INFORMATION AND COMMUNICATION TECHNOLOGIES AND ACADEMIC LIBRARY SERVICES AND OPERATIONS

By

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DECLARATION

I declare that "*Information and communication technologies and academic library services and operations*" is my work, that it has not been submitted for any degree or examination in any other University, and that all the sources I have used or quoted have been indicated and acknowledged by means of complete referencing.

Yumnaa Ocks

I declare that this dissertation: "*Information and communication technologies and academic library services and operations*" was submitted to Turnitin resulting in a similarity index of 14%.

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Dr Oghenere Salubi   November, 2020

ABSTRACT

Information Communication Technologies (ICTs) continue to have a major influence in the promotion and dissemination of information, which has and continues to shape new realities of virtual campuses and virtual libraries, thus allowing students access to information and encouraging participation. This study aims to investigate the impact of Information Communication Technologies (ICTs) on academic library services provision and operations, as well as how this has influenced the use of library information resources by undergraduate and postgraduate students at the university. The objectives of the research were to: assess the impact of ICTs on academic library operations and the academic librarians' functions, assess how ICTs have influenced undergraduate and postgraduate students' use of library information resources, identify the challenges of ICT-based library operations and services; and identify how conventional library and information services can be delivered more efficiently through ICTs. A descriptive survey research design has been employed for this research study. As data gathering tools, web-based electronic questionnaires were employed within this study. The study highlights the importance and impact of ICTs within academic libraries, library operations and users' support. The Study also draws attention to the importance of implementing ICT policies and practices for library operations and practices bounded by the technology acceptance model (TAM). Findings from the study indicate the emergence of ICTs in libraries has drastically changed the dynamics of library operations and services in areas including Online Public Access Catalogue (OPAC), wireless networks, library marketing and online reference services. The findings also revealed that although the use of ICTs in academic libraries enables libraries to offer faster and efficient services, challenges and obstacles are prevalent, including lack of training in ICTs and insufficient ICT infrastructure. It is pivotal for libraries to formulate and implement an ICT strategic plan to be used as a guideline for ICT planning of short and long-term developmental programmes. Sufficient funding and effective training programmes should also be of the utmost importance to ensure sustainability and relevancy.

Keywords: Information Communication Technologies, Academic libraries, Technology Acceptance Model, Library services, University of the Western Cape Library.

DEDICATION

To my God Almighty, I praise you for this opportunity, guidance and in answering my prayers. This thesis is dedicated to my mother, who have raised me to be the person I am today. You have been with me every step of the way, through good times and bad. Thank you for all the unconditional love, guidance, prayers and support that you have always given me, helping me to succeed and instilling in me the confidence that I am capable of doing anything I put my mind to. To my husband, Imaad Suliman, thank you for all your love, unwavering support and endless motivation, thank you for being my anchor. I could not have done this without your endless patience and motivation. Thank you.

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CHAPTER ONE

INTRODUCTION TO THE STUDY

1.1   Introduction

This study investigated the use of Information Communication Technologies (ICTs) amongst students and library staff at the University of the Western Cape (UWC) libraries. This project aimed to investigate the impact of Information Communication Technologies on academic library services provision and operations, as well as how this has influenced the use of library information resources by undergraduate and postgraduate students at the university. According to Devi and Singh (2004), the Library and Information Science (LIS) profession is a challenging and demanding profession within the current web environment. Libraries are required to keep up with computer technology trends for knowledge transmission and networks.

ICTs with their expansive information sources, fast transmission and easy access ensure user satisfaction with complex information needs, breaking down any distance barriers, shortening the time needed and ensuring that the right information reaches the right reader at the right time (Devi & Singh, 2004). Information Communication Technology (ICT) also assists in the increased demand for library collection development (Devi & Singh, 2004).

It is therefore evident that digital information services are essential in libraries as there is a growing demand from users. It is also clear that technology will continue to evolve and, to keep up with these trends, librarians will have to utilize the changing technology in order to provide effective, efficient access and services to patrons. Traditional functions in the library have improved with the use of ICTs; librarians are therefore expected to be higher system thinkers with proficiency in working in digital and computer communication environments.

Librarians are tasked with the responsibility of acquiring, organising, managing and sharing library resources, and ensuring that library provision meets the needs of all its users. Devi and Singh (2004) argued that librarians therefore require the necessary skills and knowledge in ICT techniques and handling procedures to remain relevant and to deliver these services effectively and efficiently. It is therefore common for a functional library to recruit a

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competent librarian with a sound knowledge background of different ICTs who can make use of them to render services that will satisfy users' needs.

This paper examined the changing roles of librarians in the technological era, by acquiring and applying the necessary skills to understand the evolving technologies and using this to manage and fulfil the information needs of patrons within the knowledge society. This paper also examined the changes in service delivery in academic libraries and its impact on undergraduate and postgraduate students. It is on this note that the researcher considers that there is a need for a study such as this, to unravel the necessary ICT skills that librarians need to possess in the digital age.

1.2   Background

According to Enakrire and Ocholla (2017: 1), the key focus of academic libraries is to support teaching, research and learning. An academic library aims to deliver services to students, academics and researchers at all levels; hence, librarians must know how to acquire and provide available required databases for teaching, research and learning to the university community (Enakrire & Ocholla, 2017: 2). The university library is central to teaching, research and learning in every university system, hence it usually occupies a central position on the university campus (Enakrire & Ocholla, 2017: 2).

Enakrire and Ocholla (2017: 7) defined ICT as a collection of technological tools and resources that can be used to communicate, create, manage, store information and disseminate knowledge globally. Blurton (1999) also reported that ICTs comprise a set of technologies that are applied in the process of storing, collecting, transferring and retrieving information in various formats. Enakrire and Ocholla (2017: 7) further stated that ICT comprises technologies such as cable, satellite, television, telecommunication technologies, radio, video conferencing and computer-mediated conferencing, digital technologies such as computers, information networks, software applications, internet, intranets and extranets, and the World Wide Web. According to Islam and Islam (2015: 811), this term has globally changed the way we collect, preserve and share information. The Information explosion could have originated in the seventeenth and nineteenth century, as information became an integral factor to any human activity (Wilson, 2001). Wilson (2001) also argued that a contributing factor to the information explosion was the significant growth of scientific journals providing and sharing information amongst scientific researchers. Hjorland (2006)

further concluded that additional pages of books and professional journals, which have rapidly increased, characterize the occurrence of the paper or publication explosion. Hjorland (2006) suggested that this is due to the publish or perish movement among academics and researchers. Owing to the rapid creation of knowledge it is believed that some research papers will become obsolete and may lack relevance within the next ten years, especially in the area of science.

ICTs and the internet continue to have a major influence on promoting the dissemination of information, specifically in the academic sector, enabling rapid collaboration and communication among organizations and businesses, supporting collaboration among researchers (Joshi, Meza, Costa, Perin, Trout & Rayamajih, 2013). This could lead to "virtual campuses" and "virtual libraries" thus allowing students access to information and encouraging participation (Ogunsola, 2005). Ogunsola (2005) reported that Nancy Schiller used the term "virtual library" which refers to "libraries in which computer and telecommunications technologies enable access to a wide range of information resources possible" (Ogunsola, 2005). This concept is also referred to as an "electronic library", a "digital library", a "community network", or simply "libraries without walls" (Ogunsola, 2005). The information revolution and networked domains have enabled virtual information centres to exist without walls, where data and knowledge can now be shared globally (Islam & Islam, 2015: 814).

Librarians are expected to be proficient and forward thinkers within the digital communication environment (Islam & Islam, 2015: 814). Hysa and Juznic (2013: 2) suggest that librarians as information professionals should enhance their computer competencies, allowing them to keep up to date with the necessary knowledge and skills required in this digital era. They argue that these characteristics are an integral factor in maintaining effectiveness within the library (Hysa & Juznic, 2013: 2). They also report that a move from a conventional library environment to a new digital one has forced LIS education systems to change its programmes and curricula to provide sufficient content and practice that will enable librarians with the necessary competencies to meet the needs of twenty-first century patrons (Hysa & Juznic, 2013: 2).

The University of the Western Cape is one of the public universities (University of the Western Cape, 2019), which has been playing a distinctive academic role in helping to build

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an equitable and dynamic nation. It was established as a college in 1959 and gained university status in 1970.

Library services at the University of the Western Cape, consists of the lending Services, the reading Room, the hub for students with disabilities, 24/7 services, work-integrated and the Inter Library Loans Services for the university community (University of the Western Cape, 2019). The library employs fifty-two permanent staff members, both professional and administrative support (University of the Western Cape, 2019). The library has 8000 weekly active student users and a total library staff population of 52 staff members.

1.3 Rationale

ICTs are being used by academic libraries to access digitised information thereby enabling institutions to automate the core functions of library operations and services (Enakrire & Ocholla, 2017: 3). According to Rowley (2015: 433), librarians have shifted from being custodians of knowledge and information to facilitators of library services and resources, through planning and conducting educational seminars, workshops and creating awareness on current issues through display activities. Librarians have also employed new techniques, skills and knowledge to maintain information and knowledge, using ICT tools (Rowley, 2015: 433).

It is evident that ICTs have been found to be a useful and important factor in all aspects of life such as education, business, politics, banking, religion and social activities, etc. (Furfuri, Maru, Musa & Isiaka, 2019). According to Furfuri, et al., (2019) in librarianship, the impact of ICTs in terms of professional development, adaptation and implementation of innovative practices is so vital that no library can improve its performance without implementing it. Ideally, librarians should collectively be proactive towards the adoption and implementation of ICTs by investing in ICT infrastructure and increasing the use of ICT in the delivery of library services and routines (Furfuri, et al., 2019).

Lichterman (2011) reports that it is a common assumption to attribute the advent of ICT as a potential threat to eliminate the importance of the library, its resources and its personnel. However, Lichterman (2011) averred that the internet had drastically changed the way users interact with information and had redefined the library's place in academia and society. Lichterman (2011) also stated that technology cannot work in isolation without a professional

to manage it. In the face of advancement in information provision, it is important that libraries and librarians evolve and are innovative.

Ajie (2019) reported that when taking a critical look at what is happening in libraries in developed countries, it is clear that library personnel in developing countries are lagging behind. It is therefore appropriate for all libraries to upskill their personnel to enable them to fit into the twenty-first century global world.

As a result of the influx of knowledge and information, ICTs have become a necessity for the proper management of operations and functions within an organization (Islam & Islam, 2015: 816). Freeman (2005) reports that all technological innovations and transitions will inevitably change the library and its operations, however, he states that the library remains a pivotal place where all these essential services can be obtained and provided for users. According to Islam and Islam (2015: 817), the academic library "as a place" has a central position within an institution. It is at the heart of the academic experience; it should offer adaptable spaces, accommodating and facilitating different modes of learning (Islam & Islam, 2015: 817). Information technology should form part of the library's internal environment rather than replacing the academic library (Islam & Islam, 2015: 817). The rationale of this study is that current trends of library services and operations require the implementation of ICTs to meet users' complex information needs.

1.4   Research Problem

According to Fox and Bayat (2007: 14), the concept of a research problem can be defined as filtering down the common interest in a research topic onto a specific research problem that is small enough to be explored. It is clear that the innovation of technology has created a major shift in all disciplines including library services and librarianship (Freeman, 2005). The LIS's role in a changing era requires redefining service skills to remain important (Freeman, 2005). It is evident that as library professionals continue to reduce their print collection in light of readily available digital resources, the impact of a changing landscape compels libraries to implement and to employ new concepts of its mission and purpose, in the midst of a transforming digital age (Freeman, 2005). It is therefore becoming increasingly vital for librarians to innovate and highlight their relevance in a drastically transformative, technologically dynamic work-environment (Rowley, 2015: 438).

These challenges to the conventional role of the academic library require professionals to repurpose and reconsider libraries' purposes and services (Rowley, 2015: 438). A major challenge lies in maintaining relevancy through communication, which requires the library to broaden its service provision outlook from only user satisfaction towards meeting unarticulated needs, ensuring that the services supplied and its role within the university community remain constantly in demand (Rowley, 2015: 438).

1.5   Objectives of the Study

The main objectives of this study are to:

1. Assess the impact of ICTs on academic library operations and academic librarians' functions.
2. Assess how ICTs have influenced undergraduate and postgraduate students' use of library information resources.
3. Identify the challenges of ICT-based library operations and services.
4. Identify how conventional library and information services can be delivered more efficiently through using ICTs.

1.6   Research Questions

The following research questions will seek answers:

1. To what extent have ICTs impacted academic library operations as well as academic librarians' functions?
2. How have ICTs influenced undergraduate and postgraduate students' use of library information resources?
3. What challenges do librarians and students experience in the utilisation of ICT-based library operations and services?
4. In what ways can ICTs be used to deliver more efficient library and information services?

1.7   Theoretical Framework

The Matching Person and Technology model put forward by Scherer and Craddock (2002) emerged from a grounded theory research study. This theory stated that a good match of person and technology requires focus to be directed to aspects of the environments in which the technology will be used, the preferences and the needs of the user, and the functions and features of the technology (Scherer & Craddock, 2002: 127). The theory also argued that if the match is not one of quality based on the consumer's perspective, the technology may not be used. Although the technology may not match the user, the content being provided through the technology could be preferred. This theory would not be used for this study as it fails to consider the relevance of the content being provided through the technology.

The theory Technology Acceptance Model (TAM) by Davis (1989) was employed for this study. This model put forward that when users are presented with new technology, a number of factors influence their perceptions and their decisions about how and when they can make use of it (Davis, 1989). Davis (1989) suggested that the attitude of the user is influenced by two major beliefs: perceived usefulness (PU) and perceived ease of use (PEOU) (Davis, 1989).

PU is defined as: "the degree to which a person believes that using a particular system would enhance his or her job performance" (Davis, 1989). Hence, using mobiles and other electronic devices to search for information electronically can enhance a student's academic activities more than using traditional ways only. According to Kurniabudi and Setiawan (2014) the Technology Acceptance Model is great way to explain attitudes towards using ICTs. A limitation of the TAM is its generalisation about ease of usefulness; and this is part of what the study seeks to reveal.
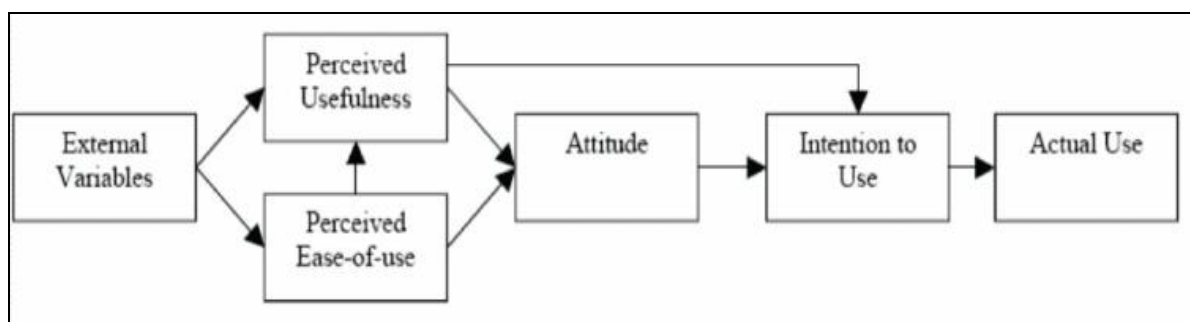
Figure 1: Davis (1989) TAM Theory

This model has extensively been used for predicting the adoption, acceptance and use of information technologies. Almasri (2014:7) argued that the TAM is an acceptable model, implemented largely in ICT systems such as internet banking, e-learning, online auctions, the World Wide Web, Radio Frequency Identification (RFID), e-portfolio systems, wireless LAN, Ecommerce, e-government and mobile learning.

TAM is a model that can be used to inform creators about the influence and impact of the system on the user's behaviour. Based on the strengths highlighted above, this model would therefore be relevant in investigating and exploring the objectives of this study.

1.8   Scope and Limitations

The scope of the study will be undergraduate and, postgraduate students, and librarians at the UWC library. The delimitation of the study is that it only focuses on the University of the Western Cape's community and the findings may not be broadly generalizable to the wider population.

1.9   Ethical Statement

The researcher adhered to the ethical guidelines of the University of the Western Cape's (UWC's) Ethics Committee. The rights of the participants will be strictly respected at all times. Consent will be obtained from the participants, and their anonymity will be guaranteed, as no information will be requested that could lead to the identification of the participants.

Participation in this research project will be voluntary and the participants will be allowed to withdraw at any stage of the research process. The data collection will only start after approval has been obtained from the UWC's Ethics Committee.

1.10   Chapter Summary

This introductory chapter outlined the background and the rationale of the study. The chapter outlined the objectives of this study, explained the problem statement and the purpose of the study. Research questions as well as the research design and methodology were explained. It highlighted the theoretical framework which comprised the Technology Acceptance Model (TAM) (Davis, 1989). Additionally, the scope and the limitations of the study were brought to light. The next chapter presents the literature review.

CHAPTER TWO

LITERATURE REVIEW AND THEORETICAL FRAMEWORK

2.1   Introduction

This chapter will focus on literature reviews related to the impact of ICTs within libraries, more specifically academic libraries, the implications and the impact on services and operations within the library. The literature reviewed in this chapter is governed by the research problem, the purpose of the study, and the objectives of this study. The study applied David's (1989) Technology Acceptance Model (TAM) as the theoretical framework.

2.2   Transformation of Academic Services and Operations due to ICTs

Academic libraries are seen as an important element in higher education, often known as the "heart" of university institutions (Okonedo, Amusa, Bakare, Bamigboye and Alawiye, 2014). Academic libraries are used as pillars in supporting and achieving the vision and the mission of universities. In achieving this, academic libraries have to provide innovative information services and resources in an easy, fast and convenient way. Implementing and integrating ICTs within library functions and services has made this possible (Okonedo et al., 2014).

According to Peyala (2011), the use of innovative information technology (IT) has contributed immensely to making life easier. IT, combined with computer and telecommunication techniques, has made it possible to create innovative systems and products used in the workplace, the home and the education realms. With the use of ICTs and communication devices such as video conferencing, emails, mobile phones and faxes, obstacles such as time and space no longer exist.

IT was introduced to libraries, specifically academic libraries, in the 1960's (Gurikar & Mukherjee, 2015) bringing along with it tools used to speed up and reduce operations and their cost within the library environment (Gurikar & Mukherjee, 2015). Wireless networks, interactive web interfaces, online collections, reference services and web portals have brought significant changes within the digital era. Advancements in ICTs, such as the printing press introduced by Gutenberg and other innovative technologies, drastically altered libraries, librarians and librarianship in general (Momoh, 2018). Daily operations in libraries such as acquisitions and cataloguing have changed from manual to automated operations (Gurikar & Mukherjee, 2015). Libraries further reported that other activities such as

organization and planning, circulation and other routine operations have been largely improved by the use of ICTs.

Krubu and Osawaru (2011) reported that additional ICT advancement tools used in the library could refer to online services, CD-ROMs, electronic databases etc. Conventional library and information services such as OPAC, current awareness services, user services, reference services, bibliographic services, document delivery, interlibrary loans, customer relations and audio-visual services can be provided more efficiently and effectively using ICTs. New ways of scholarly communication, the immense growth of mobile devices, the expansion of virtual spaces for libraries and the proliferation of social media have collectively affected the traditional role of academic libraries (Raju, 2014).

