STUDENT ADOPTION AND PERCEPTIONS OF THE LIBRARY AND INFORMATION MOBILE SERVICES AT THE UNIVERSITY OF NAMIBIA, MAIN CAMPUS.

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Declaration

This work has not been previously submitted in whole, or in part, for the award of any degree. It is my own work. Each significant contribution to, and quotation in, this dissertation from the work, or works, of other people has been attributed, and has been cited and referenced.

Signature: Signed by candidate Date:

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Dedication

I dedicate this work to my parents, Sakaria Gottlieb and Alma Tobias.

Abstract

The aim of the study was to examine students' adoption and perceptions of library and information mobile services at the University of Namibia (UNAM), Main Campus. The research objectives were: to assess factors influencing students' adoption and use of wireless technologies that enable them to access library and information services at UNAM Main Campus; to determine the challenges/opportunities that students face when accessing library and information mobile services at UNAM Main Campus; and to identify students' perceptions of the library and information mobile services offered by UNAM Main Campus library. The study employed a mixed methods approach to gather and analyse data, and was supported by the Diffusion of Innovations theory (DOI). Data were collected from students using a convenience sampling method while purposive sampling was suitable to gather the qualitative data from library staff. Data collection from students was facilitated through a questionnaire, and library staff were interviewed. The study findings showed that mobile phones and laptops have been widely adopted and used by UNAM students. The study concludes that the attributes of innovation (relative advantage, compatibility, complexity, trialability and observability) are considered to be the influencing factors in the adoption and use of wireless technologies that enable students to access library and information services. The study results indicated that students enjoy the benefits which wireless technologies provide such as mobility, flexibility, convenience, engagement and communication in improving learning and academic performance and specifically in accessing library and information mobile services. However, slow network speed/network congestion during peak hours, limited Wi-Fi network coverage in areas and network downtime are some of the challenges that are frequently experienced and frustrate UNAM students when learning and accessing library information services. Though some students are not satisfied with the current provision of library services, and perceived them as inadequate due to limited access, lack of awareness and marketing of mobile services, and lack of a library mobile application, the majority of students perceived library services as adequate due to regular instant interactions and communications via emails, telephones and social networks that they exchange with librarians. The study recommends, among other things, that UNAM library staff be innovative in marketing and creating awareness of information resources and services to attract more students and increase library usage. Since there is no mobile application at

UNAM library, the study recommends that the library design a mobile application to assist in providing library services to users with mobile devices.

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List of acronyms and abbreviations

4G	Fourth Generation
Apps	Applications
DOI	Diffusion of Innovation
HEI	Higher Education Institution
LAN	Local Area Network
MTC	Mobile Telecommunication Company (a mobile telecommunications company in Namibia providing cellular access)
MOPACs	Mobile Online Public Access Catalogues (OPAC version designed for mobile devices)
OPAC	Online Public Access Catalogue
SMS	Short Message Services
TN Mobile	Telecom Namibia Mobile (a national telecommunication operator)
UCT	University of Cape Town
UNAM	University of Namibia
USA	United States of America
WebOPAC	Web-based Online Public Access Catalogue
Wi-Fi	Wireless Fidelity
WLAN	Wireless Local Area Network

CHAPTER 1

INTRODUCTION

1.1. Introduction

This chapter introduces the study by looking at the background to the study, research problem, research objectives, research questions, significance of the study, research methodology, as well as limitations and delimitations of the study. It also provides a brief outline of the research report.

Wireless connectivity plays a crucial role in people's lives today, at work, home, schools or in public places. Wireless networks, or just 'Wi-Fi' as they are popularly known, use radio waves instead of local area networks (LANs) to receive and transmit signals to and from a user's computer or mobile device to provide wire-free internet and network connections (Drew, 2003; Held, 2003:7). Wi-Fi enables people to communicate and access digital information without the hurdle of physically connecting to another machine.

Wi-Fi is an abbreviation of 'Wireless Fidelity', described as "the industry name for wireless local area network (WLAN) communication technology related to the Institute of Electrical and Electronics Engineers (IEEE) 802.11 family of wireless networking standards" (Mitchell, 2016). LANs rely on cables to allow multiple computers to connect (point-to-point connections) and share a communication path within a localised geographical area (Comer, 2004:56; Held, 2003:7). LANs are limited by the distance between devices and cables connected to the LAN servers; a WLAN can provide access to areas where LANs cannot reach (Held, 2003:8).

According to Mitchell (2016), a wireless connection is established by using a wireless adapter to create hotspots or access points; these create areas where Wi-Fi is available to those with access permission. Both types of networks (wireless and LAN) have the purpose of connecting computers, but Wi-Fi provides "freedom from place restrictions" (Mamoukaris & Economides, 2003:1). Corporations benefit from Wi-Fi by being able to provide mobile access to information, and cut costs on cabling infrastructure (Liao et al., 2015:220; Mamoukaris & Economides, 2003:4).

Mobile devices such as tablets, laptops and smartphones are typically small and portable. Handheld devices such as cellphones and tablets are easy to transport, have less memory and cost less than desktop computers (Ochola et al., 2013). Mobile devices are considered "on-the-go" computers (Ochola et al., 2013:n.p.). They provide a platform for users to engage with other users from various locations without being bound to a desktop. Therefore, mobile devices rely heavily on Wi-Fi technology.

Technological developments have made major changes in societal practices, patterns, behaviour and values, and have impacted various fields, including education, as highlighted in Ming, Mahmud and Razak (2012) and Liao et al. (2015). Due to rapid technological changes, such as high-speed networks, increased bandwidth and advanced mobile devices that are becoming popular (Liao et al., 2015:220), students have changed the way they "communicate, create, retrieve and share information, collaborate and socialise with each other" (Moreira et al., 2016:1). On university campuses, mobile devices allow users to connect to Wi-Fi, improving access to information and enabling interactivity with others (Chen & Denoyelles, 2013:n.p.). In teaching and learning, this provides freedom of movement since students can directly connect their mobile devices to Wi-Fi to exchange information, communicate with their lecturers, search databases, produce work and learn anytime and anywhere without relying on wired networks. The study of Ashour et al. (2012) indicated that students use mobile devices to learn by exchanging education-related messages, sharing academic files among themselves, searching the internet and library databases, as well as discussing lectures that they had missed and clarifying test dates and homework assignments.

Due to their technology capabilities, mobile devices have become more popular among university students. Liao et al. (2015:220) expressed that for students in universities, "desktop computing seems to have become a matter of the past, while mobile devices which represent improved computing flexibility and mobility are the main personal computers of choice". Institutions of higher education find it beneficial to both students and staff to install Wi-Fi, allowing the use of mobile devices among their academic communities to enhance student engagement, facilitate collaboration, and improve teaching and learning.

Technologies do not only bring changes in teaching and learning in institutions of higher education, but libraries are affected too. Since mobile devices are so popular, academic libraries are faced with the challenges of delivering suitable services to satisfy the needs of students making use of those devices. If students are using mobile devices for learning, their expectation would be that libraries adapt to wireless technologies and offer mobile services that enhance student academic performance.

1.2. Background to the study

The University of Namibia (UNAM) was established in 1992 (University of Namibia [UNAM], 2019a). The Main Campus is geographically located in Windhoek and has six faculties which had an estimated student population of 14 673 in 2018. The Main Campus offers facilities such as lecture rooms with audio-visual technology, computer laboratories and a big library that has computer workstations and information resources in a variety of formats (UNAM, 2019b:n.p.). While many universities in Africa and elsewhere have been using Wi-Fi for some years, UNAM used only LANs until recently, when it implemented Wi-Fi at all campus branches to supplement the existing LAN. UNAM installed Wi-Fi because the computer facilities (hardware) that were available on campus could not accommodate the number of students who needed computer access for their learning. The use of mobile devices among students had increased, providing them with access to hardware, which resulted in high demand for Wi-Fi and pressure on the university to provide it. UNAM campuses are geographically located all over the country in an effort to take higher education closer to the people. Through enhanced technology, Wi-Fi was installed at all UNAM campuses to allow instant connectivity for staff and students to communicate and share information valuable to their academic activities. Through their mobile devices, they are also provided with flexibility and mobility to access information without the limitation of time or the campus on which they are based.

