School of Distance and Lifelong Learning ICT had played a significant role in the effectiveness of learning at UNU University. On the experiences of respondents about the effectiveness, the Principal of the College of Computing and Information Science (CoCIS) observed how ICT had helped in settling complaints among students as soon as possible; for instance, financial management aspects, updating of students results, tracking the academic progress of students as well as printing of testimonials.

According to the reviewed literature, most of the perceptions reported were from teachers and students, and few came from the educational services managers. A study by Deaney *et al.* (2003) carried out in Britain, focused on pupil perceptions on the contribution of Information and Communication Technology to teaching and learning in the secondary school. The study showed that pupils valued ICT tools as enabling them to carry out academic tasks easily, rapidly and reliably, yielding results of high quality.

In a different study conducted by Akpan (2014), it was found that on average, teachers felt that ICT had helped them to increase their classroom efficiency. They also discovered in their study that teachers' perception of their increased job efficiency was associated with the level of ICT competence possessed by the teachers. This finding suggests that ICT is effective in educational services delivery to students.

Alharbi and Drew (2014) conducted a study on using the Technology Acceptance Model in understanding academics' behavioural intention to use Learning Management Systems in Saudi Arabian schools. They discuss how important the educational services managers in this country consider ICT use as a vehicle for effective and efficient teaching and learning tool, the low levels of the technology so far notwithstanding.

6.4.3 Specific question 3: ICT Adoption and Improvement of University Management and Student Learning

The study results revealed that ICT has numerous effects on UNU University management for instance ICT had helped in settling complaints among students as soon as possible for instance financial management aspects, updating of students' results, tracking the academic progress of students, as well as printing of testimonials among others.

There were also reports of belonging to class group e-mails being mandatory to all students for them to have updates from lecturers and university administration. The feedback provided to students online in some cases is timely because students and lecturers access free internet. Research supervision is done in no small extent on line and meeting student under supervision is done only when there is a great need to do so hence helping lecturers to cope with significant numbers of students to supervise.

However, it was found out that some of the students could not cope with the latest technological innovations since most of them were not exposed to ICT before. The Head of Department, Economics Theory and Analysis expressed his experience by stating that some lecturers were still using old pedagogy. For instance, he cited giving handouts to students by lecturers was still practised and that a small proportion of the university staff had attained training in modern ICT pedagogy locally particularly in the use of PowerPoint and demonstrations in teaching. This is in support of the UNU University ICT policy that aims at improving both the efficiency and effectiveness of university operations for instance through the implementation of an integrated on-line Library Information System (LIBIS).

In line with the study findings, the reviewed literature presents several effects of ICT on University Management. For instance, Moyle (2006) in Australia focused on the role of ICT in the library. The participants consistently mentioned the physical spaces of libraries and resource centres and the roles of teacher librarians. She delineates that libraries and resource centres are growing to include a range of electronic and digital resources. On the use of ICT in the provision of student support services which is one of the functions of University management, Anyamene *et al*. (2012) show the significant positive impact of ICT on counselling among Nigerian University students. A review of various studies suggests that university managers (officers of the university) and managers of educational institutions at various levels different consider ICT a tool that will enhance their performance and that of the other stakeholders in the university system (Emmanuel & Sife; 2008; Mbwete, 2013; Oboegbulem & Ochai, 2013).

Findings from the university managers revealed that ICT was very important in planning for the university. It mainly helps the university to cope with other universities around the world through the adoption of best practices. The Deputy Vice-Chancellor in charge of Finance and Administration noted that ICT gadgets like telephones are used in communication with staff to plan for activities such as meetings with colleges, Bursar's office, or even University Secretary. The University Secretary reported that ICT was used to photocopy, print, and scan important documents, for instance, the strategic plans of the University.

ICT has assisted the University management in the organising function in some ways. This has ensured speedy management of information and its reliable storage for instance through Financial Information System (FINIS) and Human Resource Information System (HURIS). The University Bursar indicated that UNU University had procured a module used for management of financial records from South Africa, which is used in managing student financial information, asset management and payroll management using packages like PEOPLE MANAGER. ICT is also very useful in processing, storing, and disseminating information at the University.

On ICT contribution to University supervision function, the study findings indicated that ICT was very instrumental in establishing who is doing what, at what time and where using the staff database hence enabling communication. It enables the University Secretary to get information regarding the Human resource matters at the colleges and staff issues at the different colleges thus ensuring accountability. The package called SAGE PASTEL makes supervision in finance very easy because one can use it to detect who is responsible for a mistake in any transaction and many other functions.

From the findings, it was found out that ICT was very crucial in giving direction to UNU University for instance 42 policies were made and passed by the University with the help of ICT. Findings from the University Bursar indicated that ICT had helped in coordinating all the staff in the Bursar's office using the internet as well as linking up with other university units like the Dean of Students' office and University Secretary Office. This was made possible through the usage of intranet among the staff. There is also the use of phones to arrange meetings and meet appointments among the university staff.

ICT contribution to University budgeting function was very significant. For instance, findings indicated that University managers like the University Librarian and Bursar were aware of the importance of ICT in budgeting. It was also found out that the university uses the bottom-up system of budgeting where departments or colleges are asked to put together their budgets and send to the Bursar's office using ICT.

Besides, as revealed by the Deputy Vice-Chancellor in charge of Academic Affairs, ICT helps in using the University budget frame to fit into government financial limits.

On the effect of ICT on student learning at UNU University, it was found out that students could use ICT to assist them in conducting research and accessing coursework. It was found out that students access the internet using their smartphones and whole microphones to enhance student learning at the university. The study findings reveal that the effect of ICT on student learning at UNU University has been enormous. Currently, the University administrators have established computer laboratories in all colleges, and they are functional. This has eased access to e-resources including class notes, journal articles as well as reports. Besides, UNU University has introduced compulsory training for first-year students in ICT Techniques to enable them to be confident ICT users. The students are also utilising social media as a source of information as well as sharing of class notes mainly through Twitter, WhatsApp, Facebook, and other platforms. Today, the students with the help of ICT tools find notes, coursework online and they quickly reach their lecturers through e-mail and other ICT tools.

According to the literature review, Daniels (2002) observed that ICT equipment, programmes, and services had become a core part of education because of the role they play in facilitating reading, writing, and numeracy. ICT significantly improves the teaching and learning methods used by teachers by making them faster, integrative, interactive, and giving way to new scenarios, which favour both individual and collaborative learning. Medlin (2001) found out that there was a significant effect between the new adopted electronic technologies and classroom instruction. Medlin discovered, however, that this effect is influenced by decisions that educational managers as to the use of ICT and that the decisions were themselves significantly affected by factors such as personal interest in the use of ICT, the influence of friends, mentors, peer support, and students' response. He also discovered that the effect of ICT was influenced by organisational variables such as physical resource support and mandates from a university governing and management body.

The study findings among ICT administrators in the various colleges studied revealed that one of the ways of improving ICT effectiveness is by setting aside a budget for ICT and buying more equipment as suggested by ICT administrator from the College of Computing and Information Sciences (CoCIS). Others holding this view were ICT administrators from the College of Education and External Studies (CEES) and College of Computing and Information Sciences (CoCIS). In addition to what has proposed above, the ICT administrator in the Margaret Trowel School Industrial and Fine Arts suggested that UNU University should lobby for ICT donations, funding and skilling staff as a way of improving ICT effectiveness. This position was shared by a colleague of his from the School of Liberal and Performing Arts who went further by stating that for ICT to be efficiently implemented at UNU University, the Government of Uganda should eliminate taxes on ICT related equipment.