ICTs have transformed library institutions from just being a physical structure housing information resources, to online collections, accessibility off-campus, within classrooms, within offices and globally. It is evident that the use of ICTs has had a positive impact on the quality of information delivery. Users are now able to access information at the click of a button within their homes, classrooms and offices, without having to physically visit the library (Olaniyi, Omotosho, Oluwatosin, Towolawi & Ezeronye, 2012).

Reports by researchers have acknowledged the contributions of ICTs and their impact on several aspects (Park, Roman, Lee & Chung, 2009). ICTs have been used effectively in the provision of information within the information explosion era. Furfuri et al. (2019) elaborates and states that there has been a significant increase in the usage of ICTs. Furfuri et al. (2019) also stated that this could be seen in the activities within libraries. Libraries are now ICT driven, incorporating ICTs in effectively storing, processing, acquiring, retrieving and disseminating resources. Library operations such as circulation, cataloguing, acquisitions, and serials management have changed drastically due to the use of technology. According to Saleem, Shabana and Batcha (2013) easy and rapid access to information is of immense importance, especially in the higher education arena. Information processing, storage, communication, dissemination of information automation etc., furthered the development of the internet, thus revolutionizing information communication technologies.

2.2.1 The use of information technologies in libraries

Innovations and advancements within the digital era have brought about contemporary tools used for sharing, searching and preserving information. These services enable libraries to

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create awareness about library products and services. Current awareness services (CASs) keep users up to date with the latest professional literature in their fields of interest and informs library users about new acquisitions in their libraries (Jibia, Mubaraka & Michael, 2013).

Cornell University Library uses ICT tools such as blog, the RSS feed, and citation alerts to notify their library users about new books, journal tables of contents, and databases subscribed to by the library, among other activities (Cornell University, 2017).

2.2.2 Indexing and abstracting services: cataloguing

Indexing and abstracting applications allow keywords to be highlighted within the electronic document, enabling users to find relevant and specific information more effectively and faster (Rowley, 1988). The need to be updated in all fields and to be kept abreast of any new developments has, therefore, become necessary in order to avoid duplication. This refers to systems that electronically classify information, index and catalogue resources, create database indexing and databases (Rowley, 1988).

Adeleke and Olorunsola (2010) stated that without the use of classification and cataloguing, making information resources and materials widely accessible and available would be very challenging for information professionals. The emergence of ICTs has created an opportunity for libraries to access huge databases from big libraries, remotely. Adeleke and Olorunsola (2010) reported that this changed the landscape of cataloguing and classification and made it possible to classify and catalogue materials effectively and quickly. The online catalogue hosts a vast online database of the collection of materials held by the Library of Congress.

The Online Public Access Catalogue (OPAC) is a catalogue of a library's collections that is open and accessible to the public, through the internet. This catalogue provides open access to the public of the library's collection and holdings. The OPAC creates a platform that enables users to search and locate resources at available libraries. Aina (2004) stated that the OPACs are a modern form of library cataloguing with efficient tools, making it more advantageous than other forms of catalogues. Swaminathan (2017) also stated that the OPAC enables users to search, access, renew, reserve and see the issue status of the library's collection. Unlike the traditional card catalogue, several users can search the database simultaneously. This innovative system enables librarians and users to access library resources without wasting time and energy. OPACs have enhanced and advanced searching tools. Users can search for

resources using any word in a title or any other field. Users can additionally retrieve data by using the ISBN, ISSN, author or title of the resource.

2.2.3 Library automation

Library automation can be defined as the ICTs used to replace manual systems used in the library (Levine-Clark, 2013). It is a system that minimizes human intervention during operations. Advantages of automation include but are not limited to, efficiency, automatic updates, speed, improved work consistency and the reduction of routine and repetitive work. Library automation has made cataloguing possible by allowing librarians to import bibliographic records from online trusted sites, for example 'OCLC WorldCat'.

2.2.4 Library Networking and Social Media

Library Networking is a concept that enables information centres and libraries to interconnect and collaborate, thus providing a platform to exchange and to share information (Venkatachalam, 2011). Libraries and librarians are becoming aware of these trends and are establishing a social presence. This allows them to promote library services and reach their user populations. Librarians can reach their users through a variety of communication methods by using innovative and enhanced social networking sites. The following social media platforms are used in the library environment :

Facebook: Sadeh (2007) suggested that library centres should look at integrating the use of social networking sites in enhancing user experiences and enabling libraries to remain relevant and interactive. Sadeh (2007) stated that networking sites such as Facebook could be used to regularly post updates and displays in the library.

YouTube: Internet access within the library allows and connects researchers to various information resources. YouTube is a platform that could be used by library users for free and open access to digital content. Videos uploaded to YouTube could also be used as teaching and learning tools outside traditional settings (Duncan, Yarwood-Ross & Haigh, 2013). Pearce and Tan (2012) concurred, stating that this could potentially lead to the development of research.

Twitter: Is a microblogging system that enables users to follow and interact with each other. It is a platform that could be used for community development and promoting interactions within organizations, for example libraries (Fiander, 2012).

2.2.5 Recreation virtual reality and escapism

The 2016 Horizon Report's higher education edition defined Virtual Reality (VR) as "computer-generated environments that simulate the physical presence of people and objects to generate realistic sensory experiences" (Johnson, Adams Becker, Cummins, Estrada., Freeman & Hall, 2016: 40) providing stereoscopic aural and visual information to the ears and eyes, which the system changes as a user moves their head, their hands, and their body. This innovative technology has the potential to shape the future of academic libraries which could use this tool to host services such as allowing patrons to search and browse library collections.

2.2.6 Reference services

Ranganathan (1961: 53) defined reference as a service that provides a "personal service to each reader in helping him to find the documents answering his interest at the moment pin pointedly, exhaustively and expeditiously". This can be traced back to the 1800's, namely, the introduction of library reference services by Samuel Swett Green. Reference services within libraries have largely changed as the result of innovative trends and developments in ICT services such as electronic mail, "ask the librarian", chat technologies, telephone etc.

2.2.7 ICT tools used for collection development and acquisition

Technological innovations and developments have changed the way information is circulated and presented. Hence, library collections are not limited only to print collections. In the past, library collections comprised manuscripts, books, physical journals and other forms of recorded information. The emergence of e-resources has however transformed the ability to access library collections. ICTs have made accessibility to library collections rapidly available simultaneously to anybody around the globe, 24/7 (Quadri, 2012).

Rafi, JianMing and Ahmad (2019) reported that due to the popularity and usage of digital technology, library subscriptions have increased for eBooks, eJournals, online databases etc. These online resources have expanded and extended the limitations of academic research. Online scholarly databases have become a reliable and rich source of published information for users (Rogers & Nielsen, 2017). The subscription to online databases allows students access to a wide spectrum of journals on various subjects. These databases mostly provide full text online articles, sometimes providing abstracts.

2.2.8 Interlibrary loan department

In a recent ARL White Paper on interlibrary loans (ILL), Beaubien (2007) noted that among 3,700 American degree-granting institutions surveyed by the National Centre for Education Statistics, there was a 26 percent increase in book borrowing between 1998-2004. This could be due to the continuous growth in books being published, making it difficult for libraries to meet demands of all users from its own collection only. The increase of book discovery tools such as Google Books, Takealot and Amazon could also have an impact on the increased user demands (Beaubien, 2007).

Improvements in this system have streamlined workflows, creating an easier and efficient process with quicker turnaround times. These improvements have increased the popularity of ILL services among users. It is also evident that libraries have increasingly relied on ILL services because of the shift in the importance of owning resources to providing access to them.

2.2.9 Research services in academic libraries

Libraries in academic institutions are a significant factor in providing valuable support to the research community. Information is the main element of research and development. Research in institutions sets a benchmark for development and increases the visibility of the institution and its ranking across the globe. Research development has a beneficial impact on the professional development of an employee. It contributes to their profile as well as to academic society (Du & Evans, 2011).

It is therefore evident that the researcher plays a prominent role in academic institutions. The researcher perceives the library as an institution that enables effective research to be conducted and offers a repository filled with information and knowledge. It is therefore important for researchers to be offered guidance in effective research techniques (Du & Evans, 2011). This includes guidance by librarians in consulting relevant literature, using the correct medium and using Boolean operators to retrieve relevant data. Using ICT tools and products in the library provides a research friendly environment, encouraging a more engaging and easier process. Research involvement in the library also allows the librarian to have familiarity with the researcher's workflow. This can encourage librarians to seek and use innovative products that can be integrated into their workflow. Librarians assist researchers by providing them with

relevant and recent journals, databases, library website updates and implementing new technologies, software and applications.

Mendeley: Mendeley is an online reference manager and academic social network. It helps researchers to organize their material and collaborate with others online; to discover the latest research in their field. The library of the University of the Western Cape has installed the Mendeley Desktop software application on its desktops for users. The emergence of Institutional Repositories (IRs) is a new phenomenon that provides an opportunity for an institution to share its digitized intellectual wealth with the worldwide community of scholars and provide a long-term preservation solution (Saini, 2018). Saini (2018) also stated that institutional repositories promote visibility and open access to the research.

2.3 Transformations that Emerged in LIS Operations and Services in the Last Decade, due to ICTs

Library operations and services using ICTs have broadened and increased the expectancy of efficient and effective modern libraries. Library automation has promoted easy and quick access to the usage and transferring of data around the world. This advancement has made accessibility to world information and knowledge possible from any part of the globe.

In the last eight to ten years, Web 2.0 has revolutionized information communication by faster information sharing, networking, and enabling multimedia services. The emergence of social networking and interactions has driven libraries to adopt technological tools in their daily routines, to meet the user's expectations and information needs. Librarians are now expected to be able to use and demonstrate emerging ICT tools that are being used for housekeeping operations such as circulations, cataloguing, acquisitions, serial control, etc. of an academic library setup. They have drastically changed the management of information resources or daily operations of libraries.

Afolabi and Abidoye (2012), reported that effective and efficient libraries make use of ICT tools and services such as computers, the internet, email, video conferencing and computer networking to carry out effective library operations. Afolabi and Abidoye (2012) further state that the functional applications of the computer in the library include ordering/acquisition, circulation, library database, documentation and administration, desktop publishing, budgeting, cataloguing/classification, serial management, and inter-library interactions.

2.4   Operations and Services in the Twenty-first Century Library

Saunders, Rozaklis and Abels (2014) stated that information seeking, searching and utilizations are the key roles of librarians. Saunders et al. (2014) further stated that the administration, acquisition, identification, classification, cataloguing and dissemination of information are common practices and are the roles of professional librarians. However, these operations and roles are changing due to the expansion of ICTs.

Academic libraries have added a networked environment to accommodate and extend library services, due to the behavioural and interest change of their patrons. Innovations in providing these services have improved library services and operations to users; thus, it is important to educate and empower librarians with the necessary skills and knowledge. Services and operations within libraries have drastically changed; mediums such as online journals, online databases, websites, and social media have enabled librarians to reach out to their users within the twenty-first century.

Reports have shown that ICT functions have been adopted by other academic libraries in South Africa (Hoskins, 2005), Ghana (Mingle, 2014), New Zealand and China (Cullen & Huanwen, 1999). Online cataloguing was a major technology adopted in most of these studies. Over the years, manual cataloguing has been one of the most complicated and tedious library tasks and Zaid (2008) noted that since the invention of online cataloguing, it is no longer common to see newly acquired resources held up in the cataloguing department for months. Odongo (2011) reported that some of the most heavily used and employed ICTs in Kenyan academic libraries include computers, barcode readers, book check systems and security check systems. However, Odongo's (2011) study further reveals that some technology facilities such as LCD projectors and laptop scanners are not common.

Based on a research study conducted in six university libraries in Karnataka (India), Nyamboga and Kemparaju (2002) reported that some Indian academic libraries still lag behind in the utilization of information technology, but the introduction of internet access is an important stepping-stone. The study revealed that with basic IT literacy, library users and staff are able to retrieve more up to date supplements than what they get from printed information sources, increasing the efficiency and the effectiveness of the libraries, as well as helping to bring the whole institution into the information age.

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Ramana and Rao (2003) conducted a useful study about the current state of the art of using information technology in libraries in India. The survey confirmed that information technology has been deeply implemented in the management of information within academic libraries. It has become a powerful tool in the handling of routine library operations and services. The analysis has shown that the use of ICTs in libraries is increasing steadily and significantly.

2.5 The Impact of ICTs in Libraries

According to Ukachi, Onuoha and Nwachukwu (2014), the introduction of numerous and diverse ICT trends has led to restructuring of the library, a shift in work patterns, a need for new skills, and a reclassification of positions and job retention in libraries. This has also brought about a shift in the way libraries share, retrieve and access information. The rise of technology has resulted in the internet being the world's biggest warehouse of information and knowledge. This has led to digital education, learning and publishing. Marketing strategies have also been implemented in libraries to understand the needs of users better (Abubakar & Adetimirinz, 2015).

Sharma, Singh and Sharma, (2011), reported that libraries have moved away from document–centred information to a user–centred information framework (Sharma et al., 2011). Virtual visits to library resources online are outnumbering physical visits, causing library figures not to be a true reflection of user traffic using library resources.

The advancement in ICTs has created different schools of thought in relation to Library and Information Science. One school of thought aligns itself with the short run perspective, while the other school of thought aligns itself with the long run perspective. The short run perspective is of the opinion that ICTs have made library services and operations more convenient, faster and efficient. The long run perspective shares this thought, but differs in its opinion, when it comes to the human factor. This school of thought adds that five employees can manually perform a task, but with the use of ICTs, the task can be performed by one employee in an automated approach.

2.6 The Internet in the Twenty-first Century

The internet is often referred to today as the gateway to information. Edmunds, Thorpe and Conole (2012) reported that this powerful portal can have an impact on the way people learn, particularly in higher education institutions. Innovations and advancements in ICTs have created new opportunities, allowing students to share their learning experiences, ideas, opinions and research discoveries through digital and virtual platforms. These interactions are possible through internet technology and are commonly known as social media.

It is vital for higher learning institutions to maintain relevancy by staying up to date with current technological advancements in teaching and learning. Many higher education institutions have installed the necessary infrastructure around their campuses, enhancing the teaching and learning experience. Edmunds et al., (2012) elaborate and state that the installation of wireless hotspots allows students to access the internet more conveniently, anywhere on campus. Wireless hotspots and network cables provides students easy access to the internet, using it to communicate with peers and lecturers, search and retrieve information, download learning notes and access library materials.

2.6.1 Internet based tools used in academic library services

Internet based tools have visual and audio capabilities for capturing, connecting, storing and retrieving features that include:

- Blogs enable authors to publish and post their work. This online tool is being effectively used by various libraries across the world to update users regarding library resources and services. This platform can also be used for book reviews and information about new books, which could result in better utilization of library resources.

- Wikis allow users to facilitate and promote 'common creation' through joint academic ventures. The Library Instruction is an example of a wiki that is used for collaboration among libraries. A collaboratively developed resource for librarians involved with or interested in instruction, the wiki supports library instruction in general.

- Social networking sites allow users to tag, collate and share websites of their interests with each other. These websites allow users and organizations to create accounts for bookmarking online content, provide academic libraries with tools to collaborate and

network, organize and share electronic resources and teach information literacy (Redden, 2010).

2.7 ICT-related Challenges for Academic Libraries in Developing Countries

A university library, which occupies the central primary place in teaching and research, has to meet the diverse and growing needs of the educational programme at the undergraduate, postgraduate and research levels. The need for professional librarians to develop skills relating to technology has significantly increased since the usage of ICTs in library operations and services. This shift has created a need for librarians to assume different roles and tasks.

It is reported that ICTs used in libraries create challenges for professional librarians in developing countries. Training in developing skills and competencies in the usage of ICTs is required, making it essential for ICT skills and curricula to be integrated for information professionals. Veronica (2014) also stated that the speed of innovations and transitions in ICTs requires realignment and upgrades in computer skills within the librarian profession. These skills will have a direct bearing on library operations and services and are required in order for the libraries to succeed. Additionally, Veronica (2014) stated that these training programmes could range from updating or creating websites to working efficiently with staff members and users. Using computers could enable librarians to navigate within application software and access information globally.

Veronica (2014) further reported that a librarian is a pivotal component to information in any library, especially information accessed through digital platforms. It is evident that it is vital to equip librarians with skills on the ability to analyse, access, apply and evaluate information rapidly (Koganuramath, Choukimath & Agadi, 2014). To be successful, librarians need to be alert, creative and informed about what is happening in their environment. Therefore, they should strive to improve their skills and match these with the tremendous developments of the current digital age.

2.8 Benefits of ICTs in Academic Libraries

Libraries and information centres have embraced ICT tools more profoundly than many other fields have, and most of them are currently using electronic products and services (Hussain &

Lavanya, 2014). Owing to ICT enabled products and services, libraries have changed the way forward, in terms of the provision of information services. These products and services show how computer and communication technologies have been integrated, and can be applied, to store and disseminate information.

2.9 Theoretical Framework

According to Urhiewhu and Emojorho (2015), using digital resources is usually faster than using print indexes; they are also less complicated, enabling the use of a combination of keywords, which significantly reduces the time spent searching. Urhiewhu and Emojorho (2015) also stated that digital resources allow users to search multiple files at the same time, making it more effective than printing equivalents.

One theory in information science is particularly useful for explaining how digital information resources are utilized. The Technology Acceptance Model (TAM) propounded by Davis (1989), is an information systems theory that models how users come to accept and use technology. The model suggests that when end-users make use of a novel technology, various factors influence their decision about how and when they will make use of it. Ducey (2013: 20) explained that the TAM includes Perceived Ease of Use and Perceived Usefulness as important determinants of technology acceptance and user behaviour. This model is extensively used and considered as powerful and influential in the prediction and explanation of users' technology behaviour (Agag & El-Masry, 2016).

Yuvaraj's (2014) study showed that the perceived ease of use had a significant impact on attitudes towards usage and perceived ease of use. Miller and Khera (2010) also state that particular predictors of perceived usefulness and perceived ease of use are consistent across cultures (relevance, trust, and ease of access). Efforts to search information in traditional ways are automatically reduced with the use of technology, thus making this model relevant in this study. The acceptance of technologies within the field of research has been of major interest (Weerasinghe & Hindagolla, 2017). Some studies have explored ways of highlighting the challenges in using ICTs, promoting and examining the intentions of users.

Theories including the Theory of Reasoned Action (1975), the Technology Acceptance Model (1989), the Theory of Planned Behaviour (1991), Social Cognitive Theory (1986), the Information System Success Model (1992), the Diffusion of Innovations (1995), TAM 2

(2000), the decomposed Theory of Planned Behaviour (1995), and Combined TAM and TPB (Augmented TAM, 2010) have been used to explore the impacts and factors of technology. It is vital to have a better understanding of the settings surrounding the evolution of the TAM model, especially since the use of technology is used in almost every aspect of human life, making it imperative to understand why technology is rejected or accepted (Marangunić & Granić, 2015: 85).

The Theory of Reasoned Action (TRA) was developed to predict and comprehend human behaviour and attitudes. This theory critically evaluated behavioural intentions rather than attitudes as predictors of behaviour. The theory also implies that behaviour could be determined by previous intentions alongside beliefs that a person has, for a given behaviour (Fishbein & Ajzen, 2011). This model uses three components, namely behavioural intention, attitude and subjective norms affecting behaviour (Lu, Huang & Lo, 2010).