Some studies, such as those of Ming, Mahmud and Razak (2012), Bomhold (2013) and Cassidy et al. (2014), have shown that the usage of both Wi-Fi and mobile devices can provide numerous opportunities in institutions of higher education and can impact students' academic performance. As wireless connectivity allows students to access information and

academic learning materials using mobile technologies from any place, anytime, it also placed a challenge on academic institutions to meet the needs of those users who are digital natives (those growing up with intuitive abilities of using technology), who have their own views and expectations of information (Bomhold, 2013; Oblinger, 2003). These users demand instant information and satisfaction and want access through their mobile devices from any place, 24/7 (Oblinger, 2003:40). Because of this demand for information, academic libraries must keep up with the current trends in technology, transforming their services and extending access to information resources to suit and satisfy users' needs, as well as to stay relevant. Though many university library users are digital natives, there are factors that would influence their adoption of mobile devices and services. So, as mobile devices proved to be essential for students elsewhere, it is important to study this adoption at UNAM and to determine what perceptions there are among UNAM students about use of mobile devices for accessing library and information services.

UNAM has twelve campuses nationwide and eleven regional centres (UNAM, 2019a). At all satellite campuses there are library branches that serve the needs of that campus community. The UNAM library has an online presence in the form of a website which contains a variety of information services that users can access on their desktop computers and mobile devices anytime. The website has recently been redesigned in an attempt to organise its content better and provide easy access to information, including its catalogue and e-resources. The redesign was also to enhance its compatibility with mobile devices in responding to the students' informational needs. At this stage, the library has not developed a standalone mobile application. One of the roles that UNAM library plays is to "contribute to positive graduate outcomes and provide an information infrastructure necessary for ground-breaking teaching, learning and research" (UNAM, 2015:n.p.); this includes allowing users to access library and information services to improve their teaching, learning and research without the limitation of time and location.

1.3. Research problem

It can be witnessed that UNAM students are using mobile devices. These technologies have become popular and important to students for activities such as communication and

accessing information. While there was clearly a need to install Wi-Fi on UNAM campuses and many of the students own mobile technologies which they might use to access academic information to improve their learning and research activities, their adoption of these technologies with respect to the library and information services and their perceptions of the mobile services provided at the UNAM library had not been determined. There was thus a need to investigate to what extent UNAM students were using the current library and information services that are accessible via mobile technologies.

1.4. Research objectives

Considering the research problem, this study seeks to investigate students' adoption and perceptions of library and information mobile services at UNAM in order to determine students' current use of the services with the aim of improvement and meeting their informational needs. The Main Campus library in Windhoek was the site of investigation because of the high portion of the student population it serves (52% of registered students are based at Main Campus (UNAM, 2018)).

The specific objectives of the study are:

a) To assess the factors influencing students to adopt and use wireless technologies that enable them to access library and information services at UNAM Main Campus
b) To determine the challenges/opportunities that students face when accessing library and information mobile services at UNAM Main Campus
c) To identify students' perceptions of the library and information mobile services offered by UNAM library

1.5. Research questions

The research questions that will be answered are:

a) What are the factors influencing students to adopt and use wireless technologies that enable them to access library and information services at UNAM Main Campus?
b) What are the challenges/opportunities that students face when accessing library and information services using mobile devices at UNAM Main Campus?

c) What are the students' perceptions of the library and information mobile services at UNAM library?

1.6. Significance of the study

The results of this study are significant in discovering and explaining how students perceive the delivery of library and information mobile services at UNAM. It is also important to examine the types of technologies, especially the applications (apps) or tools students use on their mobile devices. It is important to undertake this study to give a clear picture of the situation at UNAM and to contribute to knowledge creation in the field of library and information science.

Over and above these, the significance of the study is to assess factors influencing students to adopt and use the technologies that are useful to their learning. The study could help UNAM libraries in identifying library services that students consider effective in influencing their performance positively, by providing research-based information that may assist in improving and marketing current and new services. Additionally, this information may help future researchers and students and assist librarians to develop relevant library applications and provide appropriate services.

1.7. Research methodology

A detailed discussion of this study's research design and methodology is presented in Chapter 3. The study employed a convergent mixed methods approach. According to Creswell and Creswell (2018:17), in mixed methods research, researchers "collect diverse data that best provides a more complete understanding of a research problem than either quantitative or qualitative data alone".

The theory of Diffusion of Innovations (DOI) was selected as the framework for the study. Research data were collected by conducting semi-structured interviews with library staff, while students were given a questionnaire. Purposive sampling was used to identify library staff while convenience or accidental sampling was used for students.

1.8. Limitations and delimitations of the study

Due to the researcher's limited finances and the geographically dispersed nature of UNAM campuses, the researcher excluded the remote campuses of UNAM and conducted the study at the Main Campus in Windhoek only. Even though the majority of students are registered at the Main Campus, this does mean that the study findings are not generalisable across the campuses, particularly as the campuses differ quite a lot from one another: for example, some being in rural areas while others, such as the Main Campus, are based in urban areas. The convenience sampling method used could be biased in selecting some participants for the study, therefore the findings may not represent all of the UNAM Main Campus students.

There is a paucity of literature that investigates the use of mobile technologies in higher institutions in the Namibian context and this posed a limitation on the study. This study seeks to grow this body of literature.

Due to delays in getting ethical approval from the UNAM Research Ethics Committee, time constraints limited the data collection period to five days (16-20 July 2018 between 08:30 - 17:30).

1.9. Outline of the research report

The research report is divided into five chapters as follows: Chapter 1 provides the introduction, background to the study, research problem, research objectives and questions, the significance of the study, limitations to the study and a brief description of the research approach and design . Chapter 2 presents a relevant literature review related to the study as well as the theoretical framework that informed the study. Chapter 3 explains the research methodology, that is, research approach and design, and procedures that were used to collect data. Chapter 4 presents analyses and interprets data that were collected by means of questionnaires and interviews. Chapter 5 deals with discussions of the main findings in the context of the literature reviewed, research questions and the theoretical framework. Conclusions are drawn and recommendations are made while recommendations for further study are suggested.

CHAPTER 2

LITERATURE REVIEW AND THEORETICAL FRAMEWORK

2.1. Introduction

Reviewing the literature is significant to a study as it helps researchers look at what others have done in the area of research and become aware of the latest developments (Bless & Higson-Smith, 2000:20) as well as the "inconsistencies and gaps between their findings and those of other studies" (Welman, Kruger & Mitchell, 2005:3). This chapter reviews literature according to themes, which are related to study objectives, on the factors influencing the adoption and use of wireless technologies by students, the challenges and opportunities for students when accessing the library and information service using mobile devices, and students' perceptions of library and information mobile services. Types of library and information mobile services are also discussed. The chapter presents the framework of the study which is the theory of Diffusion of Innovations (DOI), focusing on the five characteristics of innovations that could predict the rate of adoption.

2.2. Use and benefits of wireless technologies in higher education

Wireless connectivity has become an essential need for higher education institutions (HEIs) to supplement wired networks and provide reliable and high-speed network access to information. HEIs are found to be among "the most aggressive adopters of Wi-Fi technology" (Foundry Networks, 2006:1). It can be assumed that this trend is driven by the benefits that wireless technology brings and the high rate of adoption of mobile devices by students and staff in higher education.

The study of Kim, Mims and Holmes (2006), conducted at the University of Mississippi in the United States of America (USA), found that the introduction of wireless technologies in higher education has brought changes in "shifting the academic environment from traditional settings to mobile learning (m-learning) settings" by providing mobility and flexibility (Kim, Mims & Holmes, 2006:77). Mobile learning has been defined by various authors: Osakwe, Dlodlo and Jere (2016:16) explained it as the "learning that depends on the use of mobile devices to facilitate learning anytime, anywhere" and Han and Shin (2016:79) wrote that it is "the learning facilitated by mobile devices such as mobile phones, tablet PCs and personal

media players in both formal and informal educational settings". The aim of m-learning is for students to reach, interact with and link to online learning resources using mobile technologies. Karim, Darus and Hussin (2006:36) and Ming, Mahmud and Razak (2012:130) asserted that the penetration of wireless technologies in higher education has improved information delivery services, and produced new teaching approaches. Therefore, the use of wireless technologies in education has made huge changes and enhancements in teaching and learning.