Another important category of respondents who made suggestions on how to improve ICT effectiveness are: the Principals, Deans of Schools and Heads of Department. They are also referred to as Educational Services Managers in this study. This is because they carry out managerial duties but at the same time teaching in the units under their jurisdiction.

The Principal of the College of Education is one of the key informants in the interview who provided important views on how he thought the ICT effectiveness would be improved through securing i-Pads, projector installation, as well as giving students enough time in computer laboratories. The Director UNU University E-Learning Environment (NUELE) suggested that some lecturers be sent for training in ICT. Lastly, he mentioned that the University should enforce training in ICT among staff and not leave them to choose whether to train or not.

Deans of Schools of the University were also significant contributors to the data relating to suggestions on improvement of ICT effectiveness. Up to twelve deans participated in the study by responding to the interviews scheduled to solicit responses to these suggestions. The Dean of the School of Education suggested the need for the University to address the challenge of inadequate bandwidth and

training of ICT staff as well as buying staff laptops, and installing of projectors. The Dean of the East African School of Library and Information Science proposed buying generators and upgrading the computer laboratory. The Dean of Margaret Trowell School of Industrial and Fine Art, proposed a partnership between government institutions and the university so that the University could benefit from sharing expertise and equipment related to ICT.

Heads of department are yet another essential category that contributed useful suggestions on ways of improvement of ICT effectiveness at UNU University. A total of 38 Heads of Department participated in the interviews conducted during the study. The Head of the Department of Distance and Life Long Education suggested that the University should secure cheap ICT facilities and assist lecturers in securing i-Pads to use for teaching. He further suggests as Oliver (2005), and Rudd (2001) do the installation of more projectors, training of staff in ICT, providing students with more access time to the internet, increasing electronic communication among staff and providing the department with a generator. He supports the idea that ICT staff should be paid more salary, motivated to go for further studies and be retained in service. He also feels that there is a need for more ICT staff to be recruited to match the ever-increasing number of students who need to be taught how to use ICT.

The Head of Department of Social Sciences and Arts Education suggested compulsory periodic training of staff in ICT, constant updating of software, better pay for ICT staff, increased funding for the ICT Directorate, purchase of more projectors and providing students with more access to the internet. The Head of Department, Economics Theory and Analysis proposed modernising the lecture rooms to accommodate ICT teaching and learning. More suggestions on ways of improvement ICT effectiveness were presented by the Head of Department, Architecture and Physical Planning included integration of ICT in all university activities and subsidisation of the price of laptops.

University managers also made some recommendations on the improvement of ICT effectiveness. For instance, the Deputy Vice-Chancellor (Finance and Administration) said that the University needed to motivate ICT staff, provision of

modems or laptops to lower cadre staff as is done to senior staff and provide quicker bandwidth. He also mentioned that the Government of Uganda needs to prioritise higher education by allocating more funds. Additionally, the Deputy Vice-Chancellor stated that the University should provide wifi in all important offices, introduce ICT in the management of different departments, enforce ICT policy for all staff to be computer literate and procure more modern ICT equipment and computers for all teaching and administrative departments.

The Deputy Vice-Chancellor (Academics) also suggested the need for Government of Uganda to raise fund allocation to higher education to 1% from the current 0.3% of the country's Gross Domestic Product (GDP). Bakia, Murphy, Anderson & Trinidad (2011) cite government efforts in this regard in countries such as Australia, Canada, Estonia, Israel, Japan, New Zealand, Portugal and South Korea. The university academic staff recommended refresher courses in the latest ICT applications among others was proposed as one way to improve the role of ICT in the management of educational services at UNU University (Alhawiti, 2013). Other academic staff recommended continuous training and provision of computers to every student as earlier recommended by other studies (Adomi & Kpangban, 2010). Others opted for the hiring of committed and competent staff. Other suggestions on improvement of ICT effectiveness by academic staff included: upgrading software and hardware facilities, providing standby generators to colleges without any, purchasing of enough ICT tools. Also, there was a suggestion of capacity building for both students and lecturers on ICT use (Hudson & Porter, 2010), providing a computer to every student, enforcement of the ICT policy in teaching, setting up of computer laboratories and provision of internet connectivity in the whole University.

6.5 REFLECTIONS ON METHODOLOGY

This study was conducted at the main campus of UNU University though it had several campuses around the country. The Main Campus was selected because it is where the majority of the University students and lectures are situated. Besides, the major ICT centre and the Faculty of Computing were situated at the main campus of UNU University. Therefore, all the information needed to accomplish the study was

easily accessed at the Main Campus of the University hence the study provided representative findings.

In the study, dependability was ensured by reporting accurately all the data provided by the selected ICT administrators, educational services managers (Principals, Deans, and Heads of Department) and University managers and interpreting the data logically within the context of the study.

Also, confirmability was ensured by clarifying with respondents what they were saying to ensure that it was written or spoken as accurately as intended, reporting it without changing the intended meaning. For those who did not mind, recordings of their voices were done in the course of the interviews. In addition to the above four constructs observed in this study for purposes of ensuring that the designed interview schedule yielded reliable data, reflexivity was also ensured. Reflexivity refers to the researcher's acknowledgement of his or her role and influence on respondents. The researcher kept his influence as minimal as possible by encouraging respondents to answer in writing instead of using a face-to-face medium. The researcher tried as much as possible to respect the independence and freedom of the respondents throughout the data collection process at the University.

The study covered one university, implying that its findings may be limited regarding statistical generalisation. What is happening at UNU University may not necessarily apply to other universities and educational institutions in Uganda and beyond. Despite the above, the findings present a big picture of the ICT implementation in the management of university education and its contribution.

The fact that UNU University did not keep records regarding where its students went after graduation implies that it was difficult to cover the views of the students after university education. This limited the study regarding covering a wide range of stakeholder views regarding the effectiveness of educational service management at the University as far as meeting stakeholder expectations was concerned. However, this category of respondents was outside the study scope hence the study findings were representative enough in line with the study objectives.

Many factors affect the management of educational services at a university like UNU University. These include among others; lecturers' motivation and commitment, students' cooperation and willingness to use the services as expected, the financing of the university, and top management support. There was however need to refocus the study on the contribution of ICT to the effectiveness of the management of educational services at UNU University hence some of the above variables were not covered in this current study.

The researcher had challenges in data collection where respondents would lose questionnaires and had to ask for others, which were costly to reproduce. This was overcome by printing additional questionnaires for distribution to the respondents — also meeting officials in University Management, colleges, schools and departments involved re-scheduling appointments several times. There would always be excuses of having to attend meetings, workshops, and seminars sometimes outside the country. This made the data collection exercise tedious. Despite this, the researcher sent phone message reminders to the informants a day before the actual appointment, which made them honour the interviews at their own convenient time. This stretched data collection beyond the planned period.

6.6 RECOMMENDATIONS

From the study results, the researcher recommends the following in the order of research objectives:

This study presents numerous ways in which ICT adoption at UNU University has simplified educational management including the teaching of students and the overall management of university administration and students. Local, continental and international scholars can share the lessons learnt in ICT usage and has it has transformed the functioning of UNU University. This can help other universities to replicate the different ICT software and hardware as found out in the current study.

In order to further strengthen ICT utilisation, there is a need for investment in more ICT infrastructure at UNU University. The University should have an annual budget

to purchase more ICT tools for instance projectors, computers, and other accessories. There is a need to get new computers after every four years and increase the security in the computer laboratories to prevent computer parts from being stolen.

There is also a need to carry out more training on how to use ICT tools at all levels, that is for staff, students, and ICT technical staff. This will equip them on how to use the ICT tools hence in learning. There is also a need for training students on how to use computers and other ICT technologies better.