The Theory of Planned Behaviour (TPB) was formulated to take care of the limitations of the Theory of Reasoned Action (TRA) and set out to predict the intention of people to engage in behaviour within a particular place and time and to describe all behaviours over which an individual has the capacity to apply self-control (Ajzen 2011). Davis (1989) modified the above theories and originated the TAM, which aims to predict the acceptance or the rejection of modern technology.

2.9.1 Overview of the TAM

Initially proposed by Davis (1989), TAM has been shown to be a widely used innovation adoption model (Agag & El-Masry, 2016). This model has been used and evaluated in various contexts such as software applications, information systems and e-commerce. This model also provides a framework for exploring external variables on system usage. The model suggests that using information systems is highly influenced by users' intentions to use the system, which in turn is determined by the users' beliefs about the system. Therefore, the objective of this paper is to identify important external variables that have significant effects, through using the TAM model, on potential users' intentions to use ICT tools in academic libraries.

The model is also used to predict the use and the acceptance of ICT tools such as Electronic Mail, the World Wide Web, e-commerce, e-learning and online games (Xu & Du, 2018).

Abdullah, Ward and Ahmed (2016) state that ease of use can be defined as the extent to which a user believes that using a particular system would be free of effort. Agag and El-Masry (2016) reported that improvements in ease of use may be influential in improving user performance. Agag and El-Masry (2016) stated further that an increase in user performance has a direct influence on perceived usefulness.

A study conducted by Joo and Choi (2016), revealed that undergraduates' continuing intention to use an online library as a resource is highly influenced by perceived usefulness and ease of use. Matusiak (2012) reported that usefulness is one of the main factors that influenced usage of digital library resources. Agag and El-Masry (2016) similarly reported that both usefulness and ease of use significantly influenced user acceptance of digital libraries.

However, Fishbein and Ajzen (2011) argued that this theory may be valid only for the personal use of technology, as users may be influenced by friends and colleagues to buy and use a system based on an expert recommendation taken from an advertisement. Fishbein and Ajzen (2011) stated that the use of technology in the working environment should not be overly influenced by an employee's friends, but that they should rather follow organizational guidelines. Rule-governed behaviour at work that recommends librarians should be using a particular system argues that perceived usefulness and ease of use might not influence the attitude of a librarian who has been told to use an LIS system. They are only complying and following the institutional and library system rules because of the nature of services rendered. Another limitation is that underlying behaviour cannot be reliably quantified in an empirical investigation owing to the number of different subjective factors such as the norms and the values of society, personal attributes and personality traits. Criticism by Zahid, Ashraf, Malik, & Hoque (2013) suggested that the model does not consider factors such as age and education as external variables which could influence the willingness to use the system and the use of new technology.

This model was also specifically developed to highlight the factors of computer acceptance that are capable of explaining users' behaviour across a variety of end-user computing technologies (Rauniar, Rawski, Yang & Johnson, 2014). Consequently, the more employees recognize that the systems will make their tasks easier to perform, the higher the probability

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that they will use it and accept the new technology as being useful (Marangunić & Granić, 2015: 85).

Numerous empirical studies have found that TAM consistently explains a substantial proportion of the variance in usage intentions and behaviours when they utilize a variety of information technologies. The TAM is therefore relevant within this study as it aims to predict and could be used to explain the acceptance or the rejection of modern technology by students and library staff at the University of the Western Cape.

2.9.1.1 Perceived usefulness (PU)

Perceived usefulness can be defined as the extent to which a user believes that using a particular system will enhance his or her job performance (Abdullah et al., 2016). Chen, Lin, Yeh and Lou (2013) stated that researchers reported that a major relationship exists between system characteristics and measures concerning perceived usefulness. Chen et al. (2013) also reported that system characteristics can have a direct influence on users' perceptions on usefulness and ease of use concerning information systems.

Hayes (2018) stated that the impact of perceived usefulness can be seen in the daily operations performed by librarians. This is best illustrated by cataloguing, an area that has drastically changed in the past 20 years (Hayes, 2018). The impact of bibliographic utilities has led to dramatic reductions in the staffing of technical services, shifting the focus towards user services. It enables the library to provide value added services to users and improve their productivity.

2.9.1.2 Perceived ease of use (PEOU)

According to Awa, Ojiabo and Emecheta (2015), PEOU evaluated users' perceptions of the mental effort required to utilize specific applications. They argued that less mental effort is required to use the application, which attracts users to adopting certain behaviours. Thus, technologies with complicated user interfaces and difficult learning tools are less likely to be used. PEOU is linked to PU, as it influences short-term usefulness, since improvement in it contributes positively to outcomes and confirms the positive relationships between ease of use and attitude towards use, showing that PEOU is a proven determinant of users' intentions to accept IT. If a user perceives a digital library to be non-user friendly, with interruptions,

inefficient navigation and with an unclear layout, this might deter them from using that platform (Agag & El-Masry, 2016). The user might also consider the platform of low utility if they are required to make greater effort in using it, and could consider it as outdated, restricted and irrelevant information (Agag & El-Masry, 2016).

2.10 Chapter Summary

This literature review highlighted the use and the impact of ICTs in academic libraries. The chapter also discussed the use of the internet in the twenty-first century, and the benefits and challenges associated with ICTs in academic libraries. An overview of the theoretical framework used within this study was also outlined in this chapter. The next chapter will focus on the research design and the methodology used.

RESEARCH DESIGN AND METHODOLOGY

3.1 Introduction

This chapter describes the research methods and techniques used in the study. It explains the selected research design and methodology used. The latter is defined by Miller and Brewer (2003: 193) as a set of rules and procedures guiding the research process and evaluating its claims. The research design describes the research structure and stipulates everything that needs to be done to complete the research.

It is a detailed plan on how the research is to be conducted and how the data is to be collected and analysed (Thyer, 1998: 94). In this chapter, the research methodology; the research approach and plan; the study population; the study sample; data collection, and data analysis are addressed. Lastly, the ethical issues that were followed in the process are also discussed.

3.2 Research Design

According to Rubin and Babbie (2009), a research design involves a set of decisions with regard to what topic is to be studied, what population will be sampled, what research methods will be followed and what purposes will be served (Rubin & Babbie, 2009). A research design could also be defined as a plan outlining how observations will be made and how the researcher will carry out the project (Monette, Sullivan & DeJong, 2010).

Saunders and Lewis (2012) also stated that it is a framework for the collection and analysis of data to answer research questions and meet the research objectives. Saunders and Lewis (2012) further opined that a research design provides reasoned justification for the choice of data source, collection methods and analysis techniques.

A descriptive survey research design has been employed for this research study. A descriptive study refers to a research design that produces an accurate representation of persons, events or situations. According to Covey (2002: 6), a survey is an effective way to gather information about an organization, people's attitudes, beliefs and feelings. Polit and Beck (2004: 234) concurred with this and stated that the term "survey" can be used to designate

any research activity in which an investigator gathers data from a portion of a population for examining the characteristics, opinions or intentions of that population.

According to Zurmuehlen (1981), a descriptive survey attempts to establish the range and distribution of some social characteristics, such as education or training, occupation, and location, and to explore how these characteristics may be related to certain behaviour patterns or attitudes. Saunders and Lewis (2012) reported that a survey strategy allows the researcher to collect quantitative data, which can then be analysed quantitatively, using descriptive and inferential statistics.

A descriptive design was selected for this study because of the high degree of representativeness and the ease with which a researcher could obtain participants' opinions (Polit & Beck 2004: 50). The descriptive design employed within this study was deemed suitable as the University of the Western Cape has 22 835 students and this study has a high degree of representativeness (University of the Western Cape, 2018).

A survey needs a structured collection of data from a sizeable population. Data collection may comprise questionnaires or structured interviews. This method therefore is relevant within this study as the study aims to investigate the opinions and the attitudes of the sample with regard to the impact of ICTs on library services and operations.

3.3   Research Methodology

This study will employ quantitative research methods. Quantitative research can be defined as data consisting of numbers or data that has been quantified (Saunders, Lewis & Thornhill, 2012: 233). Quantitative Research uses measurable data to formulate facts and uncover patterns in research. This method will be applied in the collection and the analysis of data for this research. Quantitative data collection methods are much more structured than qualitative data collection methods (DeFranzo, 2011). The qualitative research paradigm is criticized for three reasons: research bias, lack of reproducibility and generalizability (Mays & Pope, 1995). Researchers find it difficult to analyse qualitative data (such as text, pictures, videos etc.) using word processors or other computerized packages, such as Nvivo and Atlas Ti. Quantitative research deals with numerical data, making it easier to manipulate or analyse using statistical software packages such as SPSS, SEM and LISREL.

3.4   Study Population

The term "population" can be defined as the complete set of group members (Saunders & Lewis, 2012). According to Bless and Higson-Smith (1995: 85), "the entire set of objects or group of people, which is the object of research and about which the researcher wants to determine some characteristics is called the population or the universe".

The study will comprise two population groups: UWC library staff members as well as students (both undergraduate and postgraduate active library users). According to data obtained from the UWC Library Circulation Services Unit in June 2019, there are 8000 weekly active student users at the library and a total library staff population of 46.

3.5   Sampling and Sampling Procedure

Sampling is the process through which a researcher selects individuals and/or groups from a population from which they require their information (Salkind, 2010). Sarantakos (2012) reported that the most significant reason for sampling is feasibility, elaborating further that a complete coverage of the total population is seldom possible. Time and cost considerations make contacting and studying an entire population challenging (Sarantakos, 2012: 139).

A simple random sampling technique was employed to determine the sample size for library staff members while a simple random technique was used to determine the sample size for students. A simple random sampling refers to a sampling technique where every item in the population has a fair chance of being selected in the sample (Laerd Dissertation, 2020).

A simple random sampling technique was also used to determine the sample size for students within this study. This technique helps to reduce any form of bias involved, as compared to any other sampling method. A study conducted by Samsuddin, Omar and Shaffril (2018) investigating the relationship between ICT facilities and behavioural factors with positive youth development among rural youth in Malaysia, used a simple random sampling approach to gather the data by taking the first 25 library visitors as the respondents in each rural library.

3.6   Specific Sample Size

With an error margin of 9 percent, a 95 percent confidence level, a response distribution of 50 percent and a population of 8000 active weekly student users, calculation from the Raosoft

sample size calculator returned a minimum representative sample size of 117. Ngulube and Ngoepe (2013); Salubi, Ondari-Okemwa and Nekhwevha (2018); Shaibu, Ama and Burnette (2016) also employed the Raosoft sample size calculator in determining their sample sizes. Thirty percent of the library staff population will be sampled for this study. This will amount to a sample size of 14 participants. Emmel (2013) suggested that a sample size of ten percent should be adequate in representing a population that is less than a thousand elements.

3.7   Data Collection Instrument

Two survey questionnaires were used to collect data for the study: one for staff and the other for students at the UWC library. A questionnaire is a research instrument comprising a series of questions and other prompts for gathering information from respondents (McLeod, 2018). This type of approach enables the researcher to understand each participant's unique perspective. Surveys are a quantitative method involving the use of questionnaires and aims to generalize from the representative sample population to a larger population of interest (McLeod, 2018).

The survey contained closed-ended questions, and the responses were analysed using accepted quantitative techniques. Close-ended questions are when all possible answers are included, and the participant only marks those that are applicable. Questions that ask a respondent to select from a list of pre-coded answers (for example, "Yes" or "No", "Excellent", "Good", "Fair" or "Poor") are considered close-ended. Partially closed questions are when a participant fills in a response that is not included in the answers offered usually denoted as "other" in questionnaires. Open-ended questions give the participant free reign over their answers. Surveys in general are about the collection of pertinent information from participants in a structured format.

Surveys are part of a quantitative research methodology, where a researcher studies the relationships between two variables such as information communication tools and academic librarians. According to Saunders and Lewis (2012), the most common method for collecting data using a survey strategy is the questionnaire. The research instrument used in this study was designed in the Linkert scale format.

3.8 Data Collection Procedures

The researcher used web-based electronic questionnaires within this study. Google forms, a free online survey platform was used. This method of survey was chosen because it is convenient and economical. In a web-based survey, questionnaires can be distributed via a web link and the scores of items can be collected and recorded into the database automatically. The researcher administered the questionnaires electronically. The participants received a URL to the questionnaire, which was sent using the University of the Western Cape email notice to the target population. The researcher added a note stating that only participants who made use of the UWC library (undergraduate or postgraduate) should complete the survey. The email also explained the purpose of the study and invited recipients who met the criteria for the study and who regularly made use of the library, to click on the hypertext link to complete the web-based questionnaire. The survey was sent to the entire student population although the minimum representative sample required was 117.

3.9 Data Analysis

Data was captured in a Microsoft Excel Spreadsheet and exported to the Statistical Package for the Social Sciences (SPSS) for analysis. Collected data was analysed using descriptive statistical methods, including simple percentages, as a measure of dispersion and central tendencies.

3.10 Ethical Considerations

The protection of human subjects through the application of appropriate ethical principles is important in all research studies. The consideration of ethical issues is vital throughout all stages of any study, to keep the balance between the potential risks of the research and the likely benefits arising from it (Arifin, 2018). Consent should be given freely. The respondents should understand what is being asked of them, and the participants involved must be competent to consent. Informed consent was the first page of the electronic questionnaire and students had to click on "I consent to participate in this study" before they were taken to the survey.

The following process was implemented within the study to obtain informed consent. The participants were informed of the purpose of the study as well as the data collection process. The respondents were also notified that participation was voluntary and that withdrawal from

the study would not affect their studies or employment in any way. The participants were also advised that they could decline or discontinue the survey at any time if they did not feel comfortable completing the survey. The anonymity and the confidentiality of the participants were preserved by not revealing their names or any other form of identification in the data and in the analysis of the results. Data collected within the study was securely stored in a password protected cloud-based database on Google Drive. Electronic data collected within this study would be kept for a period of five years, after which the data would be safely disposed of. Ethical clearance was obtained from the ethical board of the University of the Western Cape and the library.

3.11 Summary and Conclusion

This chapter outlined how the research was conducted, illustrating the process used to select the participants, and the research design and research methodology used in this study. The population and the sample study were also mentioned before discussing the data collection instrument and process. The data analysis was also outlined, and ethical considerations were implemented in the study.

CHAPTER FOUR

DATA PRESENTATION AND DISCUSSION

4.1 Introduction

This chapter presents and discusses data collected by means of two web-based questionnaires circulated among active UWC library users and professional UWC library staff. The data analysis and the presentation process involve the organisation of data categorically and chronologically, which entails a repeated review and a list of major ideas (Berg, 2009; Creswell, 2014). Both questionnaires were used to understand the impact of ICTs on operations and services in the library. This chapter discusses the study's findings seeking, in particular, to answer the following research questions which informed the study:

1. To what extent have ICTs impacted on academic library operations as well as academic librarians' functions?
2. How have ICTs influenced undergraduate and postgraduate students' use of library information resources?
3. What challenges do librarians and students experience in the utilization of ICT-based library operations and services?
4. In what ways can ICTs be used to better deliver more efficient library and information services?

The discussion of the findings will be divided into two parts, integrating and interpreting findings from both the student and staff questionnaires. Both sections sought to answer the research questions outlined. Section 1 focused on the influence of ICTs on both academic library operations and the use of library information resources by students and library staff at the University of the Western Cape. This section combined results from research questions 1 and 2. Section 2 focused on the challenges facing ICT-based library operations and services and projected ideal library services for students and library staff. This section analysed and discussed findings from research questions 3 and 4.

4.2 Response Rate

The data obtained from the UWC library indicated a population of 8000 active weekly student users. As shown in the previous chapter, the minimum representative sample

acceptable for the study was 117 library users, but a total number of 155 library users completed the survey. Out of this number, 17 responses were not usable/incompletely filled-in by participants, giving a total of 138 usable responses from library users. Nineteen staff members participated in the study which was above the minimum estimated sample population.

4.3 Respondents' Profile

The first section of both questionnaires gathered information about both students and staff participants. The questionnaire circulated amongst UWC students required the respondents to indicate their faculty of study, their level of study and how frequently they made use of the library and other online information resources.

4.3.1 Faculty of study

The respondents were asked to indicate their faculty of study. The breakdown of the 138 respondents according to the seven faculties at the University of the Western Cape is depicted in Figure 2 below.
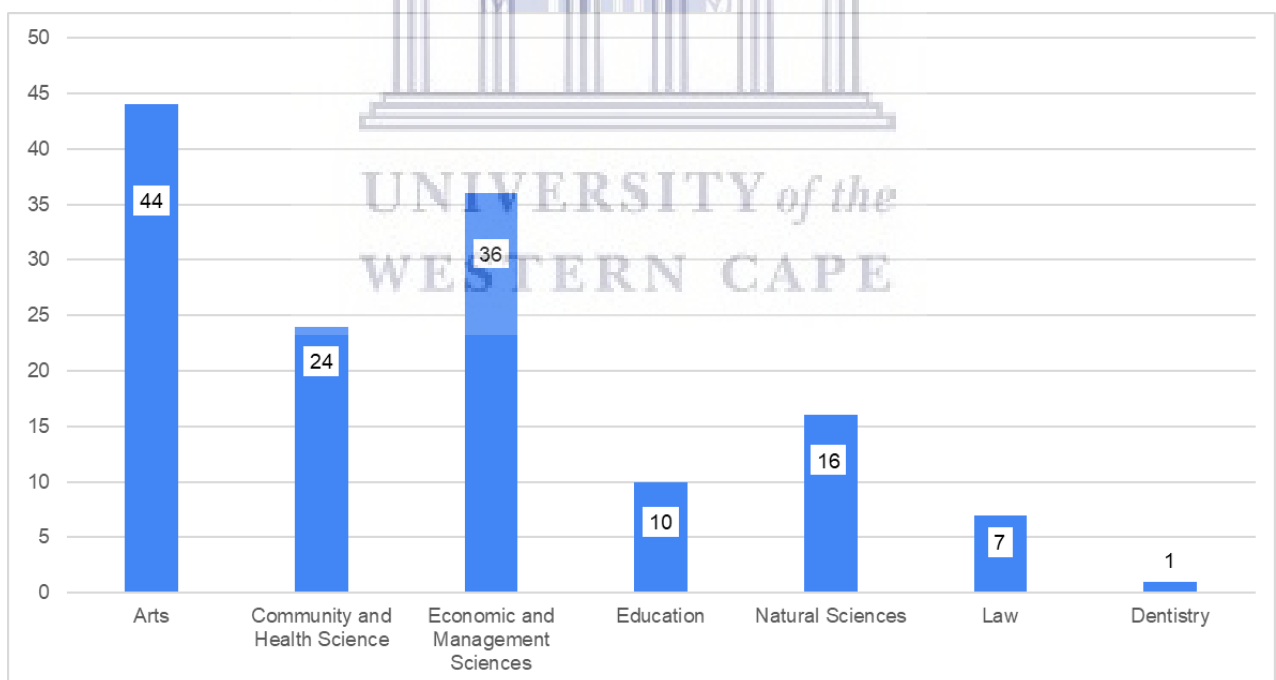

Figure 2: Respondents faculty of study

The data in Figure 2 above reveals that the majority of the responses were received from the Arts faculty with 44 respondents (31.88 percent), followed by Economic and Management Science with 36 respondents (26.09 percent) and Community and Health Science faculties

with 24 respondents (17.39 percent). The faculty of Arts at UWC is considered to be one of the largest in the Western Cape region, with over 4,000 undergraduate and 650 postgraduate students. A very low response rate was recorded for the Dentistry faculty with only 1 respondent (0.72 percent), followed by the Law faculty with 7 respondents (5.07 percent) and the Education faculty with 10 respondents (7.25 percent).