Several authors have identified other benefits of wireless networks in higher education. Drew (2003), Kim, Mims and Holmes (2006) and Mamoukaris and Economides (2003) highlighted that Wi-Fi provides mobility that can allow students to move from one point to another (for example, from class to class, to the library, to the cafeteria) and remain connected to the network without any interruptions or restrictions of location and time (users can have access anywhere, anytime). Users of mobile devices stay connected using access points that receive and transmit radio signals to and from the users' devices (Drew, 2003:103). This allows roaming without having to plug and unplug devices into and from a network cable. Other identified benefits of Wi-Fi include: faster and lower cost of installation compared to wired networks; flexibility to configure spaces and relocate the network if required; convenience; increased network speed (bandwidth); improvements in communication; and ease of collaboration among students, among staff, and between students and staff (Kim, Mims & Holmes, 2006:79; Drew, 2003:104; Mamoukaris & Economides, 2003:4).

Although Wi-Fi is found to benefit HEIs, there is still no technology without challenges or limitations. Wi-Fi is considered only as supplementary to wired networks because it has to be connected with the wired network materially somewhere (Drew, 2003:103). Security issues have been identified by Drew (2003:104) as a "possible threat" to Wi-Fi, because of "snooping from malicious strangers" (Mitchell, 2016). Hackers can more easily intercept wireless network traffic over open-air connections and extract sensitive information (Mitchell, 2016). However, new wireless security technologies are continuously being developed (Mitchell, 2016). Generally, for users to gain access to the internet and electronic services in HEIs, they are required to log on using their authenticated usernames or passwords.

Ming, Mahmud and Razak (2012:139) highlighted infrastructural and coping problems for students as challenges in using wireless technologies. The authors stated that poor network coverage and low-speed bandwidth are common problems associated with Wi-Fi, which is normally caused by network congestion when the user population is larger than what the number of wireless routers can cope with; this could cause the network system to collapse. Foundry Networks (2006:2) highlighted the same challenge: as the number of active users increases, the wireless network performance is reduced due to collision rates among users seeking access. The challenge of slow loading speed was also highlighted in the study of Lo et al. (2016). In addition to slow speed, incompatibility of websites and applications was indicated as some of the barriers that prevent students from engaging in online learning activities using their smartphones (Lo et al., 2016:231). Bad weather has also been identified as a challenge because it may also interfere with the network functionality, as reported by Ming, Mahmud and Razak (2012:139). As various challenges have been highlighted in the reviewed literature, this study tried to find out (as part of objective two) the challenges that students face when accessing library and information services using mobile devices at UNAM.

Though there are challenges faced in using wireless technologies in higher education, Ming, Mahmud and Razak (2012:141) indicated that the advantages outstrip the disadvantages: by reducing the identified problems, new learning opportunities may open up that were not possible before.

2.3. Mobile devices used by students: use and preferences

Improvements in technologies provide interactive ways for students to communicate, learn and, possibly, to improve their academic performance. The study conducted at the University of Dammam in Saudi Arabia by Al-Hariri and Al-Hattami (2015:67) showed that most students depend on the internet for their education, especially for searching for information to meet their needs, and many are using mobile devices to create and maintain relationships with one another through social media networks. Ming, Mahmud and Razak (2012:132), in a study conducted at the University of Kebangsaan, Malaysia, found that all students who participated in the study owned laptops and mobile phones. Although many of the students used these technologies to access online dictionaries and participate in online courses, the

study showed that students were not using their devices to communicate with their lecturers. Students indicated that they preferred to engage in face-to-face discussions with their lecturers (Ming, Mahmud & Razak, 2012:136).

Cassidy et al. (2014) conducted a study on higher education and emerging technologies at Sam Houston State University in the USA where they explored the use of and preferences for educational technologies among students. Apart from laptops, they looked at the use of tablets, mobile phones, e-reader devices and social networking sites. Research findings showed that students use their mobile devices for educational, as well as for recreational, purposes (Cassidy et al., 2014). Their study also found that, even though students showed an interest in online library services, such as accessing resources, renewing books online and asking questions through short text messages, there was low use of web browsing through mobile phones and low awareness concerning some existing library mobile services, such as Live Chat. This finding suggests the need for a mobile-friendly website, applications that are compatible with mobile phones, and marketing techniques to promote mobile library services (Cassidy et al., 2014:130).

The study of Cassidy et al. (2014) indicated the increasing rate of student ownership of mobile devices, especially laptops, tablets and mobile phones. Moreira et al. (2016:3) claim that, as shown by the major increases in sales, the interest in tablets and smartphones among students is higher compared to desktop computers or even laptops. This finding is consistent with Mtebe and Raisamo (2014:6), who noted that the price of mobile devices is dropping and the majority of students can now afford them. Kakana and Kanyengo (2009:26) indicated that mobile devices become less costly with every new release because of the competition to attract customers. In addition, Moreira et al. (2016:9) highlighted that the use of smartphones is on the increase because of technologically advanced features.

Despite the affordability of mobile devices and their ownership, the study findings of Chen and Denoyelles (2013) at the University of Central Florida highlighted that there is a gap between students' ownership and the actual use of mobile devices for academic purposes. Regardless, the authors acknowledged the increasing rate of ownership of mobile devices among students, with tablets being the most popular for academic purposes. The authors

highlighted that the tablet's features, such as being small, portable and possessing a reasonable screen size, showed it to be a more powerful learning device than other smaller mobile devices (Chen & Denoyelles, 2013). These features can be considered as factors that are influencing students to adopt and use mobile devices as their choice for learning.

Several studies have investigated the use of wireless technologies in higher education and found several purposes for their use. In the study of Ming, Mahmud and Razak (2012:134), the use of wireless technology has been classified under two broad categories: "accessing for learning purposes and accessing for general purposes which include communication, entertainment, social networking". In discussing accessing wireless technology for learning purposes, Ming, Mahmud and Razak (2012:134) found that students use mobile devices (a) to utilise relevant learning materials/tools (visit online learning websites, use translation tools and search for reference materials), (b) to communicate for learning purposes (communicate with lecturers, join discussion forums/online meetings/video conferences to discuss coursework), (c) for coursework-related purposes (submit assignments online, conduct research) and (d) for independent/lifelong learning.

Rawash et al. (2015) studied students' usage of Wi-Fi in three public universities and one polytechnic in Malaysia. The study examined the factors of gender and level of studies among Malaysian students in HEIs to determine the use of mobile devices in learning. The findings of the study indicated that students use mobile devices to: get comments/feedback about their learning from lecturers; share and exchange important learning information among themselves; search information; access videos for learning purposes; access educational games, course assignments and tutorials; explore mobile applications (apps) to be used in learning; learn English language through dictionary apps; and write important notes or schedule learning activities in diary applications (Rawash et al. 2015:308). However, the researchers observed that the use of mobile devices in HEIs in Malaysia was still low. The study also provides information that gender does not show any difference in the usage of mobile devices in learning, but a significant difference was found among levels of studies. The above uses of mobile devices laid a foundation for this study to investigate and identify mobile apps and tools that UNAM students use on their mobile devices for learning and, particularly, when accessing library mobile services.

According to Mamoukaris and Economides (2003:5), the purposes of using Wi-Fi in education include some of the following: (a) access to searchable databases, (b) administrative services (timetables, student records), and (c) dictionaries, vocabularies and thesauri. In the study of Chen and Denoyelles (2013), students reported that they mostly use their mobile devices to access academic apps, such as for information (Google, Safari), reference (Dictionary), school (Mobile Learn) and resource management (Dropbox, Evernote, Notes, word processing). However, the authors observed that there is a need to promote digital literacy among students to gain relevant skills in accessing, managing and evaluating digital resources. These observations are consistent with Chen and Denoyelles (2013).