UNU University management should lobby for donations, funding and encourage proposal writing so that money can be secured for development of ICT. University colleges should establish grant and partnership offices to coordinate the lobbying and management of ICT grants within the university. This will ensure that such funds are appropriately utilised primarily in the implementation of ICT facilities within UNU University.

UNU University still has a long way to go to improve the implementation of ICT through many avenues such as; buying of standby generators since the university frequently experiences load shedding, increasing on the bandwidth, building of more computer laboratories and expansion of existing ones, provision of laptops to both lecturers and administrators.

The researcher suggests the following areas for further research; funding and sustainability challenges in ICT at UNU University, ICT and management of libraries in Ugandan universities, ICT and human and financial resource management in higher education institutions in Uganda, ICT academic records management and in Ugandan universities.

6.7 SCHOLARLY CONTRIBUTION OF THE STUDY

This study has demonstrated and brought to the forefront ways in which Information and Communication Technology has been applied in educational service

management regarding teaching, learning, management, and administration of UNU University. This could as well apply to the management of educational services management in any other institution of learning which may not necessarily be a university. Questionnaires were administered to students and lecturers while in-depth interviews were conducted among Heads of Department, Deans of schools, Principals of colleges and ICT administrators and officers of the university. Documentary analysis of the ICT policies and strategic plans of the University was also carried out. In consideration of the statement of the problem, research questions, theoretical framework, and the findings of this study, the researcher presents the potential contributions of this study towards theory, literature, methodology, policy, and practice.

In this study, two theories were adopted to interpret the research findings on ICT and educational service Management at UNU University; Technology Acceptance Theory (Davis *et al.,* 1989) and Adaptive Structuration Theory (DeSanctis & Poole, 1994). These theories show the process by which an innovation such as ICT is widely spread and used in a specific social system (community, organization or group) to effect desired changes (Sahin, 2006) especially in the management of its specific components like the delivery of educational services (Surendra, 2001; Zakaria, 2001).

Technology Acceptance Theory has been widely used in the educational setting of UNU University to determine the adoption of instructional technology by educators and students (Huang *et al.,* 2007). This theory relates to the findings of the study in a way that most of the educational services managers pointed out that ICT had eased their operations regarding reducing effort in delivering messages from office to office. The University Librarian, for example, did not have to send hard copies of memoranda to the senior or junior offices all the time but merely used e-mail. Additionally, the technology helped UNU University in keeping in touch with other universities globally. This helped it to be in tandem with them in all aspects including university library business.

Additionally, as proposed in the Technology Acceptance Theory, UNU University has adopted Information System software used in handling educational services such as Academic Records Information System (ARIS) for academic records management and Library Information System (LIBIS) for managing the library services.

It is quite clear that the management activities of an institution or indeed of a university in today's world will demand some automation in order to ease if not speed up the activities that are carried out on a daily basis. These activities range from planning, organising, supervising, coordinating, directing, and budgeting.

For instance, University Managers especially the academic registrar, University Secretary, and the University Bursar are now using ICT in university planning, budgeting and supervision. Telephones and emails are used to communicate with staff to plan for activities and meetings. ICT is used in staff payroll management, and it also makes supervision easier since it shows where the staff are, what they are doing and at what time. Similarly, Technology Acceptance Theory helps to explain how ICT is used by the Dean of Students to draw student programmes for the academic years as well as establishing of student numbers to be accommodated and fed in the halls of residence at UNU University.

The Technology Acceptance Theory which considers the way in which an adoption is accepted by an institution is relevant to the improvement of student learning. In this aspect, students at UNU University undergo ICT training in their first year of university education, they continue to be taught through ICT, they are examined using ICT, and they regularly present their assignments by typing in Microsoft word and sending it to their lecturers through email for them to read and mark (Davis, Bagozzi, and Warshaw, 1989).

The second theory adopted for the study is the Adaptive Structuration Theory (AST) postulated by DeSanctis and Poole (1994). Giddens (1984) based the theory on the tenets of Structuration Theory. Structuration Theory posits that a social system (such as an organisation like a university) can be understood based on the analysis of the

nature of its structure and agency (Giddens, 1984; Pavlou & Majchrzak, 2002; Workman *et al.,* 2008).

Adaptive Structuration Theory argues that organisations that adopt ICT for their work dynamically create perceptions about the nature and utility of the selected ICT (Zhu & Kraemer, 2005). These perceptions influence the way technology is used, thereby affecting the outcomes of the technology. The impressions are created by the type and usefulness, or contribution of the introduced ICT to the human activities carried out in a social system (Matovu, 2009; Rao & Perry, 2003). The perceptions are also based on the technological context of the social system and indicate the level of satisfaction that the adopted ICT yields to the members of the social system as far as realising expected changes in the system's processes and outcomes is concerned (Stillman, 2006).

According to the tenets of Adaptive Structuration Theory (AST), UNU University educational service managers have understood the role of technology and consequently have adopted it in automation of specific functions within the university system (Zhu *et al.*, 2006; Poole & DeSanctis, 2004). In this case, Adaptive Structuration Theory helps us to look at how UNU University has changed in the way that it conducts its operations due to the adoption of ICT. Many services such as communication, recording of marks, administration of tests, calculation of Cumulative Grade Point Averages (CGPA), establishing account bank balances, student registration, checking student progress to mention but a few have been significantly simplified. These benefits of ICT innovation were identified by the researcher through his interaction with the various officers of the University and educational services managers. The theory was selected by the researcher as the best to underpin this study.

The Adaptive Structuration Theory focuses on the perceptions of the technology adopters. These perceptions influence the way technology is used, thereby affecting the outcomes of the technology (Matovu, 2009; Rao & Perry, 2003; Zhu & Kraemer, 2005). According to the study findings, the views of the Deputy Vice-Chancellor (Academics), the Deputy Vice-Chancellor (Finance and Administration), the

University Librarian, the University Secretary, the Academic Registrar, and the Dean of Students all testify to this fact.

Adaptive Structuration Theory explains how ICT adoption has brought about an improvement in the student learning at UNU University. Evidence from the qualitative data collected showed that ICT adoption enabled student learning. For example, the Head of the Department of Nutrition and Food Technology testifies that ICT is often used for research by students and lecturers for sending and receiving work. The ICT administrator from the College of Computing and Information Science states that KOHA, an online library service avails student with an online portal for them to access notes. He also adds that UNU University E-Learning Environment (NUELE) helps lecturers to update notes for their respective course units and students can download at convenience and upload assignments and assignment results. Also the UNU University Librarian in her submission to the researcher's question states that students and staff benefit from e-resources like journals and books at their convenience making things quite easy for everybody. According to her, the student or any other library user can access information from the library from any point in the University.

The study contributes to scholarship in the field of Information and Communication Technology (ICT). The study presents much literature on educational services management which scholars and educational services managers would be glad to use as reference points. The findings of this study highlight the value that ICT adds not only to educational services management in higher education but also to other educational institutions. Secondly, the study provides literature on how educational services managers perceive and experience the effectiveness regarding the implementation of ICT at UNU University and other educational institutions all over the world.

Thirdly, the study also provides literature on how ICT adoption has improved management and student learning at UNU University and other institutions globally (Bhardwaj & Singh, 2011; Bogere *et al.,* 2013; Gitonga et al.,, 2013; Hengst & Sol, 2001; Moyle, 2006; Krubu & Osawaru, 2010; Mutagahywa, 2012; UNU University

ICT Policy and Master Plan, 2001; Ujunj *et al.,* 2012). Also, the study provides literature on how ICT can be used to improve the management of educational services not only at UNU University but also worldwide in educational institutions (Mbwete, 2013).