4.3.2 Level of study

The respondents were asked to indicate their level of study. They were provided with the following categories to select their level of study; Undergraduate and Postgraduate.
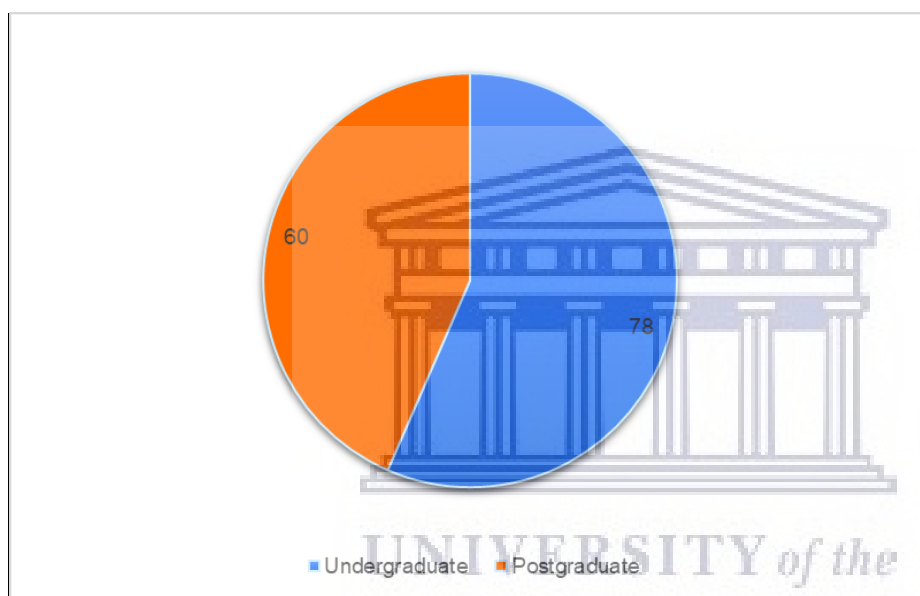
Figure 3: Level of study

From Figure 3 above, the data showed that the majority of the respondents for this study 78 respondents (56.52 percent) were undergraduate students, with 60 respondents (43.48 percent) being postgraduate students. The use of library and other information resources by users is reported below in Table 1.

Table 1: Use of the library and other online information resources

Frequency of use	n (%)
2 to 3 times a week	46 (33.3)
Daily	44 (31.9)
Fortnightly	12 (8.7)
Monthly	16 (11.6)
Weekly	20 (14.5)
Total	**138 (100%)**

The data revealed in Table 1 above shows that the majority of respondents make use of the library and other online information resources 2 to 3 times a week (33.3 percent). A total of 44 (31.9 percent) of students indicated that they make use of the library and other online information resources daily. Twelve (8.7 percent) indicated that they make use of the library and other online information resources fortnightly; 16 (11.6 percent) indicated that they make use of the library and other online information resources monthly, and 20 (14.5 percent) of students reported making use of the library and other online information resources weekly.

4.4 Academic Library Operations and ICT Influence on Students' use of Library Information Resources

This section focuses on the influence of ICTs on both academic library operations and the use of library information resources by students at the University of the Western Cape (UWC). This section will look at analysing and discussing results from research questions 1 and 2 taken from the surveys of both students and library staff at UWC. Active library users were asked to select various ICT tools that they would make use of when accessing library information services or library resources.

Library information services and resources options listed in this question were: computers, electronic databases, online public access catalogues (OPACs), printers or scanners, virtual reality and mobile devices. The respondents could select more than one ICT tool or resource.

Figure 4 below shows that the majority of students, 113 respondents use computers and that 83 respondents indicated that they use mobile devices when accessing library information services or library resources. This concurs with a study conducted by Aheto and Cronje (2018) reporting that more students use their laptops for academic work only, followed by smartphones for academic and other purposes. A study also observed that the students' visits

to the library were often in order to use electronic resources such as computers, as students often had to wait in line to use computers at peak times during semesters (Salubi et al., 2018). The study further reported that students argued that using their laptops and smartphones helps their research work, since the internet contributes to their academic success (Salubi et al., 2018). However, Abdullah, Sedek, Mahat and Zainal (2012) reported that university students often used their smartphones more for personal communication rather than for learning. A study done on college students by Tossell, Kortum, Shepard, Rahmati and Zhong (2015) found that the use of smartphones was perceived as favourable for activities outside study, but it was later revealed that students viewed smartphones as detrimental to their educational goals.

Figure 4 below also shows that 80 respondents indicated that they make use of electronic databases; 56 respondents indicated that they make use of printers and scanners when using library information services or library resources; 40 respondents indicated that they use the Online Public Access Catalogue (OPAC) and only eight respondents indicated that they use Virtual Reality (VR) ICT tools. The adoption of VR is part of a trend towards technological innovation now taking place in academic libraries. However, there is a clear lack of guidance in the library community on how to introduce, integrate, and sustain these technologies in ways that serve all library stakeholders (Lischer-Katz, Cook, Hall, Hardesty, Wittenberg, Johnson, McDonald & Carlisle, 2019). Lischer-Katz et al. (2019) further reported that many institutions are tackling the same issues, often replicating similar work, indicating a need for leadership on the part of early adopters, including academic libraries, to determine best practices for supporting VR technologies across different types of institutions.

Practical considerations, such as designing systems to reduce motion sickness and increase accessibility, have made it difficult to scale up VR services for widespread adoption. The fundamental problem is that best practices have not been systematically collated, analysed, and packaged for widespread dissemination and adoption across the community (Hall et al., 2019). It is evident that wireless networks, interactive web interfaces, online collections, reference services and web portals have brought significant changes into the digital era. It is also clear that the use of ICTs has had a positive impact on the quality of information delivery. Users are able to access information at the click of a button within their homes, classrooms and offices, without having to physically visit the library (Olaniyi et al. 2012).
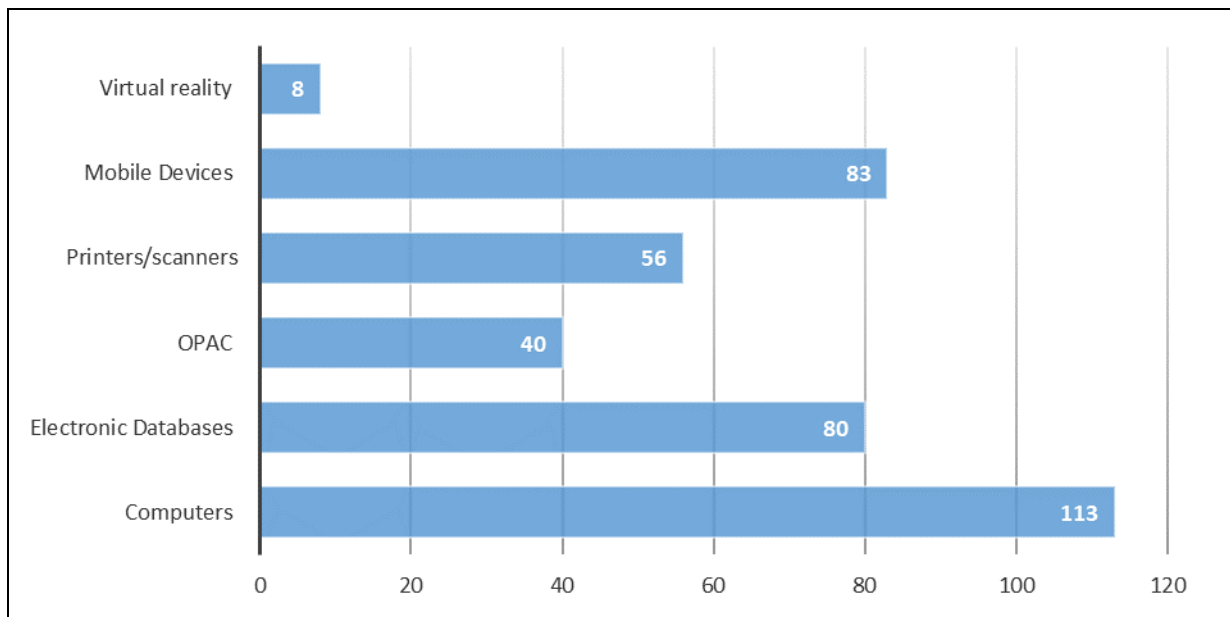
Figure 4: ICT tools used when accessing library information services/library resources

It is therefore vital for higher learning institutions to maintain their relevancy by staying up to date with current technological advancements in teaching and learning. Many higher education institutions have installed the necessary infrastructure around their campuses, thus enhancing the teaching and learning experience. Figure 4 above shows a high response rate in the use of computers, mobile devices and electronic databases, corresponding with conclusions by Saleem et al. (2013), who stated that easy and rapid access to information was of immense importance, especially in the higher education arena. Additionally, Saleem et al. (2013) stated that information processing, storage, communication, dissemination of information automation etc., the internet and the development of the World Wide Web, had revolutionized information communication technology.

This study also investigated the extent to which library services and operations has changed due to the use of ICTs in the last decade, and UWC library staff members were asked the same question. The data received for this question revealed in Figure 5 below showed that the majority of respondents indicated that library services and operations had changed 'to a great extent', due to ICTs, in the last decade. Previous research also reported that daily operations in the library such as acquisitions and cataloguing had changed from manual to automated operation (Gurikar & Mukherjee, 2015).

Olise (2010) revealed that the majority of the respondents saw ICTs as a significant tool for sustainable development in Africa. Research further corroborated that in the last eight to ten

years, Web 2.0 had revolutionized information communication by providing faster information sharing, networking, and enabling multimedia services to operate (Singh & Naidu, 2015). The emergence of social network and interactions has driven libraries to adopt technological tools in their daily routines to meet users' expectations and information needs. The data shows that a high percentage of respondents replied that circulation services have only changed 'somewhat' in the last decade. It also revealed that a high percentage of respondents indicated that Inter-library loans had also changed 'somewhat' due to ICTs in the last decade. Technological innovation has played a key role in reference librarianship in the second half of the twentieth century. Eventually, the electronic catalogue databases became online public access catalogues (OPACs), providing local as well as remote access. Another major change in the process of storage, retrieval and dissemination of information was brought about by the invention of CD-ROMs. Previous research showed that the changing demographics of library users and advancement in technological development also called for a modification in information service provision by libraries and information centres.
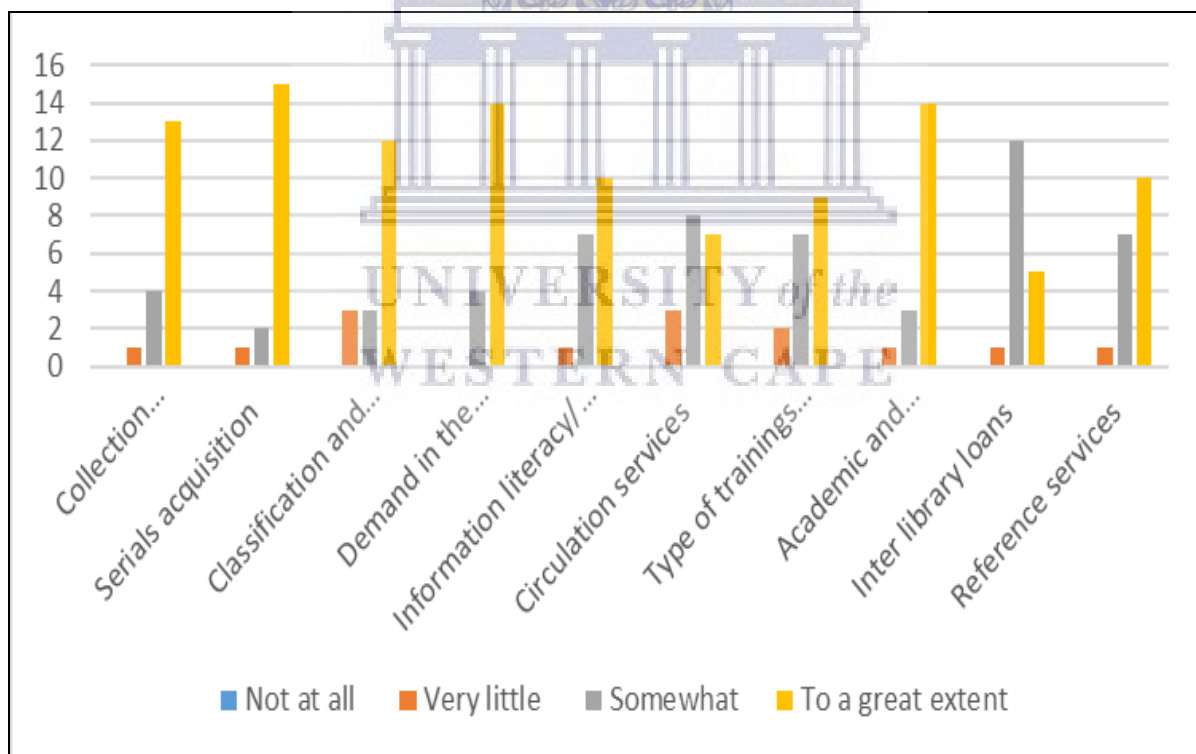
Figure 5: Changes due to ICTS in library services and operations in the last decade

Students were asked to indicate their proficiency levels in the use of the following ICT tools: Virtual reality, Electronic databases, OPAC, Computers, Printers/Scanners and Mobile devices. Figure 6 below revealed a high response rate for 'inexperienced' proficiency when it

came to virtual reality; 72 responses (52 percent) were recorded. This could be because virtual reality (VR) is an emerging technology which has not been fully implemented yet into all libraries. Hahn (2012) reported that while enthusiasm for virtual reality among educational technologists is high, the field of VR, specifically for teaching and research applications, is still new, and so the educational application of VR is still conceptual at this time. Thirty-five respondents (25 percent) indicated that they were at a 'beginner' level when it came to OPAC.

Kumar and Vohra (2011) conducted studies on the effect of web searching on the OPAC with a comparison of selected university libraries. It showed that a majority of the users in all three universities made use of web-based resources. Ready access to information through search engines considerably increased the expectations of library users while searching on the OPAC.

Their results also revealed that a significant number of users searched for information regarding library material through OPAC searches, despite encountering problems. Kumar and Vohra (2011) reported that lack of basic skills among users was found to be the major reason for not utilizing all the features of OPAC searches.

Fifty-four (39 percent) of the respondents indicated that they were 'Intermediate' in the proficiency of electronic databases. Figure 6 below illustrates that a high rate for 'proficient' responses were recorded, concerning computer usage. A high rate for proficiency in the use of printers and scanners is also shown in Figure 6. Most of the respondents indicated that their proficiency levels in the use of mobile devices are 'expert'.

These findings are consistent with the findings of a study conducted by Mpofu (2016) that more students now have access to the internet on both computers and mobile phones. Mobile phones are portable, have advanced capabilities and can be used for situated learning (Mpofu, 2016). Mpofu (2016) further reported that students currently used computers more than mobile devices for reading downloaded notes.

Based on a Groupe Speciale Mobile Association's (GSMA) (2015) report, half of the world's population has a mobile subscription with smartphone adoption having already reached critical mass in developed markets.
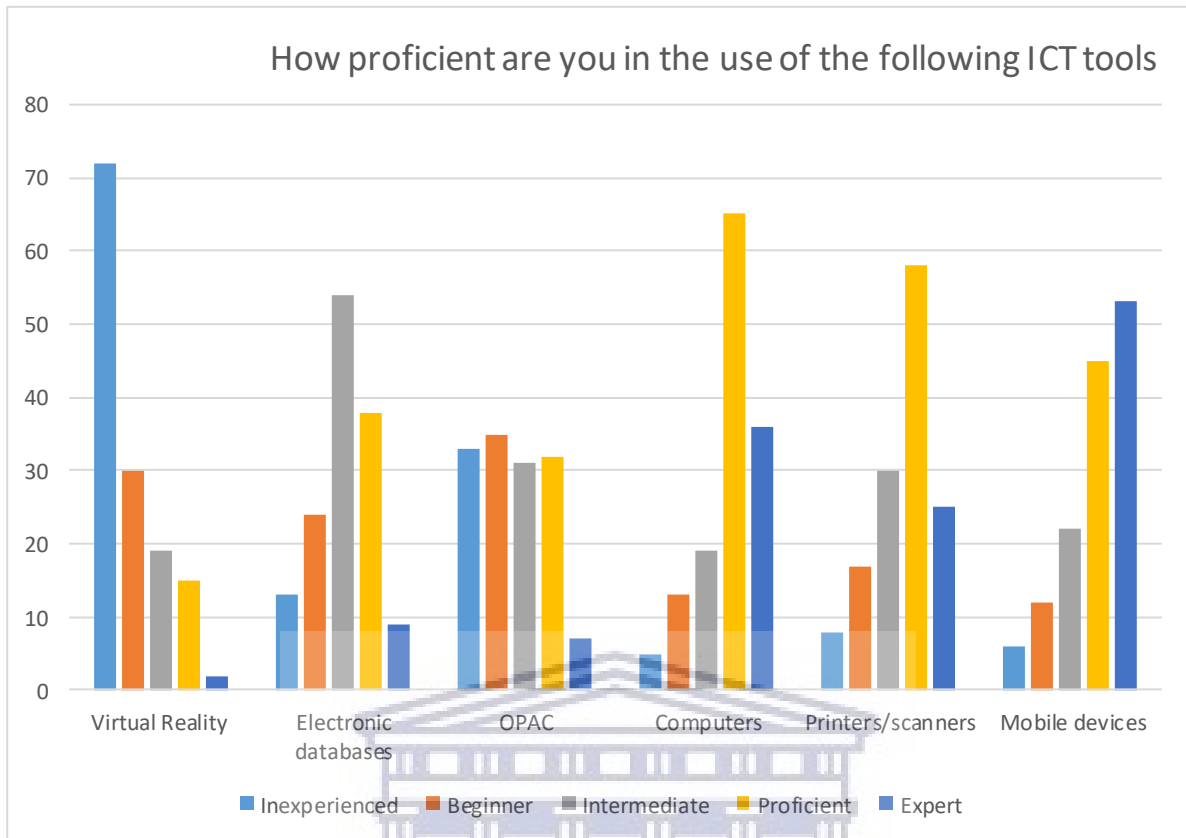
Figure 6: ICT Proficiency

The respondents were asked to identify the information resources or services they made use of when they visited the library (online or physically). The options listed were: PCs in the computer laboratories, UWC Online Repository, Consult Faculty Libraries, Academic open access repositories, specialised software packages, reference services, research support services, scholarly databases, internet connectivity and document processing software.