As indicated by the literature reviewed, users use mobile devices for various purposes either for learning, communicating or socialising with friends and family. According to Cassidy et al. (2014:124), the mobility provided by mobile technologies means that students can engage with learning content and access information services while on-the-go. Jambulingam (2013:1268) also discussed pedagogy where he said that students are interested in learning content through audio and video formats. In the case of the library, librarians can use the library website to upload LibGuides, videos for marketing and to guide users on how they can access library and information services. Based on previous studies, it can be argued that Wi-Fi and the use of mobile devices in higher education are essential.

2.4. Challenges that students face when using wireless technologies

Though wireless technologies have many benefits in higher education, as mentioned above, still, there are challenges that hinder effective usage. Barriers that confront students using mobile devices include limited screen size and the compatibility of applications (Wai et al., 2016:5), which affect displaying of websites. Limitations on the storage capacity of mobile devices are a challenge to their users (Sun et al., 2011; Ochola et al., 2013), and can negatively affect students because they have to find additional storage devices, such as memory cards or flash drives for their documents and files. Since mobile devices are small, their batteries need to be charged regularly (Sun et al., 2011). This is a challenge, as it requires adequate electrical outlets on campus to avoid overcrowding of spaces and excessive noise as students wait for an open electrical port.

Ochola et al. (2013) pointed out that technology can also be distracting, especially with mobile devices that have features, such as games, cameras and web browsers. These distractions may affect students' concentration on academic activities and may lower their performance.

Another negative aspect of using wireless technologies is internet addiction, which is "a psychological dependence on the internet" (Kandell, 1998:12). Kandell (1998:12) opined that the "fear of missing out on something" can drive users to longer internet sessions without food or sleep. Similar findings were indicated in the study of Kubey, Lavin and Barrows (2001:379), where students reported that they sometimes feel tired the next day because of extended internet sessions late at night, which makes them miss classes. In support of these views, Ming, Mahmud and Razak (2012) reported that having easy access to the internet through the use of mobile devices may lead students to neglect their coursework by surfing the internet for various purposes at any time and from any place.

Apart from internet addiction, another challenge of using wireless technologies is digital literacy skills, which Chen and Denoyelles (2013) and Osakwe, Dlodlo and Jere (2016) highlighted in their studies. Students need these skills to enable them to use different technological devices to access, evaluate, manage and integrate various online information resources (Chen & Denoyelles, 2013; Osakwe, Dlodlo & Jere, 2016:18). These are different to the skills they need for using their mobile devices socially. The authors indicated that students might be using many different applications for academic purposes, which can be difficult for them to determine how to use them for learning. In the context of Namibia, as experienced by this researcher, many students registered at HEIs may lack digital skills due to lack of ICT education and resources in primary and secondary education, specifically inadequate or lack of ICT facilities in government schools. Lack of digital literacy is a challenge that prevents students from using mobile apps and information services appropriate for their academic success.

2.5. Library and information mobile services and student perceptions of them

The use of mobile technologies has become valuable for learning and in providing access to information due to improved computing features (Liao et al., 2015:220). HEIs are using such

technologies and have created mobile versions of their websites and stand-alone applications for users that are downloadable from mobile app stores (Mansour, 2016:372). Aharony (2013), Jingru (2013) and Murray (2010) explained that the availability of mobile devices and applications provides users with access to library and information services from any space at any time. The information and services might include: library hours, Online Public Access Catalogues (OPACs), subject guides, inter-library lending (ILL) and checkout services, special collections, instructional materials or tutorials, library news and events. Libraries around the globe are working hard to adopt new technologies that provide quality and improved mobile information services to support academic activities. Aharony (2013:359) highlighted that traditional libraries have changed into digital and virtual forms, where users can remotely access vast collections of information, using numerous technological innovations to access mobile libraries. The author explained that a mobile library provides services anytime, anywhere for use on mobile devices via Wi-Fi that enables flexibility and real-time access to library and information services (Aharony, 2013:359).

The dramatic change in technologies has forced academic libraries to double up their efforts to keep up with the technological evolution and satisfy the changing needs of students. Fatoki (2005:267) explained that academic libraries are challenged in satisfying users' needs due to their high demand for real-time access to up-to-date information, as well as their varying information-seeking behaviours that have changed with the advancement in technology, such as the need for access to library resources without physically going into the library. In the study of Oblinger (2003), students were grouped and defined according to their life experiences, different attitudes, beliefs and sensitivities. Oblinger (2003) found that users have different views and perceptions about the use of technologies in accessing information resources, putting pressure on academic libraries to meet their differing informational needs.

Hamad, Farajat and Hamarsha (2018:439) indicated that academic libraries have adopted the use of wireless technologies and communication networks to support users by providing ease of access to information which has been made possible by designing mobile-friendly websites and mobile applications (Naeini et al., 2018). Librarians are expected to make significant contributions as information disseminators; they need to understand and exploit information and communication infrastructures, as well as emerging technologies, in packaging,

disseminating and providing services for when and where users access information (Bomhold, 2013:425; Fatoki, 2005:267). Academic libraries have to do this to remain important.

Currently, academic libraries are showing evidence that advancement in technology has significantly improved the transformation of libraries from traditional to digital by providing access to resources in digital formats. ChanLin and Hung (2016:637) explained that libraries could redesign their websites to be responsive to mobile devices; or they should at least be formatted to provide full or partial library services to mobile device users.

Even though academic libraries would want to provide the best and appropriate mobile services to their users, Murray (2010:234) expressed that library resources, such as finances, determine the implementation of such services that are expensive and labour-intensive; however, she indicated that a number of scalable and inexpensive services are also in existence. Murray (2010) reviewed selected mobile technology literature whereby she discussed different types of information and reference services that mobile library users are receiving. The following are a few of these services:

Library websites: Murray (2010:234) opined that the library website should be a starting point for accessing all library resources and services. She indicated that mobile access to websites has been a challenge due to incompatibility issues that affect the display of the website. This observation is consistent with the study findings of Bomhold (2013) and Lo et al. (2016): that incompatibility prevents students from accessing information and library services through the use of mobile devices, especially mobile phones. Therefore, Murray (2010:235) suggested that library websites need to be formatted and converted into a mobile-friendly design to offer the best information and library services.

***Short Message Service (SMS) reference*:** The use of SMS in libraries is popular and widely practiced by librarians all over the world to engage users on a regular basis for different reasons. Murray (2010) discussed different examples of how some libraries in the USA offer SMS reference services whereby students with mobile phones can text their reference queries to a unique library mobile number. The number automatically sends the text to a specified library email address which alerts librarians to respond; responses are then delivered to the

user's mobile phone as a text message (Murray, 2010:236). In the study of Kakana and Kanyengo (2009), which was conducted at the University of Zambia Library, it was suggested that mobile service providers can help the library set up toll free mobile phone numbers where users can send text messages to enquire about the availability of books and other information resources in the library (Kakana & Kanyengo, 2009:27). The authors expressed that, through the use of SMS, librarians can alert users about new library acquisitions, overdue books, special library events or changes in operating hours (Kakana & Kanyengo, 2009). Both Murray (2010) and Kakana and Kanyengo (2009) have indicated that the use of SMS has limitations in terms of characters and the number of words allowed to be sent. However, with regular upgrades and improved features of smartphones, students can now send emails to librarians instead of short text messages.

Mobile OPACS and integrated systems: Even though Mobile OPACS (MOPACs) tend to be available as either transcoded websites formatted for mobile devices or as standalone downloadable applications, they still provide library users with the same information contained in traditional OPACS (Murray, 2010:237). Transcoded websites translate digital files to a suitable format for users, and they are commonly used for adapting content for mobile devices (Rouse, 2008). Murray (2010) states that library users can search and locate information resources in libraries via MOPAC applications from their mobile devices. In addition, libraries can integrate the WorldCat to their MOPACs in order to provide the best service to users with mobile devices. The study of Lo et al. (2016) indicated that both the OPAC and the library account system at the Hong Kong Design Institute have a mobile version that was optimised for mobile devices; however, the authors found that many students were not aware of these available mobile library services. Such behaviour suggests that the library should conduct an aggressive marketing campaign for awareness of its mobile offerings, and possibly train students, who may not know how to use them, through an information literacy programme to maximise the usage of library mobile services. Murray (2010:241) also suggested that libraries could create video tutorials of how to use library and information resources and place them on their websites or upload them onto YouTube. Currently, this is common practice in many libraries worldwide. Librarians create library guides (also accessible through mobile devices) for specific subjects to support individual learning and research anywhere and anytime.