This study through its research paradigm (ontology and epistemology), research design, and methodology describe the nested mixed methods approach, which belongs to the pragmatic paradigm. The pragmatists believe philosophically in using procedures that “work” for a particular research problem under study and that one should use many methods when understanding a research problem (Tashakkori, Teddlie & Teddlie, 1998). Through this study, the researcher believes that the use of mixed methods research design has yielded more precious data on the adoption of ICT in the management of educational services at UNU University than any single approach would have done. During the study, the design enabled the researcher to capture data from a cross-section of stakeholders on ICT use as they responded to a variety of research instruments administered to them.

The ontological perspective to this study involved several ICT theories and concepts, but the focus is made explicitly on those that engender the use of ICT in the management of educational services such as the Adaptive Structuration Theory (AST) (Stones, 2005) selected to provide the theoretical foundation of this study.

The philosophical study in the ICT field reflects the need to affirm the theoretical modalities of Ontology on the basis of comparisons between alternative theories, models and conceptual frameworks and to contribute to investigation of modern ontological approaches such as "Ontological Engineering", “Ontology Learning”, "Ontology-based meta-data integration methodology", “Design of Ontologies used for Knowledge Sharing", and among others the “Design of Ontologies used in Information and Communication Technologies”. This study, therefore, in its unique way focuses on the Ontology of Information and Communication Technology and the Management of Educational Services at UNU University.

The contribution of the study is such that it will help UNU University to evaluate the role played by Information and Communication Technology (ICT) in enabling it to achieve the aim for which ICT was introduced. This means enhancing the University's position as a centre of academic excellence and a significant contributor to the sustainable development of in the East African region, Africa and the global community. Universities can also use the study to appreciate how ICT and be introduced and utilised most efficiently as far as educational services management is concerned.

6.8 CONCLUSION

The study findings present clearly how ICT has contributed to the effectiveness of the management of educational services at UNU University. The results show that the university has installed and provided students and staff with access to ICT tools that are important in the management of educational services. The perceptions of educational service managers revealed that ICT is quite useful in the management of educational services at UNU University. The experiences of educational services managers are such that they are familiar with it and use it quite regularly for many operations at work except for a tiny percentage of them. Although ICT has improved the University management and student learning at UNU University largely, the stakeholders did not feel that the implementation of ICT at UNU University was effective as expected. This means that there is much room for improvement in the implementation of ICT at the University.

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APPENDICES

Appendix A: Research Ethics Clearance Certificate

UNISA | college of education

Research Ethics Clearance Certificate

This is to certify that the application for ethical clearance submitted by

JM Edoru [46192409]

for a D Ed study entitled

Information and Communication Technology and Educational Management Services Management at Makerere Univiersity

has met the ethical requirements as specified by the University of South Africa College of Education Research Ethics Committee. This certificate is valid for two years from the date of issue.

Prof KP Dzvimbo
Executive Dean : CEDU

Dr M Claassens
CEDU REC (Chairperson)
mcdtc@netactive.co.za

Reference number: 2014 MAY /46192409/MC

19 MAY 2014

Appendix B: Ethical Clearance Request Letter

RUKARA COLLEGE OF EDUCATION,
P.O BOX 55 RWAMAGANA,
RWANDA.
E-MAIL: edoru2011@gmail.com
or: jmedoru@yahoo.com
29.03.2013

The Research Ethics Committee,

Uganda National Research Council of Science and Technology,

Kampala.

RE: Permission to Conduct Research entitled: "Information and Communication Technology (ICT) and Educational Service Management at Makerere University".

I am a Ugandan student conducting research for my Doctoral thesis in Educational Leadership and Management at the University of South Africa on the above-mentioned topic. The aim of the research is to contribute to improvements needed to fully embrace ICT in the delivery of educational services in universities generally and at MUK in particular so as to improve access to higher education in Uganda and beyond. My supervisor, Professor Brigitte Smit can be contacted on email: smitb@unisa.ac.za.

I kindly request for permission to access all the sources of data I need to accomplish this study, including all the respondents targeted to provide primary data at Makerere University.

I will be glad if my plea meets your kind consideration.

Yours sincerely,

Edoru John Michael

(UNISA Doctoral student- number 46192409)

Appendix C: UNCST Research Clearance Letter

Uganda National Council for Science and Technology

(Established by Act of Parliament of the Republic of Uganda)

Our Ref: IS 96 **13/05/2013**

Mr. John Michael Edoru
Makerere Univerity
Kampala

Re: Research Approval: **Information and Communication Technology and Educational Services Management at Makerere University**

I am pleased to inform you that on **30/04/2013**, the Uganda National Council for Science and Technology (UNCST) approved the above referenced research project. The Approval of the research project is for the period of **30/04/2013** to **30/12/2013**.

Your research registration number with the UNCST is **IS 96**. Please, cite this number in all your future correspondences with UNCST in respect of the above research project.

As Principal Investigator of the research project, you are responsible for fulfilling the following requirements of approval:

1. All co-investigators must be kept informed of the status of the research.
2. Changes, amendments, and addenda to the research protocol or the consent form (where applicable) must be submitted to the designated local Institutional Review Committee (IRC) or Lead Agency for re-review and approval **prior** to the activation of the changes. The approved changes must be communicated to UNCST within five working days.
3. For clinical trials, all serious adverse events must be reported promptly to the designated local IRC for review with copies to the National Drug Authority.
4. Unanticipated problems involving risks to research subjects/participants or other must be reported promptly to the UNCST. New information that becomes available which could change the risk/benefit ratio must be submitted promptly for UNCST review.
5. Only approved study procedures are to be implemented. The UNCST may conduct imprompt audits of all study records.
6. A progress report must be submitted electronically to UNCST within four weeks after every 12 months. Failure to do so may result in termination of the research project.

Below is a list of documents approved with this application:

	Document Title	Language	Version	Version Date
1	Study Protocol	English	N/A	August 2012
2	Interview Schedule for ICT administers	English	N/A	N/A
3	Students' Questionnaire	English	N/A	N/A
4	Academic Staff Questionnaire	English	N/A	N/A

Yours sincerely,

Jane Nabbuto
for: Executive Secretary
UGANDA NATIONAL COUNCIL FOR SCIENCE AND TECHNOLOGY

LOCATION/CORRESPONDENCE

Plot 6 Kimera Road, Ntinda
P. O. Box 6884
KAMPALA, UGANDA

COMMUNICATION

TEL: (256) 414 705500
FAX: (256) 414-234579
EMAIL: info@uncst.go.ug
WEBSITE: http://www.uncst.go.ug

Appendix D: Research Clearance Letters by Kampala RDC

THE REPUBLIC OF UGANDA

OFFICE OF THE PRESIDENT

PARLIAMENT BUILDING P.O.BOX 7168 KAMPALA, TELEPHONES: 254881/6, / 343934, 343926, 343943, 233717, 344026, 230048, FAX: 235459/256143
Email: secretary@op.go.ug, Website: www.officeofthepresident.go.ug

ADM 154/212/01

June 17, 2013

The Resident City Commissioner
Kampala District

This is to introduce to you **Edoru John Michael** a Researcher who will be carrying out a research entitled **"Information and communication technology (ICT) and educational services management at Makerere University"** for a period of **02 (two) months** in your district.

He has undergone the necessary clearance to carry out the said project.

Please render him the necessary assistance.

By copy of this letter **Edoru John Michael** is requested to report to the Resident City Commissioner of the above district before proceeding with the Research.