Figure 7 below reveals that the majority of the respondents make use of internet connection when visiting the library. The high rate of internet usage corresponds with conclusions by scholars such as Sahoo and Sharma (2015), who showed that many libraries were electronically networked and relied heavily on computer and telecommunication technologies as a means of providing library and information services. They also stated that the internet has become an integral part of library and information centres that help in meeting the information requirements of the users in a timely manner (Sahoo & Sharma, 2015). This is also consistent with the Technology Acceptance Model (TAM) by Davis (1989), that argues that perceived usefulness and perceived ease of use are key determinants of behaviour. Dogruer, Eyyam and Menevis (2011) states that the internet is a source of significant

information that can be easily and quickly reached. The internet is percieved as useful, as students use social websites to share knowledge and talk about school subjects (Dogruer, Eyyam & Menevis , 2011)

Due to the boundless nature of information resources on the internet, libraries are increasingly investing in the provision of internet services and resources to enable their clients to have better access to information. The shift in library user behaviour and interests has prompted academic libraries to add a networked environment as an extension of traditional library services. A study conducted by Echezona, Ibegbulem and Nwegbu (2015) reported that before the emergence of internet services, library information resources were predominantly in print. However, with the advent of the internet, materials in electronic formats are now included in library collections. The collection scope has changed from purely local content to global networks.

The use of the internet has attracted the interest of scholars because of its advantage and convenience over traditional services in libraries. Interestingly, a study conducted by Waithaka (2013) reported that an over-reliance on web sources could do more harm than good, as many internet sources have been consistently shown to be inaccurate, biased or unreliable. Mashiri (2013) opined that using such random sites of information resources for academic work could have a detrimental impact on final grades, stating further that the most important thing is information literacy and using the Web to one's best advantage.

Data from Figure 7 below also shows that a high rate of 75 respondents (54 percent) also indicated that they made use of document processing software when visiting the library. The main purpose of word processing programmes is to permit the user to create text documents, edit texts and objects, format documents or increase readability and appearances, print a copy of documents and save them for future use or reference. This therefore explains the reasoning for the high response rate because students are frequently involved with former functions.

This is also consistent with the Technology Acceptance Model (TAM) proposed by Davis (1989), that perceived usefulness has an impact on usage, as it represents the degree of belief that a certain system will help users to perform their jobs better. The model also argues that attitudes towards use are determined by the desirability of using a system and it increases if the system is perceived to be easy to use and useful. The high response rate of 50 respondents (36 percent) for 'always' using scholarly databases, corresponded with conclusions by Rafi et

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al. (2019). They reported that due to the popularity and usage of digital technology, library subscriptions have increased to include eBooks, eJournals, online databases etc. It is therefore clear that the usefulness of a system has an direct impact on behaviour.

 Rogers and Nielsen (2017) concurred, stating that online scholarly databases have become a reliable and rich source of published information for users. The subscription to online databases allows students access to a spectrum of journals on various subjects. These databases mostly provide full text online articles, and sometimes abstracts.
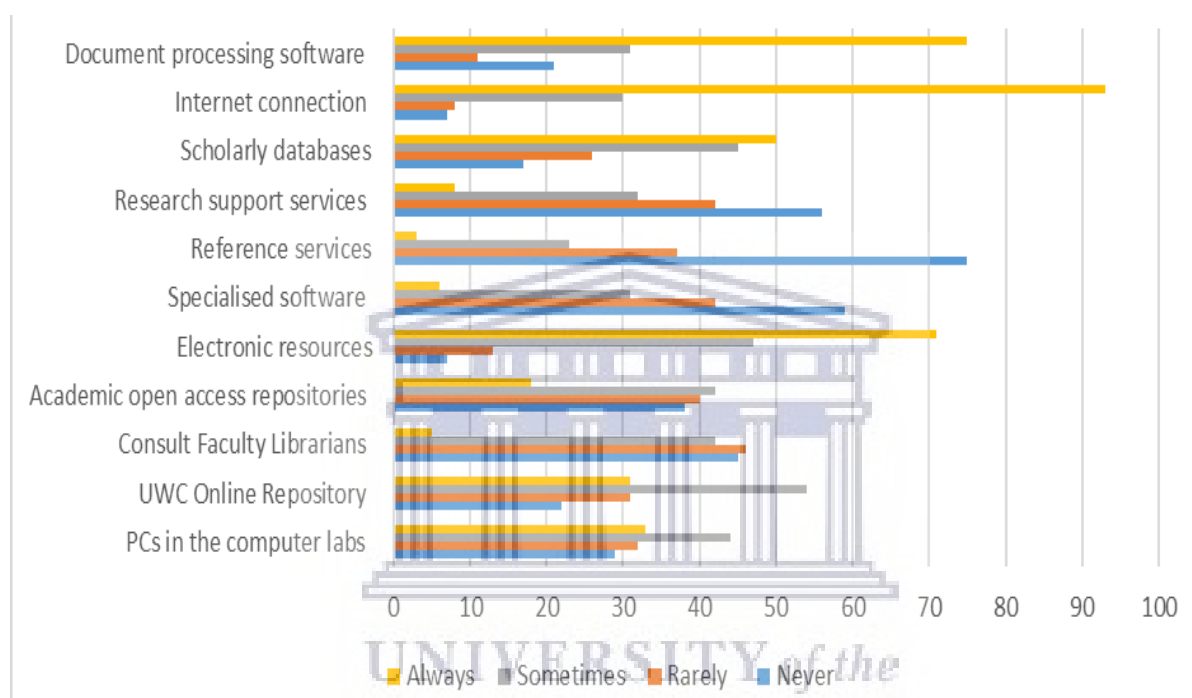
Figure 7: Information resources and services utilized during library visit (Online and Physically)

The respondents were asked to express their views on whether they would prefer the following information services or resources rendered electronically or in-person (physically). The listed information services or resources were books; theses and dissertations; consultation with faculty librarians; academic open access repositories (for example OpenDOAR); electronic resources (eJournals); reference services; research support services and streaming services (Workshop, training and other videos). It is evident, based on the findings shown in Figure 8 below, that the majority of the respondents would prefer a hardcopy version as opposed to the electronic version of a book. This could be because, eReaders are "consistently higher priced than printed versions, in initial price" (Bailey, 2019: 19).

A survey conducted at Auburn University in Montgomery, showed that the cost for libraries to implement eReaders is significantly higher than the cost of a printed book (Byars, 2015). Additionally, not all titles required for schools are available in digital format. In addition, Woody, Daniel and Baker (2010) reported that even though students have the opportunity to access technology anytime and anywhere they want, there is still a preference for reading printed books. Students may be more likely to engage with and perceive these as useful technologies which they are already familiar with. Alternatively, they may have a strong preference for print-based texts, based on prior experiences (Ross, Pechenkina, Aeschliman & Chase, 2017).

One study examined the difference between a small multimedia display and a printed book. They tested for "eyestrain, visually induced motion sickness, changes in visual functioning, user experience, and the essential optical parameters of reading equipment" (Pölönen, Järvenpää & Häkkinen, 2012: 160). The results showed that, "reading from a hard copy was the most comfortable experience. All near-to-eye displays induced eyestrain and sickness symptoms, but the magnitude of these symptoms varied according to the device. The adverse symptoms were related to problems with the display optics and design, text layout, headset fit, use context, and individual differences" (Pölönen et al., 2012: 165). A survey on young adult readers' book format preference reported that 62 percent of 16 to 24-year-olds preferred print information materials over their electronic equivalents (Falc, 2013). However, Buckley and Johnson (2013) posited that it was only a matter of time before downloadable eBooks became a major part of the academic library landscape. They stated that distance away from the academic institution, the proliferation of mobile devices, and the availability of downloadable eBooks are also factors influencing collection development decisions.

The majority of the respondents have indicated that they would prefer that theses and dissertations be provided in an electronic format. A study conducted by Buckley and Johnson (2013) at the Nova Southeastern University (NSU) libraries, mentioned that "more students and faculty are using portable electronic devices and eBooks databases now because they provide more downloading capabilities". They also reported that the thesis repository grew from 4817 to 5391 records, representing a growth of 11.92 percent. A small number of older print theses were digitized and uploaded to the repository during the year. This digitization on demand service occurred at the request of the authors and interlibrary loans requests for copies of older print theses.

The respondents also indicated that they prefer consultations with faculty librarians to be face-to-face. A case study conducted by Mehta and Wang (2020) at the Bridgewater State University shows that from 1 February to 15 March 2020 before the COVID-19 pandemic, reference services were mostly used in person rather than virtually. Findings from their study revealed that very few reference questions were asked virtually when the library was fully functional with all library employees working on site. Overall, Figure 8 below reflects that the majority of respondents would prefer the listed information services or resources to be rendered electronically. This result corresponds with studies in the literature that respondents react positively to easy and rapid access to information.
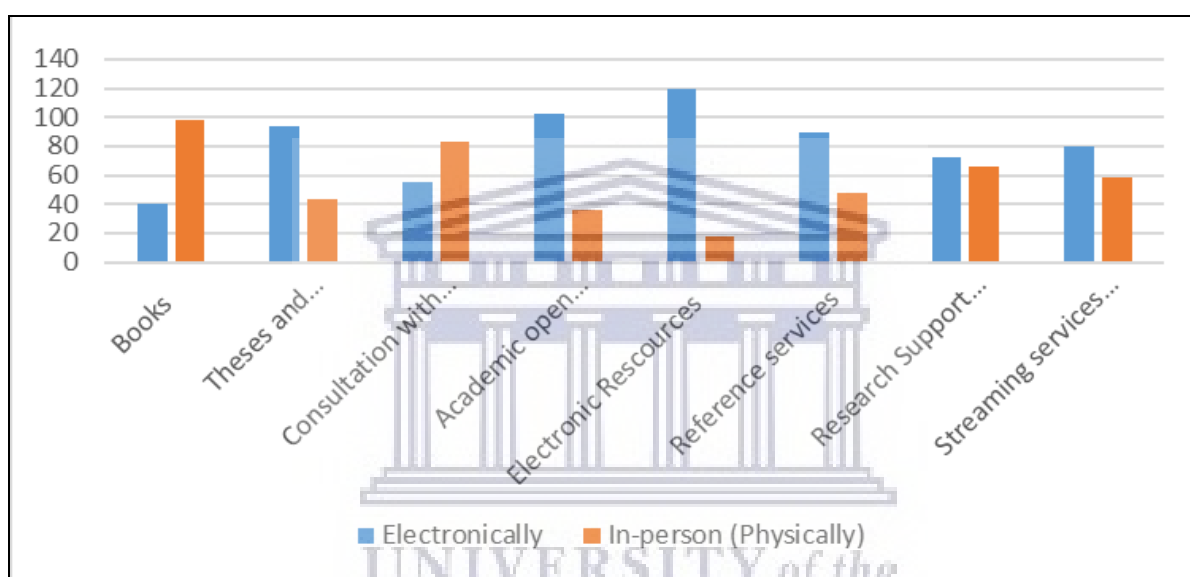
Figure 8: Preference for information services and resources

Students were also asked to indicate how often they would prefer services and resources to be listed through ICTs. The services and resources listed were books, theses and dissertations, consultation with faculty librarians, academic open access repositories, reference services, and research support services. As shown in Figure 9 below, the majority of responses for preference for the use of ICTs for the listed services and resources indicated that they would prefer 'Always' with ICTs, with the only exception being the 'Consultation with Faculty librarians'. A high response rate of 74 (54 percent) of respondents indicated that they would prefer 'About half the time' services such as consultations with faculty librarians to be rendered with ICTs.
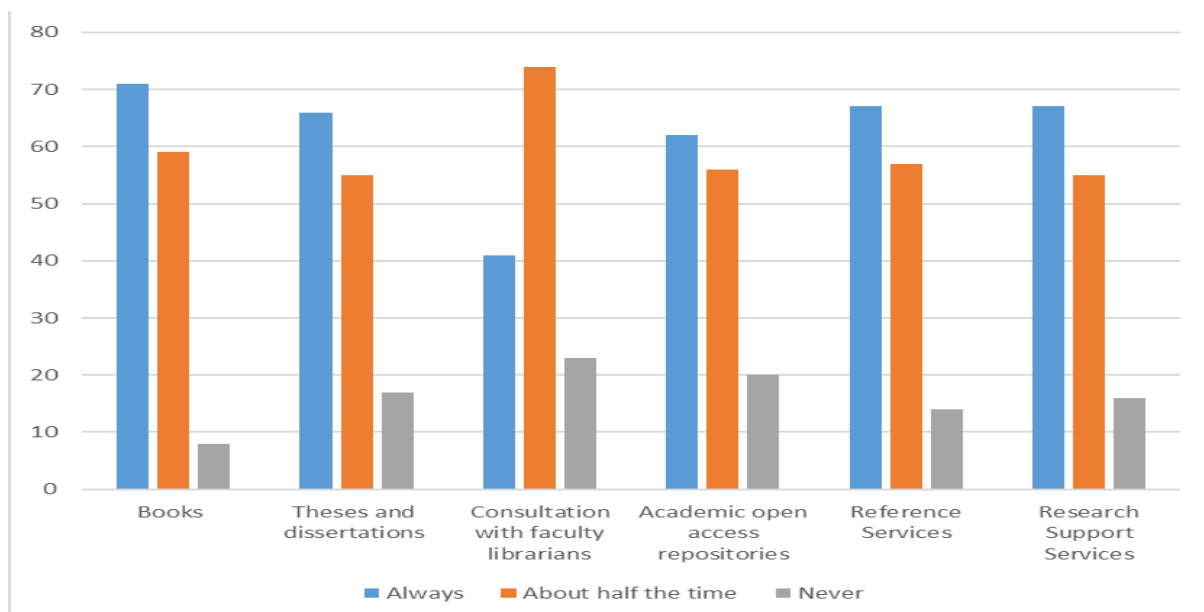
Figure 9: Resources and services preference through ICTs

The Technology Adoption Model (TAM) proposed by Davis (1989) was tested on UWC library staff to measure their attitude towards the usefulness and perceived ease of ICTS in the practices and operations of the library.

Figure 10 below reveals that the majority of respondents indicated that the use of ICTs in libraries has made daily operations easier.

The majority of respondents also indicated that the use of ICTs has provided more and more efficient services. Kumar (2012) stated that a study conducted to test the application of ICTs in the state libraries of Haryana and Chandigarh, concluded that library automation is one of the most effective applications of ICTs.

The majority of the respondents selected the option that they 'strongly Agree' that the use of ICTs in libraries has improved practices and operations by saving more time in the library. A high response rate for error free processes in operations has revealed that the majority of respondents 'agree' that the use of ICTs in libraries has improved libraries. This is consistent with the Technology Acceptance Model (TAM) by Davis (1989), that posits that perceived ease of use is a key determinant of behaviour.

Swaminathan (2017) reports that OPAC enables users to search, access, renew, reserve and see the issue status of the library collection. Unlike the traditional card catalogue, users can search the database simultaneously.

This innovative system enables librarians and users to locate library resources without wasting time and energy. However, some of the respondents 'disagreed' regarding error free processes for the use of ICTs in libraries.

The rest of the respondents also agreed that the use ICTs has provided more and efficient services. The majority indicated that they now have more work-related responsibilities than before in the library environment. On the perceived ease of use, the study on the overall, staff members find the use of Information Technology in the workplace easy to use.

Malik and Mahmood (2014) observed that in recent years, work in the library and information profession is characterized by fast-paced change and new skills requirements.

Asogwa, Ugwu and Idoko (2016) reported that academic librarians were called upon to assume newer roles and perform tasks such as guiding, facilitating, sifting through information resources, and preserving access to information. As the collections of academic libraries have changed, the delivery of services has equally changed.
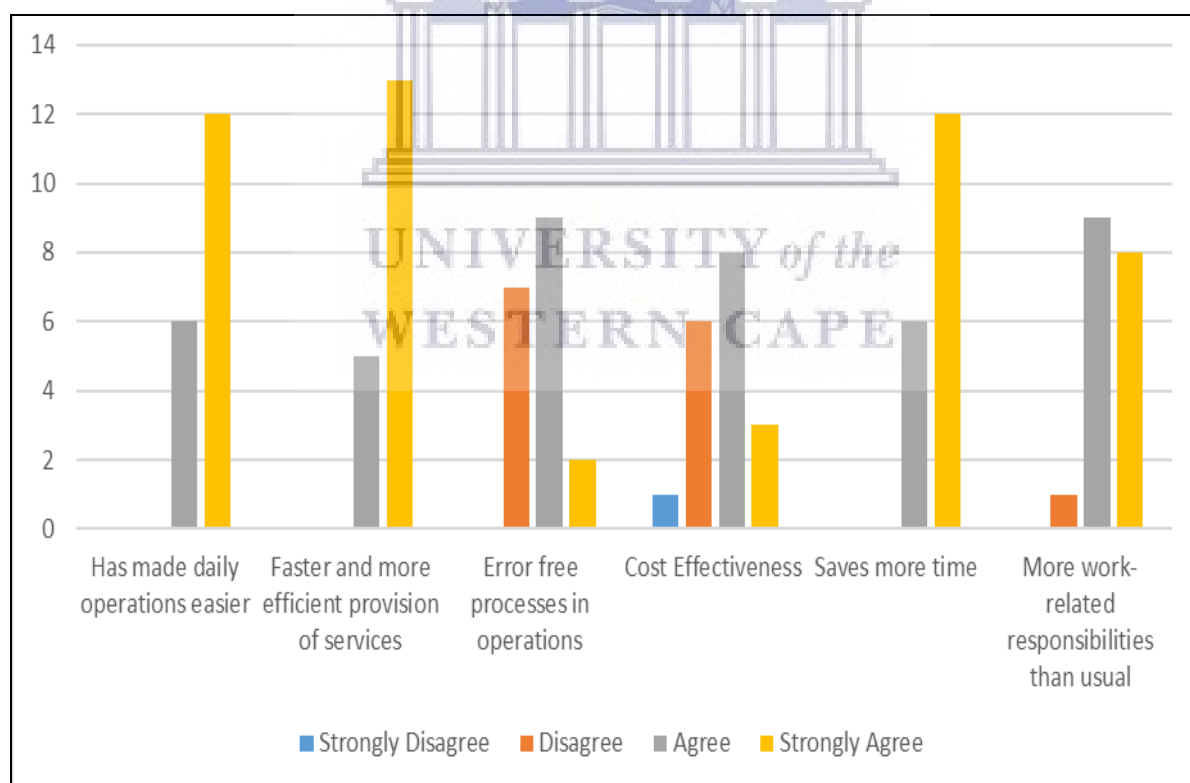
Figure 10: Improvement in library practices and operations through the use of ICTs

UWC library staff members were asked to specify a service or operation and describe how it has changed. A total of six responses were recorded for this question. Two of the respondents

indicated that the *"Card catalogue –Manual system has changed"*. This confirmed that ICTs have been used in changing and modernizing the traditional cataloguing system, making it more efficient and convenient to use. Kumar (2012) concurred with this and stated that one of Information Technology's greatest accomplishments is the transformation of the card catalogue to the OPAC to facilitate libraries. Adeleke and Olorunsola (2010) concluded by reporting that today's cataloguers, particularly in the IT-driven environment, have web access on their desktops which puts many resources within reach just by pressing a button. One staff respondent indicated that ICTs had improved *"Academic research support services, providing much more online research as well as web access to resources"*. This response indicates that ICTs are being used in the expansion of access to a wider range of academic information. Nwabueze and Urhiewhu (2015) concurred and stated that digital resources allowed users to search multiple files at a given time, making it more effective then printing equivalents. On the perceived usefulness, the study reveals positive attitudes to perceived usefulness of the information resources.