Mobile collections: Under mobile collections, Murray (2010:238) indicated that collections, such as audio books, e-books, databases, music and video files are typical collections that can easily be accessed and used on mobile devices.

Mobile instruction: According to Murray (2010:241), podcasting has been an effective method used by libraries to provide learning content in an easily accessible format. Although podcasting can benefit students because of its convenience and ease of use, it also comes with some disadvantages such as varying volume levels of large files (audio or video), the varying strength and stability of the wireless network or of the dial-up internet connections, length of time to download podcasts, and accents in the podcasts (Murray, 2010:242). Even though libraries can create in-house podcasts that may include library instruction, such as orientation, a library tour and lectures on locating, accessing and using library resources, Murray (2010) pointed out that production can be labour-intensive.

Elsewhere, library and information services are being offered to mobile device users, as indicated by several studies. Lo et al. (2016:231) noted that students were not familiar with the online services that they can access with their smartphones. At the Hong Kong Design Institute Library, these include services such as: checking library hours and library maps; accessing library accounts to renew and request library items; searching library catalogues; accessing and searching e-resources; booking a computer or a study room; contacting librarians; and providing comments and suggestions (Lo et al., 2016:231). Though the library was offering these services, there was a lack of awareness among students. The authors observed that students were interested only in the few mobile library services of an administrative nature (for example, accessing student academic records or timetables).

Paterson and Low (2011) conducted a study at the University of Edinburgh where students expressed that they wanted to access library services, such as mobile alerts (due books, reserved books available), the ability to pay fines, top up printing credit, check printer balance, and renew books on their mobile devices. Students indicated that library mobile services, such as the ability to check computer availability, search the OPAC and the library databases, view library records and reserve items on loan, were some of the services that were very useful to them.

In the study of Karim, Darus and Hussin (2006), mobile phone applications were reported to be used in Malaysian higher education to provide services in the form of information queries and delivery, such as examination results, course registrations, admission status, and academic information about the student. Even though many academic institutions in Malaysia have been providing various mobile phone-based services, the authors claimed that only a few of them have involved library-related services (Karim, Darus & Hussin, 2006:39).

The reviewed literature indicated how Wi-Fi and mobile devices have been used to provide various information services, including library services. The library and information services that are provided by UNAM library that students with mobile devices can access are listed on the library web page (UNAM, 2019b) and are: OPAC and WorldCat Discovery; e-resources; past examination papers; view my library account; renew my books; faculty librarian; and library request forms. The UNAM library website can be accessed by users with mobile devices. The web page is simple and neat, and users can access the afore-mentioned library services directly from the website.

2.6. Theory selection and integration

Rogers' theory of Diffusion of Innovations (DOI) was used to help achieve the study's first objective. The study uses the five stages (knowledge, persuasion, decision, implementation and confirmation) in the innovation-decision process of a new idea or innovation, as well as the five characteristics of successful innovations (relative advantage, compatibility, complexity, trialability and observability) in the DOI theory (Rogers, 2003) to help explore what might affect adoption and use of mobile devices and, by extension, mobile library services at UNAM. The theory of DOI is regarded as relevant to part of this study because it explains how some innovations diffuse so widely and are adopted easily. Although DOI is found to be appropriate for this study, there are other theories that can be used to investigate and explain the adoption of wireless technologies in higher education, for example, the Unified Theory of Acceptance and Use of Technology (UTAUT) model developed by Venkatesh et al. (2003), which Mtebe and Raisamo (2014) adopted and extended to "investigate students' behavioural intention to adopt and use mobile learning in higher education in East Africa". The same model was also modified and used by Jambulingam (2013) to study the

factors that influence the behavioural intention to adopt mobile technology in higher education among students in Malaysia. DOI was, however, chosen for this study because Sahin (2006:14) found this theory to be "the most appropriate for investigating the adoption of technology in higher education and educational environments".

DOI describes a process that occurs over a period and consists of various stages of adoption. The concept is defined as "the process by which an innovation is communicated through certain channels over time among the members of a social system" (Rogers, 2003:5). 'Innovation' is a new idea, practice, or object (Rogers, 2003:11) and, in the case of this study, the innovation is wireless technologies (Wi-Fi and mobile devices), which, in this study, would be used to access library and information services. There are five stages in the innovation-decision process of a new idea, according to Rogers (2003:164). The first stage is the knowledge stage whereby "an individual is exposed to the innovation's existence and gains some understanding of how it functions" (Rogers, 2003:164). At the knowledge stage, Rogers (2003) stated that an individual mainly seeks what the innovation is, and how and why it works.

The persuasion stage occurs "when an individual forms a favourable or unfavourable attitude toward the innovation" (Rogers, 2003:164). In the review of literature for this study, it was shown that students elsewhere are interested in using wireless technologies, which was indicated by the types of mobile devices they own. According to Rogers (2003:170), an individual who is unsure of the innovation's functions or results feels the need for social reinforcement from others towards the innovation. This is to ensure that the individual's thinking about the innovation is similar to that of peers, family, lecturers and colleagues.

The next stage is the decision stage where "an individual engages in activities that lead to a choice to adopt or reject the innovation" (Rogers, 2003:164). This decision could be made according to the perceived usefulness or ease of use because students may believe that the innovation could help them perform better in their academic activities as explained in Jambulingam (2013) and Davis (1989). Even though wired and wireless technologies may provide "the same capabilities and functionalities" (Kim, Mims & Holmes, 2006:88), students prefer wireless technologies because of the benefits, such as mobility and flexibility, that they

offer (Kim, Mims & Holmes, 2006:88). There are, however, factors that influence the adoption of wireless technologies, such as the availability of high-speed internet networks (Mamoukaris & Economides, 2003:1), mobile devices that are small, portable and easy to use (Chen & Denoyelles, 2013) and the quality and affordability of mobile devices (Ochola et al. 2013; Jambulingam, 2013).

In the implementation stage, "an individual puts an innovation into use" (Rogers, 2003:164). At this stage, problems on how to use the innovation could be experienced depending on the level of uncertainty about the expected outcome of the innovation (Rogers, 2003:174).

The last stage is confirmation, which occurs when "an individual seeks reinforcement of an innovation-decision already made, but he or she may reverse this previous decision if exposed to conflicting messages about the innovation" (Rogers, 2003:164). However, the individual may stay away from these messages and seek supportive information that confirms the decision to adopt (Sahin, 2006:17) by changing knowledge, attitude or actions to reduce the state of dissonance and avoid later adoption or discontinuance (Rogers, 2003:185).

The DOI theory is relevant to this study because it explains how some new technologies are easily adopted. In order to determine the factors influencing adoption of wireless technologies for library use at UNAM, the study also looked at the five characteristics or qualities that determine the rate of adoption and the success of an innovation. The attributions of innovations are:

The five characteristics of successful innovations in the DOI theory

Relative advantage is "the degree to which an innovation is perceived as being better than the idea it supersedes" (Rogers, 2003:213). Typically, users of the innovation measure relative advantage in terms of cost, social status, convenience and satisfaction, as they perceive these as important (Sahin, 2006:18). "The greater the perceived relative advantage of an innovation, the more rapid its rate of adoption is likely to be", according to Rogers (2003:15). This study investigated the relative advantage that UNAM students perceive using their mobile devices for library purposes has.

Ochola et al. (2013) discussed affordability and expressed that the high price of mobile devices is determined by the type, model, quality and specifications of the device, which could be the reason for some mobile devices not being widely adopted and used in universities. Jambulingam (2013) suggested that the cost of mobile phones and service providers should be reduced to enable students to adopt mobile devices. This view is supported by Chen and Denoyelles (2013), who wrote that "accessing the mobile device is the first step in supporting and increasing students' mobile learning practices". Students may be offered tablets at reduced prices if universities could engage in business deals with service providers, as suggested by Jambulingam (2013). However, providing cheap mobile devices to students raises the challenge of the longevity and durability of the devices. Students may then need to resort to using better and more expensive mobile devices.