Alenga Rose
FOR: SECRETARY, OFFICE OF THE PRESIDENT

Copy to: Edoru John Michael

EDORU JOHN MICHEAL is cleared to do research on "Informa and Communication technology (I.C.T. and educational Serv Mgt. at MAK" fo 2 months in Kampala

OFFICE OF THE RESIDENT CITY COMMISSIONER
P.O.BOX 352 KLA
09 JUL 2013
KAMPALA

THE REPUBLIC OF UGANDA

OFFICE OF THE PRESIDENT

PARLIAMENT BUILDING P.O.BOX 7168 KAMPALA, TELEPHONES: 254881/6, / 343934, 343926, 343943, 233717, 344026, 230048, FAX: 235459/256143
Email: secretary@op.go.ug, Website: www.officeofthepresident.go.ug

ADM 154/212/01

June 17, 2013

The Resident City Commissioner
Kampala District

This is to introduce to you **Akwi Susan** a Researcher who will be carrying out a research entitled **"Information and communication technology (ICT) and educational services management at Makerere University"** for a period of **02 (two) months** in your district.

She has undergone the necessary clearance to carry out the said project.

Please render her the necessary assistance.

By copy of this letter **Akwi Susan** is requested to report to the Resident City Commissioner of the above district before proceeding with the Research.

Alenga Rose
FOR: SECRETARY, OFFICE OF THE PRESIDENT

Copy to: Akwi Susan

AKWI SUSAN is cleared to do research on "ICT and educational services Mgt at MUK for 2 months" in Kampala.

OFFICE OF THE RESIDENT CITY COMMISSIONER
P.O.BOX 352 K'LA
09 JUL 2013
KAMPALA

Appendix E: Request for Permission to Conduct Research

KABALE UNIVERSITY

P. O. Box 317
Kabale-Uganda
Email: info@kabaleuniversity.ac.ug
admissions@kabaleuniversity.ac.ug

Tel: 256-392-848355/4864-26463
Mob: 256-782-860259
Fax: 256-4864-22803
Website: www.kabaleuniversity.ac.ug

11th June 2014

Dear Principal of.....

RE: REQUEST TO CONDUCT RESEARCH AT YOUR COLLEGE

I wish to present the above mentioned request to your office. I am a Doctoral student of Educational Leadership and Management at the University of South Africa(UNISA) conducting research on the topic: *Information and Communication Technology(ICT) and Educational Services Management at Makerere University.*

I have already received clearance from the Directorate of Research and Training of Makerere University, Uganda National Council for Science and Technology, Office of the President of the Republic of Uganda and the Research Ethics Committee of the University of South Africa (UNISA) for my research assistants and myself. I am interested in the following categories of respondents: students, ICT administrators and lecturers.

It is my sincere hope that your office grants my research assistants and I the opportunity to carry out this research in your college.

Yours Faithfully,

Edoru John Michael
DOCTORAL STUDENT

Appendix F: Acceptance letters to conduct research

MAKERERE UNIVERSITY

P.O. Box 7062 Kampala
P.O. Box 16196 Kampala
Cable: MAKUNIKA

e-mail: principal@cees.mak.ac.ug /dprincipal@cees.mak.ac.ug
Telephone: +256 312 280 829
Website: www.cees.mak.ac.ug

COLLEGE OF EDUCATION AND EXTERNAL STUDIES
Office of the Principal

TO WHOM IT MAY CONCERN

RE: INTRODUCING MR EDORU JOHN MICHEAL

This letter serves to introduce Mr. Edoru John Micheal who is undertaking his doctoral studies titled: "ICT and Educational Services Management at Makerere University." He is a student of the University of South Africa but co- assisted by me. We hope to benefit from his study findings given the relevance of ICT and education in higher institutions of learning today.

We shall be very grateful if you accord him the necessary assistance.

Yours Sincerely,

MAK. COLLEGE OF EDUCATION & EXTERNAL STUDIES
04 JUL 2014
OFFICE OF THE DEPUTY PRINCIPAL

Muwagga Mugagga Anthony (PhD)
Assoc. Prof.
Deputy Principal

I: IT Manager, CoBAMS
Please do the needful.
7/7/14

II: Colleagues please give the necessary help if contacted.

Kabale University,

P.O Box 317,

Kabale

1st August, 2014

Dear Principal of College of Humanities and Social Sciences

RE: REQUEST TO CONDUCT RESEARCH AT YOUR COLLEGE

I wish to present the above mentioned request to your office for the second time. I sincerely apologize that the first letter that you signed to this effect was misplaced in the course of data collection. I am a Doctoral student of Educational Leadership and Management at the University of South Africa(UNISA) conducting research on the topic: *Information and Communication Technology(ICT) and Educational Services Management at Makerere University.*

The research objectives are as follows:

1) To analyse the nature of ICT adopted to facilitate the management of educational services at Makerere University
2) To assess the perceived effectiveness of educational services management at Makerere University
3) To investigate the effect of ICT on the management of educational services at Makerere University
4) To propose strategies that can be adopted to ensure that ICT enables the management of educational services to be as effective as expected by stakeholders.

I wish to get access to the following categories of respondents:

- ICT staff at college and school levels(at least 6)
- Academic staff spread throughout the schools(at least 57)
- Students spread throughout the schools(at least 63)

It is my sincere hope that your office grants my research assistants and I the opportunity to carry out this research in your college.

Yours Faithfully,

Edoru John Michael

UNISA DOCTORAL STUDENT

Colleagues (CHUSS)

Please assist.

MAKERERE P. O. BOX 7062 04 AUG 2014 PRINCIPAL COLLEGE OF HUMANITIES & SOCIAL SCIENCES

4/8/2014

Appendix G: Student Questionnaire

Dear Student,
I am Edoru John Michael, a student of University of South Africa. I am conducting an academic research aimed at analyzing the use of ICT in the Management of Education Services at UNU University, with a view to proposing strategies which will help improve this use to a level that can enable lecturers to deliver educational services that satisfy students' and other stakeholders' expectations. In your position as a lecturer, you have useful information to contribute to this research. You are therefore requested to provide this information by answering the questions in this questionnaire as honestly as possible. The questionnaire will take about 15 minutes to be filled. Your participation is entirely voluntary. Completing and returning the questionnaire is entirely dependent on your volition and consent. I therefore request for your cooperation and willingness to participate. The quality and usefulness of this research depends on your cooperation and sound assessment. The information you provide will be kept confidential, completely anonymous and used for purely academic purposes. Therefore, you do not have to indicate your name. The provided information will not be used to victimise you in any way. The study will be of benefit to you when UNU University adopts and implements its recommendations. Thank you in advance for your help.