One respondent stated that, *"Most services changed due to technological advancements and global trends in academic libraries"*. This statement confirms that ICTs have had an impact on the services and operations within academic libraries. Innovations and advancements in the ICT sector have also created innovative services, catering for a modern and tech savvy audience. Raju (2014) corroborated this and reported that new ways of scholarly communication; the immense growth in the use of mobile devices; expansion of virtual spaces for libraries and the proliferation of social media have collectively affected the traditional role of academic libraries.

One respondent indicated that the *"acquisition of serials is mostly for electronic journals"*. This confirms that ICTs have greatly impacted the acquisition of serial publications. This also shows that the University of the Western Cape acquires more serials in electronic formats than hardcopy formats. Rafi et al. (2019) also reports that due to the popularity and the usage of digital technology, library subscriptions have increased to include eBooks, eJournals, online databases etc. These online resources have expanded and extended the limitations of academic research. The subscription to online databases allows students access to a wide spectrum of journals on various subjects.

One respondent indicated that, *"Training's in libraries - Diverse training's within libraries are constantly increasing"*. This confirms the increase in diverse and constant training taking place in libraries. Veronica (2014) stated that the speed of innovations and transitions in ICTs requires realignment and upgrades in computer skills within the librarian profession.

The need for training in developing skills and competencies in the use of ICTs is required, making it essential for ICT skills and curricula to be integrated for information professionals. These skills will have a direct bearing on library operations and services and are required in order to succeed (Veronica, 2014). Veronica (2014) also stated that these training programmes could range from updating or creating websites to working efficiently with staff members and users.

Seena and Sudhier-Pillai (2014) stated that the application of ICTs is posing a particular challenge to library professionals in developing countries. There is a need for additional training to augment traditional skills to develop competency in ICT use (Seena & Sudhier-Pillai, 2014). Kattimani and Naik (2013) conducted a study looking at librarianship, ICT skills, and constraints of library professionals working in engineering college libraries in Karnataka state. The results from Kattimani and Naik's (2013) study showed that the deputy librarian and librarian category showed relatively higher skills in ICT-related tasks compared to assistant librarians, library assistants and others. The results also showed that the increased workload of the professionals (82.2 percent) is the most important constraint in acquiring ICT skills (Kattimani & Naik, 2013).

Table 2: Ways in which library services and operations have changed

Please specify the services and the operations and how these have changed	Responses
Academic research support services, providing much more online information as well as web access to resources.	1
Card catalogue-manual system.	2
Most services changed due to technological advancements and global trends in academic libraries.	1
The acquisition of serials is mostly for electronic journals.	1
Training in libraries - Diverse training within libraries which is constantly increasing.	1
Total	6

4.5 Challenges of ICT-based Library Operations and Services and Projected Ideal Library Services

This section continues with the data analysis dealing with the challenges of ICT-based library operations and services. It also deals with projected ideal library services suggested by both the UWC library students and the UWC library staff members. The UWC students were asked to indicate whether they had any difficulties concerning the use of ICTs in library resources and services.

Figure 11 below illustrates that a high rate of responses by 62 students (45 percent) indicated that there is seldom a lack of appropriate ICT facilities at the library. This could point to the fact that the UWC library boasts facilities that offer students a convenient place to access their emails, browse the World Wide Web, obtain course information, access library catalogues, write papers, and submit assignments for classes and other tasks. They also contain special hardware (such as printers and scanners) and software specific to courses. The labs are subdivided by purpose: General access walk-in, Teaching facilities and Specialised/ Departmental Labs (access to students registered to the Department or specialised courses). There are over 180 electronic databases to help students find journal articles.
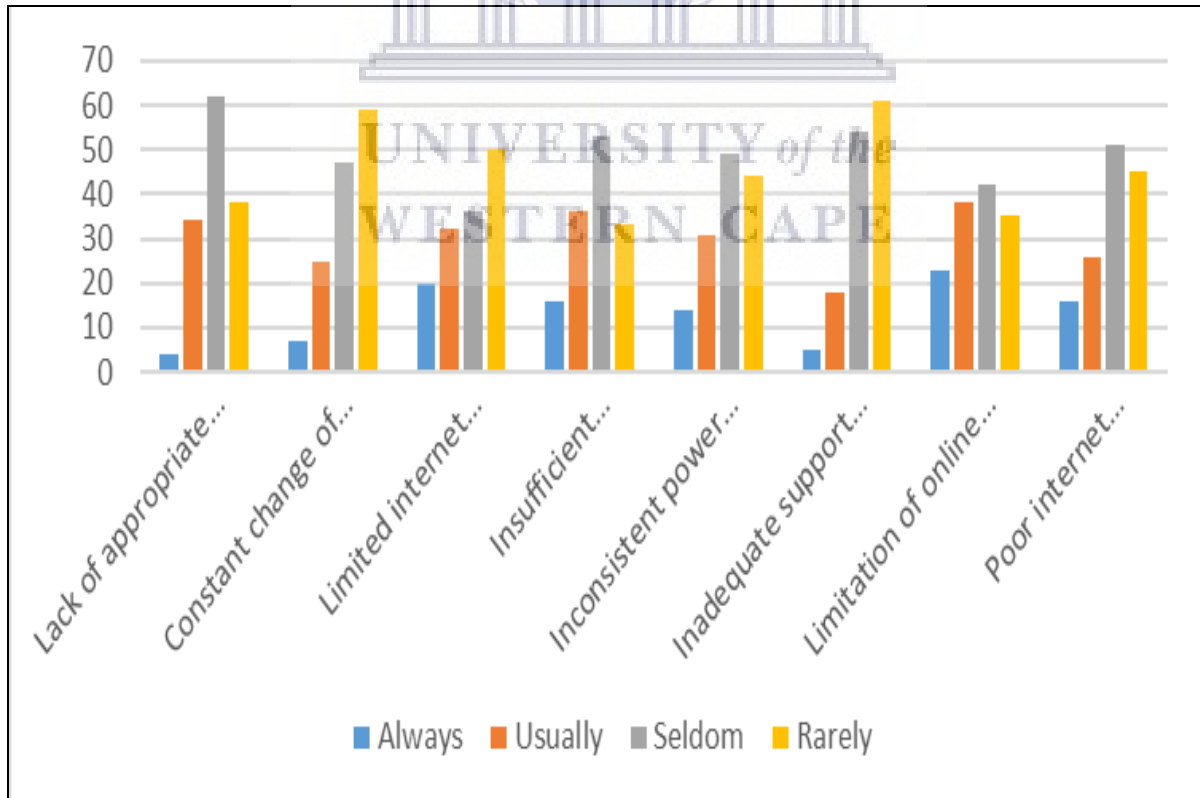
Figure 11: Difficulties encountered due to ICTs in the use of library resources and services

The respondents were also asked about the level of difficulties experienced regarding inadequate support from the library. Sixty-one (44 percent), the majority of respondents, indicated that they rarely have difficulties concerning inadequacies in the support from the library. This could be the result of Lab assistants being available to all students, who are equipped to answer their questions and fix problems that arise in computer rooms.

Figure 12 below also reveals that 51 (37 percent), the majority of respondents, also indicated that they seldom experience poor internet connectivity. The Information and Communication Services (ICS) Department at UWC has embarked on a strategic initiative focusing on the replacement of the campus's ageing fibre network that has served the university for almost twenty-five years (University of the Western Cape, 2013).

This project was considered as an investment and an opportunity to improve the network across the campus, ensuring a better end-user connected experience from a coverage and performance perspective (University of the Western Cape, 2013). Figure 11 reveals that the majority of the respondents seldom experience difficulties concerning the use of ICTs in the provision of library resources and services.

Figure 12 also revealed that 34 students (25 percent) indicated that they 'usually' experienced a lack of appropriate ICT facilities. Shafi-Ullah and Roberts (2010) found that ICT infrastructure is necessary to provide a research culture in higher education institutions and recommended allocating funds for ICT infrastructure. Twenty-five respondents (18 percent) also indicated that the constant change of software and hardware creates difficulties in using ICTs for the use of library resources and services. It is important to note that 36 (26 percent) indicated that insufficient knowledge in the use of ICT tools also creates a challenge when using ICTs for the use of library resources and services. Lack of library training and information literacy skills could bring difficulty in effectively using library resources and finding relevant academic information materials. It is therefore imperative to train students in using electronic information to ensure its effectiveness.

UWC library staff members were also asked to indicate what difficulties they encountered due to ICTs whilst rendering library information services. The respondents were given a list of options to choose from. These were as follows: internet downtime; lack of technical ICT knowledge by library staff; inconsistent power supply; constant change of software; hardware, and inadequate ICT infrastructural facilities. The respondents indicated with a high

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response rate that they 'Very rarely' encountered difficulties when it came to internet downtime. Respondents also indicated that they 'rarely' experienced a lack of technical ICT knowledge in library staff. The majority reported that they occasionally experienced inconsistent power supply, creating difficulties in rendering library information services using ICTs.

Heinemann (2019) explaining this issue within South Africa, stated that power scarcity and blackouts have become increasingly common again in Africa's largest economy since the beginning of the year. Shortages in electricity supply have sometimes brought industrial production and mines to a standstill for several hours a day. The cause of the declining power supply is the extremely outdated stock of power plants (35 years on average) which have also been poorly maintained. Delays in the construction of two new power plants, Medupi and Kusile, are further aggravating the situation.

The majority of the respondents indicated that they 'occasionally' experience inadequate ICT infrastructural facilities. Theresa and Revathi (2013) mentioned that the inadequate technological infrastructure is another challenge affecting library professionals.
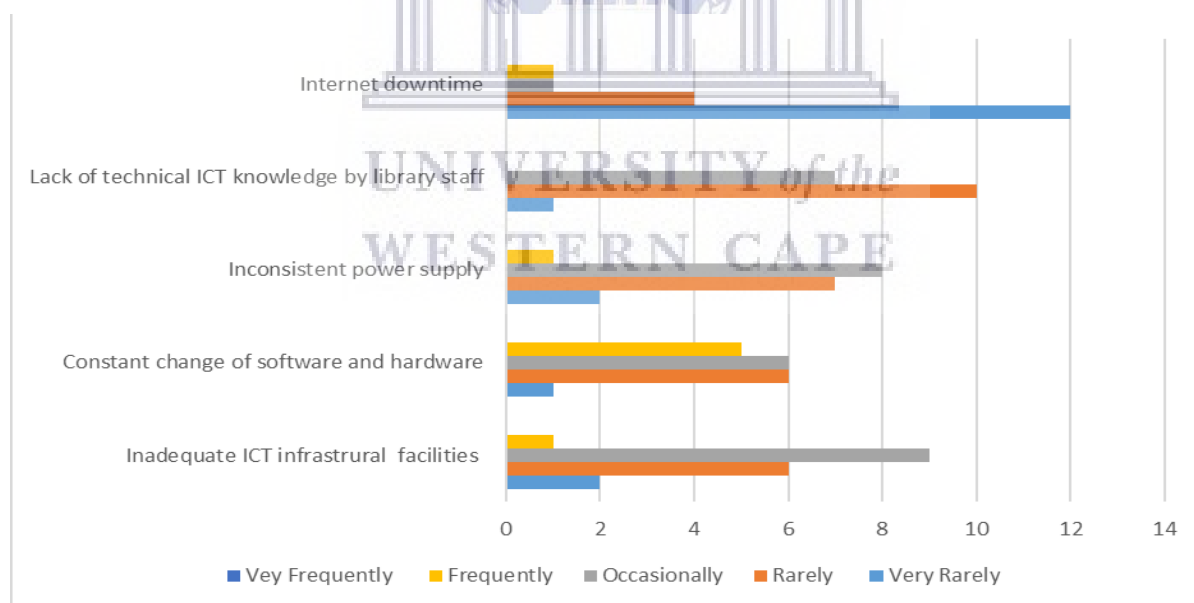
Figure 12: Difficulties encountered due to ICTs when rendering library information services

Library staff members were asked to indicate what challenges they experienced due to the implementation of ICT-based services and activities in libraries. The respondents showed a high response rate for 'sometimes' experiencing a lack of consultancy service for ICT. Figure 13 below also reveals a high response rate for 'sometimes' experiencing challenges regarding

inadequacy in implementation planning when it came to ICT-based services and activities in libraries. Figure 13 overall reveals that respondents 'sometimes' experienced challenges when it came to listed ICT-based services/activities in libraries.
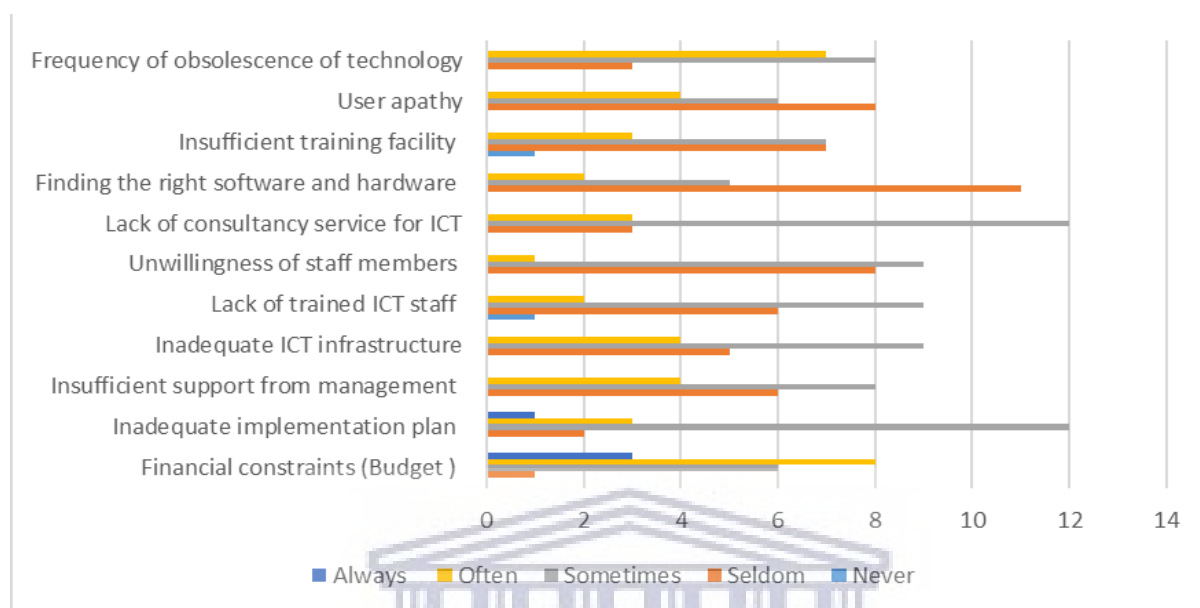
Figure 13: Challenges experienced in the implementation of ICT-based services and activities in libraries

UWC students were asked to indicate their satisfaction levels with the following library services and resources. The listed services and resources were: PCs in the computer laboratories; the Knowledge Commons area; UWC Electronic Theses and Dissertations Repository; consultations with faculty librarians; academic open access repositories; electronic resources (eJournals); electronic resources (eBooks); specialised software packages; reference services; research services; scholarly databases; internet connection; document processing software and online printing services.

A total of 65, the majority of the respondents (47 percent), indicated that they are 'somewhat satisfied' with the PC's in the computer laboratories. Respondents also indicated, with a high percentage (47 percent), that they are somewhat satisfied with the knowledge commons area. The respondents are very satisfied with UWC electronic theses and dissertations. The respondents indicated with a high percentage that they are very satisfied with electronic resources (eJournals) at the library. The majority of respondents also indicated that they are very satisfied with electronic sources (eBooks) and scholarly databases. Figure 14 overall reveals that the respondents were 'somewhat satisfied' with the listed library services and resources offered at the University of the Western Cape's library.
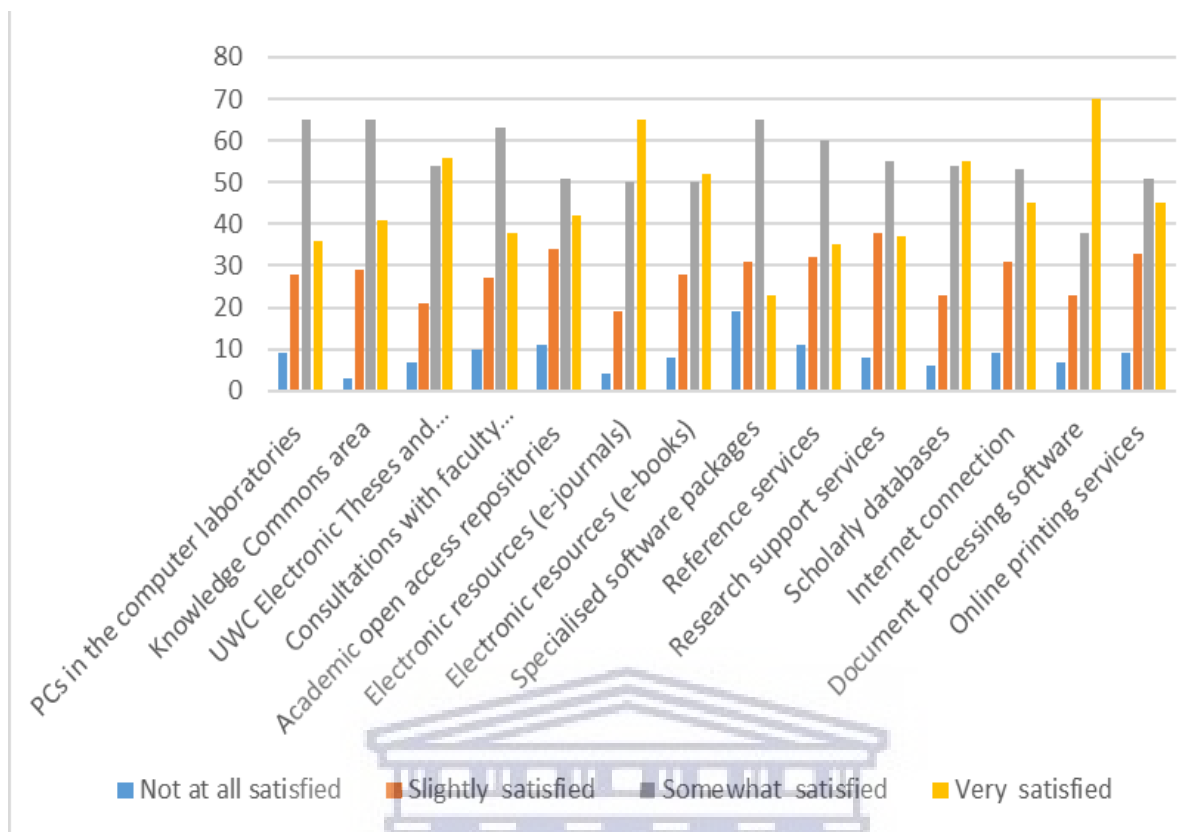
Figure 14: Level of satisfaction with library services and resources

The respondents were required to indicate which library services they would like to see improved upon with the use of ICTs. Thirteen out of 127 (10 percent) respondents indicated that they are happy with all the library services. Satisfied respondents indicated with responses such as "*I find myself to be satisfied with everything regarding our library*" and "*Am honestly okay with everything regarding our library*". This reveals a positive response regarding the library services offered at the University of the Western Cape.