Compatibility is "the degree to which an innovation is perceived as consistent with the existing values, past experiences, and needs of potential adopters" (Rogers, 2003:223). An innovation that is incompatible with an individual's values and briefs, experience and needs may delay its rate of adoption, as explained by Rogers (2003:223). Thus, Sahin (2006:18) stated that, "if innovation is compatible with an individual's needs, then uncertainty will decrease and the rate of adoption of the innovation will increase". This study tried to determine the compatibility that UNAM students experienced when using mobile devices for learning and specifically to access library and information services.

Complexity is "the degree to which an innovation is perceived as relatively difficult to understand and use" (Rogers, 2003:230). An innovation that is clearer to understand could be adopted more rapidly than those that require the users to develop new skills. If students perceive that using mobile devices to obtain access to library and information services is simple and user-friendly, then the rate of adoption may happen easily and fast.

Trialability is "the degree to which an innovation can be experimented with on a limited basis" (Rogers, 2003:231). An innovation that is trialable presents less uncertainty to users. If students are given an opportunity to be trained and practice how they can use their mobile devices to access library and information services, then they may perceive these devices positively and more easily adopt them in their learning.

Observability is "the degree to which the results of an innovation are visible to others" (Rogers, 2003:232). According to Sahin (2006:18), peer observation and role modelling are significant factors in influencing adoption and use of technology. Thus, students may use mobile devices for accessing library and information services, in particular, if they observe positive results among their peers, lecturers or librarians.

All factors discussed above may determine the rate of adoption and use of wireless technologies among students at UNAM for learning, in particular, for accessing library and information services. Some of the questions posed in the survey (see Appendix A) were intended to assess the stages of, and the factors affecting, the adoption of mobile devices in in relation to the mobile library services at UNAM.

2.7. Summary

This chapter discussed the literature on the use and benefits of wireless technologies in higher education, mobile devices used by students and their preferences. The literature reviewed factors influencing the adoption of wireless technologies, the challenges that students experience when using wireless technologies, students' perceptions of the library and information mobile services, as well as library and information services provided by libraries. The chapter also discussed the theoretical framework that informed the study.

CHAPTER 3

RESEARCH METHODOLOGY

3.1. Introduction

This chapter will describe the research methodology and techniques used in conducting the study. It will discuss the study's research approach and design, research population and sampling, data collection instruments, reliability and validity, data analysis, data collection procedure and research ethics.

3.2. Research approach

A convergent mixed methods approach applying both qualitative and quantitative techniques in data gathering and data analysis was used. The mixed methods approach was found to be suitable for this study because of "its ability to employ a variety of data collection methods" (Struwig & Stead, 2001:100). According to Tronchim, Donnelly and Arora (2016:70), the mixed methods approach provides for "a better understanding of the research problem than any one approach alone". Convergent mixed methods allows the researcher to merge and compare the data and determine where the findings converge or not (Creswell & Creswell, 2018:15).

Quantitative research relies on measuring phenomena in numbers by employing statistics to describe, for example, large populations, using survey data (Abbott &McKinney, 2013:35). According to Greenfield and Greener (2016:215), studies that use qualitative research methods "attempt to understand complex phenomena by getting to know the behaviours or cognitions of persons or organisations involved as well as their values, rituals, symbols, beliefs and emotions".

The study used a quantitative approach to measure variables associated with students, such as demographic information, frequency of accessing or using library and information services, types of mobile devices owned and used, and satisfaction with the current provision of Wi-Fi. A qualitative approach was used to gain a broader understanding of the subject by gathering library staff's opinions on how students use mobile devices to access library and information services. The use of mixed methods in data collection neutralises the bias and weaknesses of

each method, and this may allow the researcher to converge data through triangulation (Creswell & Creswell, 2018:15).

3.3. Research design

A case study research design was found to be suitable for this study as it consists of one case, that is, the UNAM Main Campus in Windhoek. Leedy and Ormrod (2015:271) define a case study as research in which a single individual, programme, or event is studied in depth for a defined period.

A case study incorporates several sources of data collection to provide detailed accounts of a real-life situation (Morgan et al., 2017:1060; Leedy & Ormrod, 2015:271); thus, according to Creswell and Creswell (2018:14), a case study integrates well with mixed methods. This study seeks a complete understanding of how students perceive the library and information mobile services, the factors influencing students to adopt wireless technologies that enable them to access library and information services and the challenges or opportunities that students encounter when accessing library mobile services at UNAM. According to Leedy and Ormrod (2015:272), a case study is appropriate for "learning more about a little or poorly understood situation", where intervention may be needed – for example, about how library services can be improved to meet users' needs over time.

3.4. Research population

A research population is defined as "an entire group of people or objects or events which all have at least one characteristic in common and must be defined specifically and unambiguously" (Burns, 2000:83). Tronchim, Donnelly & Arora (2016:81) indicated that a population is a group from which the researcher would like to sample because it is the group the researcher wants the results to be about.

The population for this study included students and library staff of UNAM based at Main Campus in Windhoek. According to statistics for the student population, UNAM (all campuses) registered 28 217 students for the 2018 academic year (UNAM, 2019a); 14 673 students have been estimated to have been registered at Main Campus. The purpose of adding the library

staff (population of 71) was to capture their views and opinions on the use of existing library and information services that are available to students with mobile devices, and to find out if they perceive that wireless connectivity in the library has increased the library usage or the demand for mobile library services. Importantly, this was to gain different views of students and library staff on the factors influencing the adoption of mobile technologies and the impact these technologies have on accessing library mobile services at UNAM.

3.5. Sampling

Abbot and McKinney (2013) observed that it is impractical to study the whole research population, which can be too large and difficult to study intensively due to time and money required to measure every unit. Therefore, the population has to be sampled. A sample is defined as "a subset of units taken from the population" (Abbot & McKinney, 2013:103). According to Burns (2000:83), a sample must ensure that it represents the overall population in terms of the variables that relate to the characteristics the researcher wishes to study. This means that a sample has the exact typical features as those of the study population and, according to Abbot and McKinney (2013) and Burns (2000), the researcher can reach a conclusion or make a valid generalisation about the entire population based on the findings from the sample. A sample was necessary for this study because it is impractical to consult all students and library staff at UNAM Main Campus and due to time and financial restraints and because a paper questionnaire was used. A paper questionnaire was convenient to get information fast from respondents that were library users at that time. Alternatively, the researcher could have used an online questionnaire since the study was investigating the adoption and use of mobile devices at UNAM, but the researcher felt that poor internet connection might hinder students' participation in the study.

The study used convenience sampling, a non-probability sampling method, therefore, only students who were using the Main Campus library on the days when the study was being conducted (16-20 July 2018 between 08:30 and 17:30) had a chance to be included. Even though the focus was on library and information services used through mobile devices, the researcher wanted to ensure that the respondents were already library users to increase the response rate and so it seemed simplest to sample those present in the library. The library

was chosen because it is a central place on campus with a variety of information resources and desktop computers connected to the internet for students to access. It is a place where many students can be found learning, researching or networking.

This study found purposive sampling, a non-probability sampling technique, suitable for library staff. In purposive sampling, the researcher samples with a purpose linked to the type of participants the researcher is looking for (Tronchim, Donnelly & Arora, 2016:87) and with the objectives of "gaining insight and understanding into a particular chosen phenomenon" (Burns, 2000:465). This sampling method allowed the researcher to identify individuals that can represent the library staff population because they have met certain criteria. Purposively, this study included an assistant librarian from the ICT department, an e-resources librarian and an assistant librarian from the Reference and User Service department, because they are directly in contact with students and they are in the best position to notice changes in students' attitudes and behaviour towards the use of library and information services. These selected staff were likely to give valuable inputs as they are in charge of compiling library statistics including the use of online information services.