INSTRUCTIONS: Put a tick in the box which corresponds to the option that you feel is appropriate or write your opinion answer(s) in the space provided

SECTION A: BIOGRAPHICAL INFORMATION

i) Name of your College..... (Specify please)

ii) Faculty..…..…….. (Specify please)

iii) Department/Directorate..... (Specify please)

iv) Course of Study..... (Specify please)

v) Year of study: First ☐ Second ☐ Third ☐ Other…..... (Specify please)

SECTION B: ICT HARDWARE AND SOFTWARE

1) Please respond to the statements in the table below by putting a tick in a cell (box) corresponding to the option that best suits your opinion:

Statement	**Not Sure**	**Strongly Disagree**	**Disagree**	**Agree**	**Strongly Agree**
Lecturers use desktops when delivering lectures in classrooms					
Students' with personal computers are enabled to use the PCs and access lecture notes and any academic instructions from their lecturers					
Library services provided to students are computerized to easy their access and use					
Students' with mobile phones are enabled to use the phones and access lecture notes and any academic instructions from their					

Statement	Not Sure	Strongly Disagree	Disagree	Agree	Strongly Agree
lecturers					
Students are able to interact academically with their lecturers through virtual teaching and learning					
Lecturers use internet facilities to deliver lectures to students					
The ICT facilities used in the delivery of academic instructions are enough to satisfy all the learning needs of students					
Lecturers email lecture notes to students					
Lecturers assigned to supervise students on research programmes use email to facilitate their supervisory interaction with the students					
Lecturers can deliver lectures to students via online teaching-learning facilities					
Television facilities are used to facilitate the delivery of academic instructions from lecturers to students					
Radio facilities are used to facilitate the delivery of academic instructions from lecturers to students					
Lecturers record lecture notes on flash disks which they give to students to use and learn what the lecturers have prepared					
Lecturers record lecture notes on CDs which they give to students to use and learn what the lecturers have prepared					
Lecturers use laptops when teaching					
Projectors to deliver lectures to students in classrooms					
Lecturers make use of microphones when delivering lectures to students					
Lecturers deliver computer-based programmed lectures to students					
Students' with personal computers are enabled to use the PCs and access needed library services					
Students' with mobile phones are enabled to use the phones and access needed library services					
Lecturers use ICT facilities when guiding students through laboratory experiments					
Students can study using ICT facilities that facilitate networked learning					
There are no delays in ICT facilities used in the delivery of academic instructions are up-to-date					
Lecturers can email courseworks and testing exercises to students if they choose to					
Students can email answered courseworks and testing exercises back to their lecturers					
Lecturers can administer end of semester exams through a computerized evaluation programme					
Lecturers use ICT to monitor students' lecture attendance					
Lecturers use ICT to monitor students' academic progress					
Students do not have to go physically to the library because those with internet facilities nearby can access the needed library services wherever they are					
The ICT facilities used in the delivery of academic instructions are up-to-date					
Lecturers use intranet to interact with students academically					

Statement	Not Sure	Strongly Disagree	Disagree	Agree	Strongly Agree
The ICT facilities installed at UNU University are meet the learning needs of students as appropriately as expected					
UNU University has ICT facilities that support the delivery of games and sports services to students					
UNU University has ICT facilities that support the delivery of recreational services to students					

2) Mention any other equipment (hardware) used to manage educational services at UNU University
   i) ……
   …..
   ii) ……
   ….
   iii) ……
   ….
   iv) .....
   ...
   v) .....
   ...

3) Mention the applications (software) used to manage educational services at UNU University
   i) ……
   ….
   ii) ……
   ….
   iii) ……
   ….
   iv) .....
   ..
   v) .....
   ..

4) Briefly explain how the ICT hardware and software mentioned above is used in delivery of educational services at UNU University

……

……

……

SECTION C: EFFECTIVENESS OF EDUCATIONAL SERVICES MANAGEMENT

1) Please provide your option on each of the statements given in the table below by ticking the option that best suits it.

Statement	Not Sure	Strongly Disagree	Disagree	Agree	Strongly Agree
The curricula content of the lectures delivered to students is relevant to developing knowledge and skills needed by students to be as productive as expected after graduation					
The curricula content of the lectures delivered to students is relevant to developing knowledge and skills needed by students to become as employable as expected after graduation					
The non-curricula facilities provided to students enable them to develop their non-academic talents as expected					
The lectures delivered to students contain up-to-date content					
Lecturers have the competence needed to optimally use the ICT facilities installed at UNU University to support teaching					
Students have the competence needed to optimally use the ICT facilities installed at UNU University to support learning					
There are no delays in the delivery of lectures at UNU University					
The conditions of providing lectures to students at UNU University are convenient to students					
Lecturers supervise students who do research well					
There are no delays in the delivery of library services at UNU University					
The university's library services are sufficient for all enrolled students					
Lecturers teach students without dodging any lecture					
The university's science laboratory facilities are enough for all enrolled science students					
The science laboratory facilities provided by the university are up-to-date					
The university's recreational facilities are sufficient for all enrolled students					
The recreational facilities provided by the university are up-to-date					
The university's games and sports facilities are sufficient for all enrolled students					
The games and sports facilities provided by the university are up-to-date					
The library services provided by the university to students are up-to-date					
Lecturers deliver assigned lectures to students in a timely manner.					
The conditions of examining students at UNU University are convenient to the students					
Lecturers administer all the tests (courseworks) that students					

Statement	Not Sure	Strongly Disagree	Disagree	Agree	Strongly Agree
should do every semester					
Lecturers administer end of semester exams to students as expected					
Lecturers mark all the tests (courseworks) that students do every semester					
Lecturers mark all end of semester exams students do every semester					
Lecturers attend to students in need of academic assistance					
The facilities the university provides support students' academic research are sufficient					

SECTION D: STRATEGIES

1) Mention the factors that limit the role of ICT in improving the effectiveness of managing educational services at UNU University
   i) ……..
   ii) ……
   iii) ……
   iv) .....
   v) .....

2) Mention the ways that can be used to improve the role of ICT in ensuring that the management of educational services at UNU University is as effective as expected
   i) ……
   ii) ……
   iii) ……
   iv) .....
   v) .....

THANK YOU FOR YOUR TIME

Appendix H: Academic Staff Questionnaire

Dear Lecturer,
I am Edoru John Michael, a student of University of South Africa. I am conducting an academic research aimed at analyzing the use of ICT in the Management of Education Services at UNU University, with a view to proposing strategies which will help improve this use to a level that can enable lecturers to deliver educational services that satisfy students' and other stakeholders' expectations. In your position as a lecturer, you have useful information to contribute to this research. You are therefore requested to provide this information by answering the questions in this questionnaire as honestly as possible. The questionnaire will take about 15 minutes to be filled. Your participation is entirely voluntary. Completing and returning the questionnaire is entirely dependent on your volition and consent. I therefore request for your cooperation and willingness to participate. The quality and usefulness of this research depends on your cooperation and sound assessment. The information you provide will be kept confidential, completely anonymous and used for purely academic purposes. Therefore, you do not have to indicate your name. The provided information will not be used to victimise you in any way. The study will be of benefit to you when UNU University adopts and implements its recommendations. Thank you in advance for your help.

INSTRUCTIONS:
Please put a tick in the box which corresponds to the option that you feel is appropriate or write your opinion answer(s) in the space provided

SECTION A: BIOGRAPHICAL INFORMATION

i) Name of your College..... (Specify please)

ii) Faculty...…..……..... (Specify please)

iii) Department/Directorate..... (Specify please)

iv) Period of service at UNU University: < 1 ☐ 1-5 ☐ 6-10☐ 11+

SECTION B: ICT HARDWARE AND SOFTWARE

1) Respond to the statements in the table below by ticking the option that best suits your opinion:

Statement	Not Sure	Strongly Disagree	Disagree	Agree	Strongly Agree
UNU University has ICT-based sources of information that lecturers can use to access content needed to include in the curricula of the academic courses offered by the university					
UNU University has online facilities by which lecturers can access curricula modules needed to help them design appropriate curricula for the academic programmes offered at the university					
UNU University has online facilities by which lecturers can access the necessary curriculum updates					
UNU University has internet facilities that support searching relevant curriculum materials via the World Wide Web					
UNU University has online facilities by which lecturers can network with universities for purposes of internationalizing the curriculum content delivered to students					
Lecturers' PCs are enabled to access needed curricula content via the World Wide Web					
Lecturers use desktops when delivering lectures in classrooms					
Lecturers use laptops when teaching					
Lecturers use projectors to deliver lectures to students in classrooms					
Lecturers make use of microphones when delivering lectures to students					
Lecturers deliver computer-based programmed lectures to students					
Students' with mobile phones are enabled to use the phones and access lecture notes and any academic instructions from their lecturers					
Library services provided to students are computerized to easy their access and use					
Students do not have to go physically to the library because those with internet facilities nearby can access the needed library services wherever they are					
Lecturers assigned to supervise students on research programmes use email to facilitate their supervisory interaction with the students					
Lecturers can deliver lectures to students via online teaching-learning facilities					
Television facilities are used to facilitate the delivery of					