The findings reflected in Table 3 below reveal a need for library services and systems to be improved by using ICTs. One response indicated that an "*Online interactive 'live chats' with library staff experts*" could improve library services. This confirms that services and platforms in libraries can use ICTs to deliver efficient services to their clients without any time and space constraints. Table 3 below also highlights one respondent who stated that the "*Renewal of books myself*" could improve library services with the use of ICTs. This speaks to the 'Self Help' theme prominently associated with ICTs in academic libraries. The respondents also pointed out that there is a need for improving the quality of computers and hardware equipment in the library. One respondent indicated, "*The quality [of] printers must*

be improved, and these devices must be well maintained and be working at all times". The need for *"More computer areas for students"* was also expressed by students. This emphasised the need and usefulness of ICTs within the library.

Responses showed a great need for electronic resources. A request for *"Prescribed textbooks available online"* and *"The accessibility of online law books"* recorded by respondents indicates the need for online materials, confirming its use and usefulness in academic libraries. The respondents also indicated that *"Access to recent and relevant online journals"* is needed. They also specified a need for full-text, peer-reviewed, recent and relevant electronic journals. Findings from Table 3 below show that ICTs are also used in the research process. The respondents indicated a need for *"Research support"* and *"Research tools"* to be improved by implementing the use of ICTs. Other responses showed the need for: improvement on book circulation; specialised software packages; document-processing software; a knowledge commons area; the Online Public Access Catalogue system; past papers online (memos included); additional books; access to online theses and dissertations, and consultations and advice on specialised programmes. Table 3 below, groups the responses of the remaining participants into categories with samples of responses recorded verbatim.

Table 3: Which library services would you like to see improved upon through the use of ICTs?

Question: Which library services would you like to see improved upon through the use of ICTs?	
Category	**Samples of responses**
Library services and systems	• Library Marshalls. • Online interactive "live chats" with library staff – experts. • Consultation with faculty librarians. • Renewal of books myself.
Printers and printing services	• The quality of printers must be improved, and these devices must be well maintained and be working at all times. • Printing section in different library levels. • Loading of printing credits, especially when machine is offline, easier method of loading credits when you are currently busy in a PC session and you've used all your printing credits (to prevent you having to go downstairs to load).
eBooks	• The accessibility of online law books. • Prescribed textbooks available online. • eBooks/electronic versions of books when hard copies are unavailable (lockdown).

Computers and hardware	- More computers, more printers. - More computer areas for students. - Install more computers in the library, otherwise all is good. - PCs in laboratories. - Hardware. - Electronics.
Research support services	- Research tools. - Research support. - Electronic databases, research support.
Electronic journals (eJournals)	- Limitation of online full-text resources. - Access to online journal resources. The system still has a large number of 'search hits' that take you to paywalled or moved papers. The library search service should be optimised to show more clearly when you have access rights to a resource. - Full-Text resources. - Access to recent and relevant online journals. - Better access to peer reviewed scholarly journals. - UWC should acquire a larger range of journals. - More access to full text articles online. - Access to Taylor and Francis. My link doesn't seem to work, and it is very frustrating because I can't go to campus to get it fixed.
UWC library website	- Finding a book online using UWC library website. - The ability for multi users to be online without the system crashing.

UWC students were asked to express their view on whether the library should bring in more ICT tools in their service operation. The respondents had to answer either 'yes' or 'no'. Seventy (51 percent) said 'no' and sixty-eight (49 percent) said 'yes'.
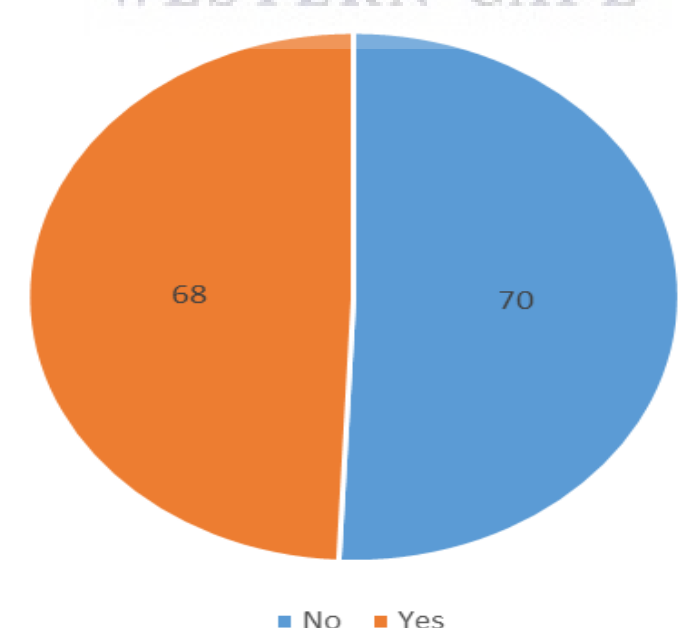
Figure 15: Utilization of more ICT tools in library services operation

Subsequently, the respondents who answered with a 'yes' were asked to recommend ICT tools that they thought the library should acquire. A total of 29 responses were received. Fifteen (52 percent) of the respondents recommended that the library acquire more computers. Three of the respondents (10 percent) indicated that the library should acquire iPads and tablets. Six of the respondents (21 percent) recommended that the library acquire more access to eBooks. Three of the respondents (10 percent) recommended more eJournals subscriptions for the library and 3 (7 percent) recommended virtual reality centres and that ICT tools should be acquired by the library.

UWC staff members were also asked if they thought that the library should utilise more ICTs in their service operation. All the respondents responded with a 'yes', revealing that 100 percent of the respondents agreed that the library should utilize more ICTs in their service operation. The respondents who responded with a 'yes' for the previous question in the survey, were asked to provide the types of ICT tools and services that they would recommend the library should utilize more in their service operation. All staff members responded with a 'yes'. All 19 responses were recorded. Table 3 above shows the responses verbatim.

Automatic ICT tools as a theme can also be noted. Two of the respondents suggested "*Automatic scanners*" as an ICT tool for the library. One suggested using automatic book systems. Software such as Alma was mentioned by one respondent and a recommendation for "*Book circulations and reservations and a catalogue system*" was also recorded by one respondent. Another interesting suggestion to note is "*Library Apps on smartphones*" as a suggested service to go hand in hand with the use of ICTs.

Information training via an electronic portal was also recorded, one respondent suggesting that the library could be "*Conducting information training services via Zoom*". A respondent also suggested "*Electronic course reserves*" should be implemented with the use of ICTs in academic libraries. Two of the respondents also listed iPads as a suggested ICT tool that should be used in libraries and some suggested the use of projectors and tablets. Another respondent suggested that the library should have "*Maker Space; Adaptive tools for persons with Disabilities*".

Once again, the 'self-help' theme was prominent in these responses. Two of the respondents indicated that they would recommend a *"Self-service kiosk (book scanning, self-checkout)"* and *"Self-Loans"* system at libraries. The researcher also asked library staff to express their views about the services that they would like to see improved upon, with the use of ICTs. The responses are presented below. Fifteen responses were received. Three responses (20 percent) indicated that they would like printing facilities and scanners improved. The respondents also indicated that they would like to see "*staff computers*" improved, increased "*Internet speed*" and also an improvement in the area of "*digital services*". They asked for the digitization of requested items, saying that the current tools were not efficient. This confirmed and reiterated the need for quality hardware in the library.

Similar comments from the librarians focusing on training included *"the training services still use the traditional way to train users, virtual learning is needed to be improved"*. "*We can do better with improved virtual reference services*" and "*training of faculty librarians in ICT tools used by researchers"*. Previous research studies also reported that training and retraining of all library staff should be organized on a regular basis (Adebayo, Ahmed & Adeniran, 2018).

Responses on library services included references to; *"circulation"*, *"book reservations and bookings"*, "*online references", "the staff should be more helpful when assistance is needed"*. One respondent indicated that the *"Ikamva"* service needed improvement with the use of ICTs. This question probed the respondents on which services they would like to see improvements. The answers revealed that the respondents would like certain services rendered at the library to be improved upon. It is evident that there is a need for improvement in library services and resources.

The above responses revealed a need for improved library training. Antony and Vijayakumar (2016) reported that librarians and librarianship have been changed by the development and use of Information and Communication Technologies (ICT). They stated that technological advances and increasing library computerization required that librarians have increasingly sophisticated computer skills. In an open-ended question, the respondents were asked to indicate what changes they foresee in the future in the access and use of library information services due to ICT's. A total of 45 students responded.

The data revealed that the majority of respondents (27 percent) foresaw virtual libraries in the future of libraries. This showed the students thoughts and expectations of future libraries. The virtual library emulates a 'real' library but is understood to be a product of the virtual world of the internet. The virtual library environment encompasses the concept of the digital library but is more than a collection of digitized resources. Somvir (2011) reported that methods of providing persistent and comprehensive resource discovery on the internet are being explored and that librarians are playing an important role in these initiatives. They further stated that virtual libraries are the new vision of libraries of the future. Virtual Libraries provide a new way of serving new and future generation users of libraries. Three of the respondents indicated that they foresaw a library with less physical interaction.

Five of the respondents (11 percent) also indicated that they foresaw improved and stronger internet connections. This response could refer to the advent of 5G technologies. Research by Brake (2016) aligns with this by reporting that 5G networks promise radically expanded capabilities. 5G introduces significant improvements with respect to current networking technologies in terms of a larger bandwidth, a more reliable service, very low latencies and a higher density of devices.

Four of the respondents (9 percent) also indicated that increased access to eBooks would be a reality in the future with the use of ICTs. One respondent also indicated that an *"increased digital mitigation of newspapers and magazines will occur in the future".* This could refer to the fact that newspapers and magazines have a limited shelf life, and that switching over to a digital platform would expand shelf life and reach a wider audience.

The results as indicated by the respondents reveal that easier and faster accessibility of information and library services will be possible in the future with the use of ICTs in libraries. One respondent also indicated that better library facilities are needed, and 3 other respondents (7 percent) indicated that libraries should be upgraded with better technical infrastructure.

A total of 5 respondents (11 percent) indicated that there should be increased installation of computers and computer labs in libraries. One respondent also stated that access to computers should still be possible during power shortages. This could be achieved by installing generators. In an open-ended question, library staff members were also asked to indicate what

changes they foresaw in the future, due to ICTs in rendering library information services. Fifteen librarians responded to the question.

One staff member responded by saying that he foresaw a library with more computer labs for students. One respondent also indicated that they foresaw a library with 3D printers. This showed that librarians expectations of future library services and operations would change in line with ICT trends. Three of the respondents (20 percent) indicated that there would be more online books and more online tools. Only 1 respondent indicated that Radio Frequency Identification Systems (RFID) should be used to arrange and circulate library collections. An RFID tag is a tiny radio device that is also referred to as transponder, smart tag, smart label, or radio barcode (Singh & Mahajan, 2014). The adoption of RFID technology by libraries promises a solution that could make it possible to do an inventory on hundreds of thousands of items in their collections.

A prominent theme raised once again in the findings is *"Self-Help"* processes and tools. The respondents highlighted self-help apps; self-help electronic stations; self-help shelving and checking-in systems. It is interesting to note that one respondent also indicated that the library would require less and less staff dealing with traditional services, which was similar to the response from students indicating that they foresaw a library with less physical interaction. More electronic and online systems also emerged as a theme from this question.

The responses indicated that more computer labs, eBooks and electronic resources would be prominent in the future due to ICTs in the rendition of library information services. It is evident, based on these responses, that respondents foresee changes in the library with regard to library services and the use of ICTs.

4.6   Chapter Summary

This chapter presented an analysis of the data about the use of Information Communication Technologies among students and library staff at the University of the Western Cape libraries, collected by means of a web-based questionnaire. The chapter sought to provide answers to the four research questions identified in Chapter One concerning the use of ICT's amongst students and library staff at UWC.

It is evident that in this era of globalization, in which the world is connected, information gains its power through permanent storage and wide distribution, which can be achieved

through the effective usage of ICTs. This study has revealed the strong significant impact of percieved ease of use and percieved usefulness on behavioural intentions. This impact of ICTs on library and information services has led to the development of new professional paradigms within the field of librarianship. However, the findings revealed that libraries are experiencing many barriers to the adoption of ICTs, resulting from several factors such as the inadequacies of computers and online resources. The results also suggested that if exposed to relevant training and a conducive IT-driven environment, librarians would readily and willingly adopt the use of online tools and techniques for processing library resources.

CHAPTER FIVE

SUMMARY, CONCLUSION AND RECOMMENDATIONS

5.1 Introduction

The study explored the effects of ICTs on academic library services and operations, and the impact of ICTs on services and operations within the library. This chapter comprises a summary of the major findings of the research as presented in the previous chapters. It will also focus on the significance of the study, and on recommendations and suggestions regarding future research. The chapter will conclude with a critical assessment of the findings, regarding the answering of the research questions.

As mentioned previously, the study sought to answer the following research questions:

1. To what extent has ICTs impacted on academic library operations, as well as academic librarians' functions?
2. How have ICTs influenced undergraduate and postgraduate students' use of library information resources?
3. What challenges do librarians and students experience in the utilization of ICT-based library operations and services?
4. In what ways can ICTs be used to deliver better, more efficient library and information services?

5.2 Summary of Findings

The summary of the findings will be in light of the questions raised for the research study.

5.2.1 How have ICTs influenced undergraduate and postgraduate students' use of library information resources?

It is evident, based on the results from this study, that the emergence of ICTs within academic libraries has had a significant impact on library operations and services. It is clear that innovative developments in the technological sphere have contributed to the radical changes in library operations and services. It is also clear that the use of ICTs within academic libraries has created many opportunities for interoperability and information exchange.

Results from the study revealed that active UWC library users make use of the computers when accessing library services and resources. Results also showed that UWC library members make use of mobile devices when accessing library information services and resources. The results further revealed that although computers and their internet-based facilities were most preferred by users, there were still users who make use of the OPAC and printing facilities that are provided in the UWC library. The data gathered in Chapter Four also revealed that a large percentage of students make use of the internet when visiting the library. It is therefore clear that ICTs have been embraced by the students at the University of the Western Cape library by utilizing ICT tools and functions to complete assignments, proving that they are useful in light of the Technology Acceptance Model (TAM).

5.2.2 To what extent has ICTs impacted on academic library operations as well as academic librarians' functions?

The findings revealed that the majority of the respondents indicated that they 'strongly agree' that the use of ICTs in libraries has improved practices and operations by saving time. The results confirmed that most librarians surveyed found the use of ICTs within the library to be efficient and effective. It was highlighted in the research that ICTs have had an impact on library operations and services and have "to a great extent" changed operations and services within the academic library. The data showed that 63.15 percent of UWC library staff members strongly agreed that the use of ICTs has made daily operations in the library "easier".

However, there are several challenges that do arise when using ICT tools in libraries. Libraries globally are experiencing issues such as limited funding, constant changes in software and hardware, a lack of ICT skills and knowledge. Copyright and intellectual property rights are a common problem that libraries are facing globally.

5.2.3 What challenges do librarians and students experience in the utilization of ICT-based library operations and services?

The data gathered from the study revealed that the majority of librarians indicated that they have more work-related responsibilities than before. It is also clear that staff members indicated that a lack of knowledge and ICTs skills is a challenge experienced in their library. Library training was highlighted as a priority in delivering more efficient and effective library services. This is because without ICT skills, library professionals will face difficulty in

implementing new technologies in the libraries. In support of this, Khan and Qutab (2016) and Dhanavandan and Tamizhechelvan (2014) stated that for libraries to effectively meet users' needs there is a need for improvement in ICT skills among library professionals. Therefore, they must continue to be educated for the smooth running of the services in the libraries. The data gathered from the UWC library staff members also indicated that there is a need for improved printing and scanning facilities, increasing of staff complements, improved computers, and improved internet speed and digitization tools.

Staff members from the UWC's library also highlighted the power shortages experienced at the library, creating challenges in providing library services. They also indicated that they occasionally experienced inadequate ICT infrastructural facilities and inadequacy in the implementation planning of ICT-based services in the library.

5.2.4 In what ways can ICTs be used to better deliver more efficient library and information services?

The findings revealed in Chapter Four that requests for more computers and printers in the library are in progress. Data gathered revealed that the students indicated that they usually experienced a lack of appropriate ICT facilities at the library. It is important for libraries to obtain sufficient ICT facilities, to ensure that students requiring these facilities will have a chance to make use of it. A lack of sufficient facilities may discourage students from using the library and may increase negative connotations towards the library. The respondents also indicated that they experienced difficulties when it came to constant changes of the software and the hardware used in the library; limited internet, insufficient knowledge in the use of ICT tools, an inconsistent power supply, inadequate support from the library, limitations of online full-text resources and poor internet connections. The research revealed that most university libraries in Africa and other developing countries get very little funding from their parent institutions and the government for support of their activities. The data gathered from students in Chapter Four revealed various themes in the delivery of a more effective and efficient library service. These themes include improving library services by implementing innovative applications and self–help functions; improving and providing quality printers; increasing hardware and infrastructure; providing increased and improved access to online resources; access to full, relevant and recent online journals; effective access for finding books on the library's website, and the ability of multiple users to use the website simultaneously without negatively affecting the system.

5.3   Conclusion

This study has shown that academic libraries are central to any academic institution. Its contribution to the success of the institution lies within its alignment with institutional goals and its relevancy and innovation in meeting students' needs. Technological trends and developments are inevitable. It is therefore important that libraries keep abreast with these developments to remain relevant. It is clear that ICTs have played a major role in technological and innovative services offered at academic libraries. The growing demand for ICTs and infrastructural facilities in libraries can be seen in the daily ICT usage in libraries. It is also evident that ICTs have proven to be useful among both students and staff at academic libraries. Findings in the study have proven that ICTs used in academic libraries are perceived as easy and useful.

The findings in the study also showed that difficulties and challenges in the use of ICTs within libraries are prevalent. It is therefore important to look at various factors associated with the use of ICTs to ensure its effectiveness and efficiency. It is also important to look at the challenges and the constraints of using ICTs in academic libraries. This would then allow for possible solutions and future developments in resolving the challenges. The evolution of ICTs showed that future trends, updates and innovations are inevitable. It is therefore necessary for libraries to stay abreast of innovations and implement plans and policies that are relevant to ICTs, ensuring continued sustainability and quality control. The objectives of this study were achieved.

5.4   Implication of the Study Findings on the Theoretical Framework

The findings of the study support the theory that shows that perceived usefulness and ease of use directly affects one's intention to use ICTs. The study revealed that 63 percent of the respondents 'strongly agree' that the use of ICTs in libraries has improved practices and operations by saving time in the library. Another factor to consider in influencing students use of ICT is usefulness. Data from the study shows that a high rate of respondents (54 percent) indicated that they make use of document processing software when visiting the library. Word processing programmes are aimed at enabling the user to create and edit all types of documents. The findings revealed that the majority of the respondents (82 percent) use computers. Sixty percent of the respondents indicated that they use mobile devices when accessing library information services or library resources. This implies that students are

using technology that they think will assist them in completing tasks. Previous research further reported that students have argued that using laptops and smartphones helps their research work since the internet contributes to their academic success (Salubi et al., 2018).

5.5   Recommendations

The results show that ICTs have significantly impacted the library arena, by simplifying acquisition, providing convenience, better organization, provision of expansive storage and retrieval and the provision and usage of information in libraries. Despite their tremendous potential, ICTs have brought new challenges that must be overcome in order to increase the effectiveness and the efficiency of libraries in developing countries. This refers to issues such as the lack of a national ICT policy, low internet connectivity, an inadequate number of PCs, an inadequate supply of electricity etc.