3.5.1. Sample size

According to Tronchim, Donnelly and Arora (2016:103), the ideal sample size can depend on many factors and some of the factors can be resource constraints, sampling strategy or the purpose of the study. Burns (2000:93) indicated that the larger the sample, the better because results tend to be more accurate, but he warned that a larger sample size will not eliminate or reduce any bias in the selection procedure. However, Abbot and McKinney (2013:118) stated that the sample can be small and still be useful and valid, if representative of the population. The disadvantage of bigger samples is that they are more expensive and harder to obtain and manage than smaller ones (Tronchim, Donnelly & Arora, 2016:103).

Even though the 2018 statistics did not specify how many students were registered per campus, UNAM states that 52% of registered students are based at Main Campus (UNAM, 2018). With total students being 28 217 (UNAM, 2019a), the researcher estimated that 14 673 were at Main Campus in 2018. A free sample size calculator (Raosoft) was used to assist

in calculating the recommended sample size from the targeted population. The recommended sample size of a population is normally calculated at 95% confidence level, however, in this study a confidence level of 85% was eventually hoped for as only 200 questionnaires were distributed due to time limitations. Table 3.1 displays the sample size recommended for the student population at confidence levels of 95% and 85%.

Table 3. 1: Population size and recommended sample size

Population size	Confidence level	Recommended Sample size
14 673	95%	375
	85%	205

Data Source: UNAM Strategic and Physical Planning, (2018) and Raosoft (2018).

Though the total library staff population was 71, only three library staff were purposefully selected (one librarian and two assistant librarians). The three selected informants were enough to represent library staff because the focus of the study was on the students' use of mobile devices when accessing library and information resources

3.6. Data collection instruments and procedures

The study used two data collection tools: a questionnaire to collect quantitative data and interviews for the qualitative data, both of which are methods appropriate to a case study. Through triangulation, different uses of research methods would enhance the procedure to strengthening the validity and credibility of research instruments to examine variables in an attempt to corroborate research findings (Welman, Kruger & Mitchell, 2005:143; Leedy & Ormrod, 2015:104).

3.6.1. Questionnaires

It is important to have a well-constructed questionnaire that can increase the response rate as stated by Burns (2000:574). This study used a questionnaire with two types of questions, closed and open-ended (Tronchim, Donnelly & Arora, 2016:182).

According to Kumar (2014:185), open-ended and closed questions each have some advantages and disadvantages; therefore, they need to be “balanced in the questionnaire to reduce the weaknesses”. Closed questions are easy to use since the questions are laid out with various response options where respondents simply choose or circle an option (Tronchim, Donnelly & Arora, 2016:182). The advantage of using closed questions is “the ability to achieve greater uniformity of measurement and reliability” (Burns, 2000:572). Most closed questions “use scaling to ensure uniformity in the responses” (Tronchim, Donnelly & Arora, 2016:182) and one of the widely known scales is the Likert scale which is based on “the assumption that each statement on the scale has equal value, importance, or weight in terms of reflecting an attitude or opinion towards the issue in question” (Kumar, 2014:204). Thus, the researcher can easily compare answers across cases to see the emerging patterns from the data. Burns (2000:572) further stated that closed questions are “more cost-effective and efficient because coding is developed into the answer categories themselves”. This prevents the misclassification of responses. The main disadvantages of closed questions include the “possibility of annoying respondents who find none of the options suitable and forcing responses that are inappropriate” (Burns, 2000:573). This may contribute to low return rates of a questionnaire.

Though open-ended questions are suitable for sensitive subjects (Abbot & McKinney, 2013:213), respondents might not feel comfortable to express their opinions on sensitive subjects; however, since respondents write down the answers in their own words, this option may help to obtain answers that are not predetermined. The main advantage of open-ended questions is that “there are no restrictions on either the content or the manner of the respondent’s reply, facilitating a richness and intensity of response” (Burns, 2000:572). Open-ended responses must be coded according to the themes before they can be processed for computer analysis, which is time-consuming (Kumar, 2014:186). However, the coding process requires the researcher “to interpret the meaning of responses, opening the possibility of misunderstanding and researcher bias” (Babbie, 2017:257). Another limitation of open-ended questions that Babbie (2017) indicated is that some respondents might give answers that are irrelevant to the researcher's intent. Open-ended questions that are difficult or take a long time to answer discourage respondents from completing them. The questionnaire for this study used both closed and open-ended questions formulated from research objectives

discussed in the literature review (Chapter 2). Similar themes used in the questionnaire were included in the interview guide.

3.6.1.1. Administering the questionnaire

For this study, the researcher opted to use a hard copy of the questionnaire. The printed questionnaire has a high chance of obtaining a satisfactory return rate, if the researcher administers and collects the questionnaire personally (Welman, Kruger & Mitchell, 2005:154) or if administered to a group of respondents gathered at the same place and at the same time (Babbie, 2017:268), for example, a group of students in a library. For convenience and to ensure a quick response, the researcher handed the questionnaire to participants personally, targeted student library users entering or exiting the Main Campus Library between 16 and 20 July 2018 from 08:30 to 17:30, the period the survey was carried out. Although the hard copy questionnaire has many advantages, it also has limitations. Respondents can fail to return the questionnaire or it may get lost and that may lead to a low return rate. Additionally, data analysis from the questionnaire is time-intensive as the researcher firstly has to capture responses digitally, which could invite errors.

A questionnaire provides greater assurance of anonymity (Kumar, 2014:181) thus, in this study, no participant's name or identification were given, therefore, participants were likely to be more truthful in their responses.

A questionnaire with four structured sections was designed to collect data from students (Appendix A). To avoid misinterpretation, incompleteness and a possibility that not all participants return their questionnaire, the researcher developed a questionnaire with simple, clear and straightforward questions. The recommended sample size was 204 (85% confidence level) for this study. Only 200 questionnaires were ultimately distributed among UNAM students.

A pen was awarded to participants as a 'thank you' for returning a completed questionnaire. The rewarding method obtained a high return rate, whereby 160 questionnaires were completed and returned.

3.6.2. Interviews

Interviews were conducted with library staff to collect qualitative data for this study. The researcher employed the face-to-face interview, which, according to Kothari and Garg (2014:94), has the benefit of yielding more accurate answers depending on the researcher's interview skills. Interviews were conducted in the interviewees' offices. A well-designed and executed interview obtains more detailed answers than a self-administered questionnaire (Babbie, 2017:273).

There are three categories of interviews: structured, unstructured and semi-structured. According to Kothari and Garg (2014:93), a structured interview involves "the use of predetermined questions and of highly standardised techniques of recording answers". The researcher asks questions following the exact wording and the order of questions as laid down in the interview schedule (Kumar, 2014:178). Because of the inflexibility of the structured interview, the researcher cannot ask additional questions, omit some, or change the form of questions (Kothari & Garg, 2014:93).

In the unstructured interview, the researcher has the freedom to ask whatever is relevant to the issue being investigated without following the form or order of the questions (Kumar, 2014:177); hence, it provides the researcher with the "flexibility to supplement, omit or change the wording of some questions" (Kothari & Garg, 2014:93). Unstructured interviews are found useful in providing in-depth information as the researcher "explores intensively and extensively into a situation, phenomenon, issue or problem" (Kumar, 2014:177).

A semi-structured interview falls between the structured and unstructured interviews, where the researcher has a list of prepared themes and questions to be covered (Welman, Kruger & Mitchell, 2005:166). The advantage of using a semi-structured interview is that the researcher uses an interview guide, but has the freedom to determine what further questions to ask in order to get the required information (Welman, Kruger & Mitchell, 2005:166). Additionally, probing to clear up vague responses or expanding on a certain issue can be used (Babbie, 2017:275).

This study used a semi-structured interview to allow the researcher flexibility to clarify questions, request elaboration to clear up vague responses, and change the order of questions or supplement them where required.

3.6.2.1. Interview schedule

An interview schedule (Appendix B) with semi-structured questions was designed to assist in guiding the researcher to gather in-depth information from the three library staff members about students' perceptions about the use of mobile devices to access the available library and information services, how technology impacts the usage of the library, and opinions about improving the current library and information mobile services. The researcher conducted the interviews alone, one-on-one, and followed the interview guide to ensure that no area was omitted. The interviews were recorded on a smartphone and transcription was done later. The face-to-face interview also allowed the researcher to explain and restructure questions where required. The interview guide consisted of questions that included some areas covered by the questionnaire and all formulated based on research objectives (Chapter 2). Before interviewing the library staff, invitation emails explaining the purpose of the study and appointments to meet key informants for interviews were sent in advance to all selected interviewees.