Statement	Not Sure	Strongly Disagree	Disagree	Agree	Strongly Agree
academic instructions from lecturers to students					
Radio facilities are used to facilitate the delivery of academic instructions from lecturers to students					
Lecturers record lecture notes on flash disks which they give to students to use and learn what the lecturers have prepared					
Lecturers record lecture notes on CDs which they give to students to use and learn what the lecturers have prepared					
Students' with personal computers are enabled to use the PCs and access lecture notes and any academic instructions from their lecturers					
Lecturers use internet facilities to deliver lectures to students					
Lecturers use intranet to interact with students academically					
Lecturers email lecture notes to students					
Students' with personal computers are enabled to use the PCs and access needed library services					
Students' with mobile phones are enabled to use the phones and access needed library services					
Lecturers use ICT facilities when guiding students through laboratory experiments					
Students can study using ICT facilities that facilitate networked learning					
Students are able to interact academically with their lecturers through virtual teaching and learning					
UNU University has internet facilities that support students' search of needed learning materials via the World Wide Web					
Lecturers can email courseworks and testing exercises to students if they choose to					
Students can email answered courseworks and testing exercises back to their lecturers					
Lecturers can administer end of semester exams through a computerized evaluation programme					
Lecturers use ICT to monitor students' lecture attendance					
Lecturers use ICT to monitor students' academic progress					
University administration use ICT to monitor lecturers to establish whether they are doing their work or not					

2) Mention any other equipment (hardware) used to manage educational services at UNU University
   i) ……
   ii) ……
   iii) ……

3) Mention the applications (software) used to manage educational services at UNU University
   i) ……
   ii) ……
   iii) ……

4) Briefly explain how the ICT hardware and software mentioned above is used in delivery of educational services at UNU University
   i) ……
   ii) ……
   iii) ……

SECTION C: EFFECTIVENESS OF EDUCATIONAL SERVICES MANAGEMENT

2) Please provide your option on each of the statements given in the table below by ticking the option that best suits it.

Statement	**Not Sure**	**Strongly Disagree**	**Disagree**	**Agree**	**Strongly Agree**
The curricula content of the lectures delivered to students is relevant to developing knowledge and skills needed by students to be as productive as expected after graduation					
The curricula content of the lectures delivered to students is relevant to developing knowledge and skills needed by students to become as employable as expected after graduation					
The non-curricula facilities provided to students enable them to develop their non-academic talents as expected					
The lectures delivered to students contain up-to-date content					
Lecturers have the competence needed to optimally use the ICT facilities installed at UNU University to support teaching					
Students have the competence needed to optimally use the ICT facilities installed at UNU University to support learning					
There are no delays in the delivery of lectures at UNU University					
The conditions of providing lectures to students at UNU University are convenient to lecturers					
The conditions of providing lectures to students at UNU University are convenient to students					
The conditions of examining students at UNU University are convenient to the students					
The conditions of examining students at UNU University are					

Statement	Not Sure	Strongly Disagree	Disagree	Agree	Strongly Agree
convenient to the examiners					
There are no delays in the delivery of library services at UNU University					
The university's library services are sufficient for all enrolled students					
The library services provided by the university to students are up-to-date					
The university's science laboratory facilities are enough for all enrolled science students					
The science laboratory facilities provided by the university are up-to-date					
The university's recreational facilities are sufficient for all enrolled students					
The recreational facilities provided by the university are up-to-date					
The university's games and sports facilities are sufficient for all enrolled students					
The games and sports facilities provided by the university are up-to-date					
Lecturers teach students without dodging any lecture					
Lecturers deliver assigned lectures to students in a timely manner.					
Lecturers supervise students who do research well					
Lecturers administer all the tests (courseworks) that students should do every semester					
Lecturers administer end of semester exams to students as expected					
Lecturers mark all the tests (courseworks) that students do every semester					
Lecturers mark all end of semester exams students do every semester					
Lecturers timey attend to students in need of academic assistance					
The facilities the university provides to support students' academic research are sufficient					

SECTION D: STRATEGIES

3) Mention the factors that limit the role of ICT in improving the effectiveness of managing educational services at UNU University
   i) ……
   ii) ……
   iii) ……
   iv) .....

4) Mention the ways that can be used to improve the role of ICT in ensuring that the management of educational services at UNU University is as effective as expected
   i) ……
   ii) ……
   iii) ……
   iv) .....

THANK YOU FOR YOUR TIME

Appendix I: Interview Schedule for ICT administrators

Introduction

I am Edoru John Michael, a student of University of South Africa. I am conducting an academic research aimed at analyzing the use of ICT in the Management of Education Services at UNU University, with a view to proposing strategies which help improve this use to a level that can enable lecturers to deliver educational services that satisfy students' and other stakeholders' expectations. In your position as a lecturer, you have useful information to contribute to this research. You are therefore requested to provide this information by answering the questions in this questionnaire as honestly as possible. The questionnaire will take about 15 minutes to be filled. Your participation is entirely voluntary. Completing and returning the questionnaire is entirely dependent on your volition and consent. I therefore request for your cooperation and willingness to participate. The quality and usefulness of this research depends on your cooperation and sound assessment. The information you provide will be kept confidential, completely anonymous and used for purely academic purposes. Therefore, you do not have to indicate your name. The provided information will not be used to victimise you in any way. The study will be of benefit to you when UNU University adopts and implements its recommendations.

Thank you in advance for your help.

SECTION A: BIOGRAPHICAL INFORMATION

i) Name of your College..... (Specify please)

ii) Faculty...…..……. (Specify please)

iii) Department/Directorate..... (Specify please)

SECTION B: ICT HARDWARE AND SOFTWARE

1. What ICT tools (both hardware and software) has UNU University put in place to facilitate the management of educational services at UNU University? (*Explain in terms of concrete examples or probe for concrete examples when interview is oral*)

……

……

2. How often do you do update the available ICT tools both hardware and software? (*probe for schedule /interval for maintenance/updates*)

.....

……

SECTION C: EFFECTIVENESS OF EDUCATIONAL SERVICE MANAGEMENT

1. Briefly explain how the available ICT has contributed to improving the effectiveness of managing educational services at UNU University (*Explain in terms of contribution to (a) equipping students with knowledge and skills relevant for attaining desired employability and productivity; (b) computerizing curriculum designing, delivery of lectures, library services, students' self-directed learning and other educational services. Or probe for clarification of contribution to each of these areas if the interview is oral).*

……

……

……

2. How do you comment on the lecturers' and students' ability to use the available ICT tools optimally?

……

……

……

SECTION C: STRATEGIES FOR IMPROVEMENT

3. What factors limit the contribution of ICT to managing educational services at UNU University?

.....

.....

.....

4. In your opinion, how can the factors be addressed in order to improve the contribution of ICT to effective management of educational services at UNU University?

.....

.....

.....