The following recommendations were discussed with reference to specific research questions posed within the previous chapters. It is important that the introduction of ICTs within academic libraries should be encouraged and sustained. Frequent maintenance of ICT facilities is crucial to the sustainability of ICT services. Challenges are bound to occur in any organization, especially in the introduction of new systems and tools within the library. Libraries should therefore formulate and implement an ICT strategy, which in addition to being used to guide the improvement of ICT infrastructure; should lay out short- and long-term skills development programmes.

Essentially, the University of the Western Cape's library should develop long-and short- term in-house training programmes for its staff members, to enable them to effectively use and apply ICTs in library services provision. This must be done regularly because information technologies change rapidly. It has become increasingly important for library professionals to acquire and enhance their ICT skills, in order to implement new technology in libraries to provide new ICT based library services to users. It is also important and recommended to have qualified technical personnel to maintain and manage the ICT facilities, ensuring smooth operation. A backup generator should be acquired to eradicate challenges stemming from frequent power cuts. It is imperative for libraries to embrace new technological trends and developments, ensuring their relevance to users. It is also important for academic librarians to adopt technologies that meet the needs of their users. It is evident that due to the quick pace and transient nature of technological development, ICTs in academic libraries

require sustained funding. Therefore, the provision of sufficient funds should be allocated for ICTs in academic libraries. Libraries should also be provided with sufficient funds to attain modern information communication facilities**.**

5.6   The Significance of the Findings

The researcher hopes that this study will highlight the impact and importance of ICTs within academic libraries, library operations and in support to users. The researcher also hopes that it will encourage academic libraries to implement ICT policies and practices for both library services and operations. This study highlighted both the advantages and the challenges associated with the introduction of ICTs into academic libraries. It also identified the factors that influence students' attitudes towards ICTs and will thus try to develop or amend those factors affecting students' attitudes to direct them towards positively using ICTs. The study could therefore be used for future reference in improving ICTs in academic libraries.

5.7   Areas of Further Study

Since this study has focused on the impact of ICTs on both academic library operations and the use of library information resources by students and library staff at the University of the Western Cape, future research should be directed at the effects of ICT usage in academic libraries and its link to students' academic performance. It is also recommended that a similar study be completed at other South African universities to determine the utilization and the impact of ICTs in the South African academic community. According to the findings of this study, some suggestions for further studies are:

- Research to investigate and examine the role of virtual libraries in academic institutions.
- New research could look at robotics in libraries and assess how it can be used effectively in library operations and services.
- Research could examine the gaming arena and see how it can be used to enhance learning experiences in libraries and information centres.
- Research to look at the future position of academic libraries in the 4th Industrial Revolution.

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APPENDICES

APPENDIX 1: Online Questionnaire for UWC Staff members

SECTION A: Respondents' Profiles

1. Please tick in the space provided below your area of work.

   ☐ Circulation services

   ☐ Faculty information services

   ☐ Acquisition/collection development

   ☐ Reference services

   ☐ Information Technology support services

Any other please specify --

SECTION B: Impact of ICTS on Academic Library Operations and Academic Librarians' Functions

1. Which of the following ICT tools do you use in rendering information services and/or during your daily library operations? (Please select all)

ICT Tools	Mark (X)
Virtual Reality	
Electronic Databases	
OPAC (Online Public Access Catalogue)	
Computers	
Printers/Scanners	
E-mail	
Intranet	
Video Conferencing Facilities	
Institutional Repositories/Digital Libraries	
Data Mining/Resource Discovery Tool	
Wikis	
Blogs	
Social Media Services	

2. To what extent have library services/operations changed due to ICTs in the last decade? (Please select all that apply)

	Not at all	Very little	Somewhat	To a great extent
Collection development				
Serials acquisition				
Classification and cataloguing				
Demand in the formats of information resources				
Information literacy/user training services				
Circulation services				
Type of trainings being offered to users				
Academic and research support services				
Inter library loans				
Reference services				

3. Please specify the service/operation and how it has changed

_____

_____

_____

_____

4. In your opinion, has the use of ICTs in libraries improved traditional practices and operations in the library? Tick in the appropriate box

	Strongly Disagree	Disagree	Agree	Strongly Agree
Has made daily operations easier				
Faster and more efficient provision of services				
Error free processes in operations				
Cost effectiveness				
Saves more time				
More work-related responsibilities than usual				

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SECTION C: Challenges Experienced in the Utilisation of ICT-based LIBRARY Operations and Services

5. What challenges do you experience in the implementation of ICT-based Services/Activities in libraries?

	Never	Seldom	Sometimes	Often	Always
Financial constraints (Budget)					
Inadequate implementation plan					
Insufficient support from Management					
Inadequate ICT infrastructure					
Lack of trained ICT staff					
Unwillingness of staff members					
Lack of consultancy service for ICT					
Finding the right software and hardware					
Insufficient training facility					
User apathy					
Frequency of obsolescence of technology					
Other (Please specify)					

6. What are the difficulties that you encounter due to ICTs when rendering library information services?

	Very Rarely	Rarely	Occasionally	Frequently	Very Frequently
Inadequate ICT infrastructural facilities					
Constant change of software and hardware					
Inconsistent power supply					
Lack of technical ICT knowledge by library staff					
Internet downtime					
Other (please specify)					

7. Do you think that the library should utilise more ICTs in their service operation?

   Yes [ ]   No [ ]

8. If yes, which ICT tools/services would you recommend?

   _____

   _____

9. Which services would you like improved upon with ICTs?

   _____

   _____

10. What changes do you foresee in the future due to ICTs in the rendition of library information services?

    _____

    _____

    _____

APPENDIX 2: Online Questionnaire for UWC Students

SECTION A: Respondent's Profile and LIR use

1. Please indicate your faculty of study

Faculty	
Arts	
Community and Health Sciences	
Dentistry	
Economic and Management Sciences	
Education	
Law	
Natural Sciences	

2. What is your level of study?

   Undergraduate [ ]   Postgraduate [ ]

3. How often do you make use of the library and information resources? [Please tick one]

   Daily [ ] 2-3 time a week [ ] Weekly [ ] Fortnightly [ ] Monthly [ ] Never [ ]

SECTION 2: Influence of ICTs on Undergraduate and Postgraduate Students' use of Library Information Resources

1. Which ICT tools do you use when accessing library information services/library resources?

ICT Tools	Mark (X)
Virtual reality	
Electronic databases	
OPAC (Online public access catalogue)	
Computers	
Printers/scanners	
Mobile devices (phones and tablets)	
Other (please specify)	

2. How proficient are you in the use of the following ICT tool?

ICT Tools	Inexperienced	Beginner	Intermediate	Proficient	Expert
Virtual reality					
Electronic databases					
OPAC (Online public access catalogue)					
Computers					
Printers/scanners					
Mobile devices (phones and tablets)					
Other (please specify)					

3. Identify the information resources/services that you have utilised or make use of when you visit the library?

	Never	Rarely	Sometimes	Always
PCs in the computer laboratories				
UWC Online Repository (including theses and dissertations)				
Consult faculty librarians				
Academic open access repositories (e.g. OpenDOAR)				
Electronic resources (e-Journals, e-Books)				
Specialised software packages (e.g. SPSS)				
Reference services				
Research support services				
Scholarly databases				
Internet connection (Wi-Fi)				
Document processing software (e.g. MSWord)				
Other (please list)				

4. How would you prefer the following information services/resources rendered?

	In-Person (Physically)	Electronically
Books		
Theses and dissertations		
Consultation with faculty librarians		
Academic open access repositories (e.g. OpenDOAR)		
Electronic resources (e-Journals, e-Books)		
Reference services		
Research support services		
Streaming services (workshop, training and other videos)		

5. How often would you prefer these services through ICTs?

	Never	About Half the Time	Always
Books			
Theses and dissertations			
Consultation with faculty librarians			
Academic open access repositories (e.g. OpenDOAR)			
Electronic resources (e-Journals, e-Books)			
Reference services			
Research support services			
Other (please list)			

SECTION 3:   Challenges of ICT-based Library Operations and Services

6. What are the difficulties that you encounter due to ICTs in the use of library resources and services?

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	Always	Usually	Seldom	Rarely
Lack of appropriate ICT facilities				
Constant change of software and hardware				
Limited Internet access due to high cost				
Insufficient knowledge in the use of ICT tools				
Inconsistent power supply (load shedding)				
Inadequate support from the library				
Limitation of online full-text resources				
Poor internet connectivity				
Other (please specify)				

7. How satisfied are you with the following library services and resources?

	Not at all Satisfied	Slightly Satisfied	Somewhat Satisfied	Very much Satisfied
PCs in the computer laboratories				
Knowledge common area				
UWC electronic theses and dissertations repository				
Consultations with faculty librarians				
Academic open access repositories (e.g. OpenDOAR)				
Electronic resources (e-Journals)				
Electronic resources (e-Books)				
Specialised software packages (e.g. SPSS)				
Reference services				
Research support services				
Scholarly databases				
Internet connection (Wi-Fi)				
Document processing software (e.g. MSWord)				
Online printing services				
Online printing services				

SECTION 3: ICT use in Delivering more Efficient Library and Information Services

8. Which services would you like to be improved upon through the use of ICTs?

    _____

    _____

9. Do you think that the library should utilise more ICT tools in their service operation?

    Yes [ ]   No [ ]

10. If yes, which ICT tools would you recommend that the library acquire?

    _____

    _____

    _____

11. What changes do you foresee in the future due to ICTs in the access and use of library information services?

    _____

    _____

    _____

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APPENDIX 3: Ethical Clearance and Permission

UNIVERSITY of the WESTERN CAPE

YEARS of hope, action & knowledge

01 June 2020

Ms Y Ocks
Library and Information Science
Faculty of Arts

Ethics Reference Number:	HS19/9/1
Project Title:	Information and Communication Technologies and academic library services and operations.
Approval Period:	01 June 2020 – 01 June 2023

I hereby certify that the Humanities and Social Science Research Ethics Committee of the University of the Western Cape approved the methodology and ethics of the above mentioned research project.

Any amendments, extension or other modifications to the protocol must be submitted to the Ethics Committee for approval.

Please remember to submit a progress report by 30 November each year for the duration of the project.

The permission to conduct the study must be submitted to HSSREC for record keeping purposes.

The Committee must be informed of any serious adverse event and/or termination of the study.

Ms Patricia Josias
Research Ethics Committee Officer
University of the Western Cape

Director: Research Development
University of the Western Cape
Private Bag X 17
Bellville 7535
Republic of South Africa
Tel: +27 21 959 4111
Email: research-ethics@uwc.ac.za

NHREC Registration Number: HSSREC-130416-049

FROM HOPE TO ACTION THROUGH KNOWLEDGE.

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11 December 2019

Mrs Y Ocks
Library and Information Science
Faculty of Arts

Ethics Reference Number:	HS19/9/1
Project Title:	Information and communication technologies and academic library services and operations.
Approval Period:	25 October 2019 – 25 October 2020

I hereby certify that the Humanities and Social Science Research Ethics Committee of the University of the Western Cape approved the methodology and ethics of the above mentioned research project.

Any amendments, extension or other modifications to the protocol must be submitted to the Ethics Committee for approval.

Please remember to submit a progress report in good time for annual renewal.

The Committee must be informed of any serious adverse event and/or termination of the study.

Ms Patricia Josias
Research Ethics Committee Officer
University of the Western Cape

NHREC REGISTRATION NUMBER - 130416-049

FROM HOPE TO ACTION THROUGH KNOWLEDGE.

The University of the Western Cape is a Public Higher Education institution established and regulated by the Higher Education Act, No. 101 of 1997 (Republic of South Africa), with the language of instruction being English. The University is duly accredited by the Council on Higher Education and its degrees and diplomas are registered on the National Qualifications Framework in terms of the South African Qualifications Authority Act, No. 58 of 1995.

REQUEST FOR PERMISSION TO CONDUCT RESEARCH AT THE UNIVERSITY OF THE WESTERN CAPE

This serves as acknowledgement that you have obtained and presented the necessary ethical clearance and your institutional permission required to proceed with the project referenced below:

Name of Researcher
YUMNAA OCKS

Research topic
Exploring Information and Communication Technology on academic library services and operations

Period permission is valid for
28 July 2020 – 01 June 2023
(or as determined by the validity of your ethics approval)

Reference code
UWCRP280720YO

You are required to engage this office in advance if there is a need to continue with research outside of the stipulated period. The manner in which you conduct your research must be guided by the conditions set out in the annexed agreement: *Conditions to guide research conducted at the University of the Western Cape.*

Please be at liberty to contact this office should you require any assistance to conduct your research or require access to either staff or student contact information.

Yours sincerely

DR AHMED SHAIKJEE
DEPUTY REGISTRAR
UNIVERSITY OF THE WESTERN CAPE

UWC
UNIVERSITY OF THE WESTERN CAPE
ACADEMIC ADMINISTRATION
28 JULY 2020
This document contains a qualified electronic signature and date stamp. To verify this document contact the University of the Western Cape at **researchperm@uwc.ac.za.**

ANNEXURE

CONDITIONS TO GUIDE RESEARCH CONDUCTED AT THE UNIVERSITY OF THE WESTERN CAPE

The onus rests on the researcher/investigator to observe and comply with the conditions set out below with the aim to conduct responsibly ethical research. Clarity must be sought from the authorising office should the interpretation of the conditions be unclear.

1. ACCOUNTABILITY

1.1. The University reserves the right to audit the research practices of the researcher/ investigator to assess compliance to the conditions of this agreement.

1.2. Data collection processes must not be adapted, changed or altered by the researcher/ investigator without written notification issued to the authorising office.

1.3. The University reserves to right to cease research if any proposed change to the data collection process is found to be unethical or in contravention of this agreement.

1.4. Failure to comply with any one condition in this agreement may result in:

    1.4.1. Disciplinary action instituted against a researcher/investigator employed or registered at the University;

    1.4.2. The contravention reported to the organisation employing or registering the external researcher/ investigator.

2. GOVERNANCE

2.1. Approval to conduct research is governed by the Protection of Personal Information Act, No 4 of 2013, which regulates the entire information life cycle from collection, through use and storage and even the destruction of personal information and it is incumbent on the researcher/investigator to understand the implications of the legislation.

2.2. The researcher/investigator must employ the necessary measures to conduct research that is ethically and legally sound.

3. ACQUIRING CONSENT & RIGHTS OF PARTICIPANTS

3.1. It is incumbent on the researcher / investigator to clarify any uncertainties to the participant about the research.

3.2. Written consent must be obtained from participants before their personal information is gathered and documented.

3.3. Participation in the research must be voluntary and participants must not be pressured or coerced.

3.4. Participants have the right to access their personal information, obtain confirmation of what information is in the possession of the researcher / investigator and who had access to the information.

3.5. Participants have the right to withdraw from the research and insist that their personal information not be used.

4. DATA AND INFORMATION MANAGEMENT
4.1. Due diligence must be afforded by the researcher/investigator to:
4.1.1. Mitigate any risks that could compromise the privacy of participants before
4.1.2. during and after the research is conducted;
4.1.3. Collect only information that is relevant to the aim of the research;
4.1.4. Verify all personal information collected about a participant if the information is supplied by a source other than the participant;
4.1.5. Refrain from sharing participant information with a third party;
4.1.6. Apply for an exemption if the identity of participants should be revealed in the interest of the research aims.
4.2. The researcher/investigator must employ appropriate, reasonable and technical measures to protect, prevent loss of and unlawful or unauthorised access of research information.

Should you have any questions relating to this agreement please contact:

ashaikjee@uwc.ac.za, or researchperm@uwc.ac.za

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APPENDIX 4: Informed Consent Forms (Students)

Information and Communication Technologies and academic library services and operations Survey

UWC Student Questionnaire

Information Sheet

The aim of this study is to investigate the impact of Information Communication Technologies on academic library services provision and operations, as well as how this has influenced the use of library information resources by undergraduate and postgraduate students. This study is focusing on ACTIVE USERS of the UWC Library. Your experience as a library user would provide invaluable insight. If you agree to participate, kindly assist in completing this survey relating your experience as a library user. The questionnaire will not take longer than 15 minutes to complete. I wish to assure you that there are no risks involved if you choose to participate. Also, all information is strictly anonymous. No names will be requested and disclosed in reporting my findings. Your participation in this study is completely voluntarily. You have the right to withdraw at any stage from participating in the questionnaire.

This research has been approved by the University of the Western Cape's Humanities and Social Sciences Research Ethics Committee (HS19.9/1) and permission has been obtained to conduct this study: https://drive.google.com/file/d/1MaQDCqohxnDqdIjjcqxaFRTkSWdzFsfp/view?usp=sharing

If you have any questions about this research or your role as a participant, please contact me, Yumnaa Ocks (Researcher), contact number 0745899404 or email 8937222@myuwc.ac.za. You can also contact my supervisor, Dr Oghenere Salubi, Tel: 021 959 8651 or email osalubi@uwc.ac.za. For further information or queries, you may contact the Humanities and Social Sciences Research Ethics Committee, Research Development, Tel: 021 959 4111, Email: research-ethics@uwc.ac.za. If you agree to participate in this research, please complete and sign the consent form provided.

Thank you for considering the request to complete this survey.

Consent Form *

	Yes
I confirm that I have read and have understood the in...	☐
I understand that my participation is voluntary and th...	☐
I understand my responses are anonymous and will ...	☐
I agree to take part in this research project.	☐

APPENDIX 5: Informed Consent Forms (Staff)

Information and Communication Technologies and academic library services and operations Survey

UWC Library Staff Questionnaire

Information sheet

The objective of this study is to investigate the impact of Information Communication Technologies on academic library services provision and operations, as well as how this has influenced the use of library information resources by undergraduate and postgraduate students. Your experience as a library staff member would provide invaluable insight. If you agree to participate, kindly assist in completing this survey relating your work-related service provision to library users. The questionnaire will not take longer than 15 minutes to complete. I wish to assure you that there are no risks involved if you choose to participate. Also, all information is strictly anonymous. No names will be requested and disclosed in reporting my findings. Your participation in this study is completely voluntarily. You have the right to withdraw at any stage from participating in the questionnaire.

This research has been approved by the University of the Western Cape's Humanities and Social Sciences Research Ethics Committee (HS19/9/1) and permission has been obtained to conduct this study: https://drive.google.com/file/d/1MaQDCqcnxnDqdlijcqxaFRTk5WdzFsfp/view?usp=sharing

If you have any questions about this research or your role as a participant, please contact me, Yumnaa Ocks (Researcher), contact number 0745899404 or email 3337222@myuwc.ac.za. You can also contact my supervisor, Dr Oghenere Salubi, Tel: 021 959 3651 or email osalubi@uwc.ac.za.
For further information or queries, you may contact the Humanities and Social Sciences Research Ethics Committee, Research Development, Tel: 021 959 4111, Email: research-ethics@uwc.ac.za. If you agree to participate in this research, please complete and sign the consent form provided.

Thank you for considering the request to complete this survey.

Consent Form *

Yes

I confirm that I have read and have understood the in... ☐

I understand that my participation is voluntary and th... ☐

I understand my responses are anonymous and will ... ☐

I agree to take part in this research project. ☐