THANK YOU FOR YOUR TIME

Appendix J: Interview schedule for Educational Service Managers

(Principals of Colleges, Deans of Schools, & Heads of Departments at UNU University)

Introduction

I am Edoru John Michael, a student of University of South Africa. I am conducting an academic research aimed at analyzing the use of ICT in the Management of Education Services at UNU University, with a view to proposing strategies which may help to improve this use to a level that can enable lecturers to deliver educational services that satisfy students' and other stakeholders' expectations. In your position as a lecturer and an education administrator, you have useful information to contribute to this research. You are therefore invited to provide such information by responding to the questions in this interview schedule as honestly as possible. The interview will take about 15 minutes to be concluded. Your participation is entirely voluntary. Responding to the interview is entirely dependent on your volition and consent. I therefore request for your cooperation and willingness to participate. The quality and usefulness of this research depends on your cooperation and sound assessments. The information you provide will be kept confidential, completely anonymous and will only be used for purely academic purposes. Therefore, you do not have to indicate your name. The provided information will not be used to victimise you in any way. The study will be of benefit to you when UNU University adopts and implements its recommendations.

Thank you in advance for your help.

SECTION A: BIOGRAPHICAL INFORMATION

i) Name of your College..... ……
(Specify please)

ii) Position of leadership...….....……
(Specify please)

iii) Department/Directorate……
(Specify please)

SECTION B:

PERCEPTIONS AND EXPERIENCE OF EDUCATIONAL SERVICES MANAGERS ON EFFECTIVENESS OF ICT IMPLEMENTATION

1. What is your perception of the effectiveness of the implementation of ICT in the management of educational services at the University?
   ……
   ……
2. What is your experience on the effectiveness (or the lack thereof) of the implementation of ICT in the management of educational services at the University?
   ……
   ……
3. In which ways if any does the use of ICT benefit your administrative unit?
   ……
   ……
4. Explain how the effectiveness of the implementation of ICT reduces the unit cost of administration.
   ……
   ……
5. Describe the challenges of ensuring effective implementation of ICT in your administrative unit.
   ……
   ……
6. Describe the level of use of ICT for teaching and research by staff at the University.
   ……
   ……
7. What is the level of preparedness of staff and students for the implementation of ICT?
   ……
   ……
8. What do you suggest can be done to improve ICT use by staff and students at the University?
   ……
   ……

THANK YOU FOR YOUR TIME

Appendix K: Interview Schedule for UNU University Management

(Officers of the University)

Introduction

I am Edoru John Michael, a student of University of South Africa. I am conducting an academic research aimed at analyzing the use of ICT in the Management of Education Services at UNU University, with a view to proposing strategies which may help to improve this use to a level that can enable lecturers and university managers to deliver educational and management services that satisfy students' and other stakeholders' expectations. In your position as a manager, you have useful information to contribute to this research. You are therefore invited to provide such information by responding to the questions in this interview schedule as honestly as possible. The interview will take about 15 minutes to be concluded. Your participation is entirely voluntary. Responding to the interview is entirely dependent on your volition and consent. I therefore request for your cooperation and willingness to participate. The quality and usefulness of this research depends on your cooperation and sound assessment. The information you provide will be kept confidential, completely anonymous and will only be used for purely academic purposes. Therefore, you do not have to indicate your name. The provided information will not be used to victimise you in any way. The study will be of benefit to you when UNU University adopts and implements its recommendations.

Thank you in advance for your help.

SECTION A: BIOGRAPHICAL INFORMATION

i) Name of your College.....
(Specify please)

ii) Position of leadership.....
(Specify please)

iii) Department/Directorate……
(Specify please)

SECTION B: EFFECT OF ICT ON UNIVERSITY MANAGEMENT AND STUDENT LEARNING

1. How does ICT contribute to the university planning function?

   ……
   ……

2. How does ICT contribute to university organization function?
   ……
   ……

3. How does ICT contribute to university supervision function?

   ……
   ……

4. How does ICT contribute to university direction function?

   ……

   ……

5. How does ICT contribute to university coordination function?

   ……
   ……

6. How does ICT contribute to university budgeting function?

   ……
   ……

7. Does this institution provide access of ICT to staff?

   ……

   If yes, kindly explain how this has been done.

   ……
   ……..

8. Does this institution provide access of ICT to students for learning?

   ……
   If yes, kindly explain how this has been done.

   ……..
   …….

9. In which way does the adoption and implementation of ICT improve problem solving at the University?

   ……..
   ……..

10. How does the University management ensure the training and implementation of ICT is university wide?

    ……
    ……

11. What do you suggest as ways of improving ICT use by the University management?

    ……
    ……

THANK YOU FOR YOUR TIME

Appendix L: Krejcie & Morgan (1970) Sample Size determination table

SAMPLE SIZE DETERMINATION TABLE BASED ON A GIVEN POPULATION

N	*S*	*N*	*S*	*N*	*S*
10	10	220	140	1200	291
15	14	230	144	1300	297
20	19	240	148	1400	302
25	24	250	152	1500	306
30	28	260	155	1600	310
35	32	270	159	1700	313
40	36	280	162	1800	317
45	40	290	165	1900	320
50	44	300	169	2000	322
55	48	320	175	2200	327
60	52	340	181	2400	331
65	56	360	186	2600	335
70	59	380	191	2800	338
75	63	400	196	3000	341
80	66	420	201	3500	346
85	70	440	205	4000	351
90	73	460	210	4500	354
95	76	480	214	5000	357
100	80	500	217	6000	361
110	86	550	226	7000	364
120	92	600	234	8000	367
130	97	650	242	9000	368
140	103	700	248	10000	370
150	108	750	254	15000	375
160	113	800	260	20000	377
170	118	850	265	30000	379
180	123	900	269	40000	380
190	127	950	274	50000	381
200	132	1000	278	75000	382
210	136	1100	285	1000000	384

Source: Krejcie & Morgan (1970)

Note. *N* is population size. *S* is sample size.

Appendix M: Turnitin Report

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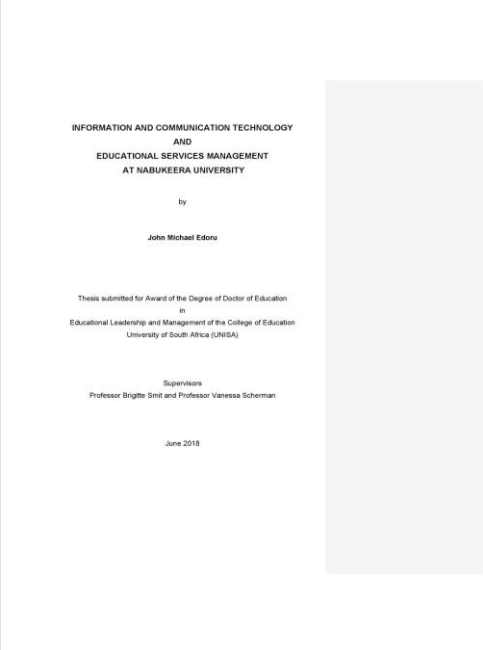

INFORMATION AND COMMUNICATION TECHNOLOGY
AND
EDUCATIONAL SERVICES MANAGEMENT
AT NABUKEERA UNIVERSITY

by

John Michael Edoru

Thesis submitted for Award of the Degree of Doctor of Education
in
Educational Leadership and Management of the College of Education
University of South Africa (UNISA)

Supervisors
Professor Brigitte Smit and Professor Vanessa Scherman

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Appendix N: Editorial Letter

EDITING SERVICES

To whom it may concern

This letter serves to confirm that editing and proofreading was done for:

John Michael Edoru

Degree of Doctor of Education in Educational Leadership and Management

Information and Communication Technology and Educational Services Management at a Ugandan University

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