3.7. Data Analysis

Data analysis is about how the researcher makes sense of the data collected (Kumar, 2014:294). It is about how the researcher communicates and presents the findings of the study. The convergent mixed methods approach used comprised quantitative and qualitative research approaches. Data analysis in quantitative research "involves the techniques by which the researcher converts data to a numerical form and subjects it to statistical analyses" (Babbie, 2017:444); while qualitative analysis is "the non-numerical examination and interpretation of observations" (Babbie, 2017:420). In data analysis, the research results may be given in explanatory notes or presented in the form of charts, tables and graphs in order to display findings visually and in an abbreviated form (Fox & Bayat, 2013:104). Therefore, data analysis was necessary for the researcher to arrange and present the findings of the study into something meaningful.

Responses from the questionnaire were collated and presented according to research questions using descriptive statistics (frequencies and percentages). For this study, Microsoft Excel was preferred over other statistical software to summarise and display data in tables, pie charts and bar graphs.

Qualitative data analysis involved analysing interviews and doing content analysis. Interview data were captured as audio recordings that were transcribed to text, analysed and interpreted. Though the researcher took a few notes during the interviews, there were some spelling and grammar errors that might not represent the facts accurately, therefore the researcher relied on the transcriptions. In both the questionnaire and interview guide, questions were organised under similar themes to help with triangulation.

Cooper and Schindler (2006:309) stated that data analysis usually "involves reducing accumulated data to a manageable size, developing summaries, looking for patterns, and applying statistical techniques". The researcher used simplified tables, charts and graphs that can be easily interpreted to gain insight into the student adoption and perceptions of the library and information mobile services at UNAM's Main Campus.

3.8. Validity and reliability of research instruments

Validity refers to "the extent to which the instrument measures what it is intended to measure" (Leedy & Ormrod, 2015:114). Validity is "a concept that establishes the appropriateness, quality and accuracy of research findings" (Kumar, 2014:212). Therefore, the validity of questions was scrutinised before the questionnaire was administered. Because of time constraints (the researcher is employed full-time and had to complete her study in the time allocated by her funder), there was no pre-testing of the questionnaire with students, nor the piloting of the interview schedule with library staff to test validity.

As a way of piloting and ensuring the validity of the data collection instruments, the researcher incorporated the comments from the supervisor into the final questionnaire and interview schedule about wording and arrangements of the questions, language use (whether it was simple and understandable to respondents) and the length of the questionnaire.

The validity of the research instrument can be tested in three different forms: face and content validity, concurrent and predictive validity, and construct validity (Leedy & Ormrod, 2015:114). Each type of validity is important in a different situation. This study used the content validity that Kumar (2014:214) defined as "the extent to which each question on the research instrument has a logical link with the objective of the study". In this study, questions were designed to address the study objectives and were organised according to themes related to student adoption and perceptions of the library and information mobile services. Some questions had been used by earlier researchers such as Cassidy et al. (2014), Ming, Mahmud & Razak (2012) and Mansour (2016), and yielded valid results. Kumar (2014:214) stated that content validity could also be judged on "the extent to which statements or questions represent the issue they are supposed to measure, as judged by the researcher, audience and experts in the fields".

Predictive validity or criterion-related validity is judged by "the degree to which an instrument can predict an outcome" (Kumar, 2014:215). The predictive validity is based on external criteria, for example, the validity of wireless connectivity at UNAM library is shown by the ability to predict the high usage of e-resources accessed through mobile devices. The concurrent validity is judged by "how well an instrument compares with a second assessment concurrently done" (Kumar, 2014:215). Construct validity is "the extent to which an instrument measures a characteristic that cannot be directly observed but is assumed to exist based on patterns in people's behaviour" (Leedy & Ormrod, 2015:115).

Reliability is about the consistency in the results obtained with a research instrument each time applied repeatedly to the same object (Babbie, 2017:149). This simply means that the researcher must be able to obtain consistent findings when using the same instruments and the same participants. Therefore, if data obtained from the questionnaire and interviews are consistent, then they are reliable if the same answers are given at different times. Interviews were conducted on different days and times depending on the availability of the selected library staff. The interviews enabled the researcher to discuss in detail the current usage and perceptions of the library mobile services at UNAM and gain more information on the adoption of mobile devices. To avoid influencing the responses of interviewees, the

researcher avoided offering personal opinions that could have affected the reliability of the study findings.

3.9. Ethical considerations

In terms of ethics, the researcher has to comply with the research ethic policies and guidelines of the University of Cape Town (UCT) and specifically in accordance with the research ethics guidelines of the Faculty of Humanities in conducting research with human participants. Approval of ethical clearance to conduct research was sought and obtained from the university's Humanities Faculty (Appendix C). Approval was then sought from UNAM since participants are UNAM students and library staff (Appendix D). An email with the questionnaire, interview guide, research summary and ethical clearance was forwarded to UNAM Research Ethics Committee in March 2018 to grant the researcher permission to conduct research at the Main Campus, but only received the approval clearance in June 2018. All ethical issues were clearly stated, and that none of the participants in the study would be harmed in any way, whether physically or emotionally. Information that might upset, embarrass or put participants' life in danger was not requested. Participants were informed in advance that their participation in this study was completely voluntary, therefore, they could refuse to participate or withdraw any time they wished without penalties. Thus, participants were asked to give consent by signing a consent form (Appendix E and Appendix F) before completing the questionnaire or participating in the interviews. Participants were also assured that any personal details gathered would be treated with confidentiality. Confidentiality was guaranteed for all information obtained from participants by assuring them that information would be used for academic and research purposes only. None of the participants' identity was disclosed in this study.

3.10. Summary

This chapter discussed the research methodology and techniques that the researcher used to investigate the students' adoption and perceptions of the use of mobile technologies in accessing library and information services at UNAM. The chapter discussed the research design and the reasons for selecting the convergent mixed method approach. Detailed descriptions about the research population, sampling techniques and sample size selected

have been outlined. Data collection methods such as the questionnaire and interview were discussed and modes of administering the questionnaire have been explained. Data analysis of the data collected has also been discussed. The next chapter will present the research findings.

CHAPTER 4

PRESENTATION OF DATA

4.1. Introduction

This chapter presents the data collected from the UNAM students and staff at the Main Campus in Windhoek. The study solicited information from students in various age categories, levels of studies and from different faculties, and from library staff. Students were given a questionnaire to complete, while library staff were interviewed.

The interview was conducted according to the interview guide (Appendix B), which sought to obtain information from library staff to supplement data gathered from students on library services, perceptions, influence and adoption, as well as challenges and opportunities.

4.2. Response rate

Out of 200 questionnaires administered to students, 160 (N) were returned, giving a response rate of 80%. The response rate of 80% is good for the study and it yielded sufficient and valuable information to the critical study questions, despite the fact that findings cannot be generalised. Library staff interviewed were three key informants. The quantitative data collected through the questionnaire were analysed using Microsoft Excel 2016, while qualitative data from the interviews were analysed using content analysis by grouping answers according to themes or categories.

In the data presentation, 'n' represents the number of respondents for a particular question. The questionnaire was administered to students at the Main Campus between 16 and 20 July 2018, while the interviews took place in Windhoek between 23 July and 9 August 2018. The analysis of the data is presented according to the questions posed to respondents, with some questions discussed together.

4.3. Demographic information of questionnaire respondents

The purpose of collecting demographic information is to find out whether demographics influence the adoption and use of wireless technologies in relation to access to library and information mobile services.

Questions 1.1 & 1.2: *Indicate in which age category you fall.*

The study results reveal that the majority of the respondents were female (92; 57.5%). The data showed that 38 (24%) of the respondents were aged from 17 to 20, and only two respondents represented the 35 and above age category. The majority of students who responded to the questionnaire were in the 21-25 age category, as can be seen in Figure 4.1.

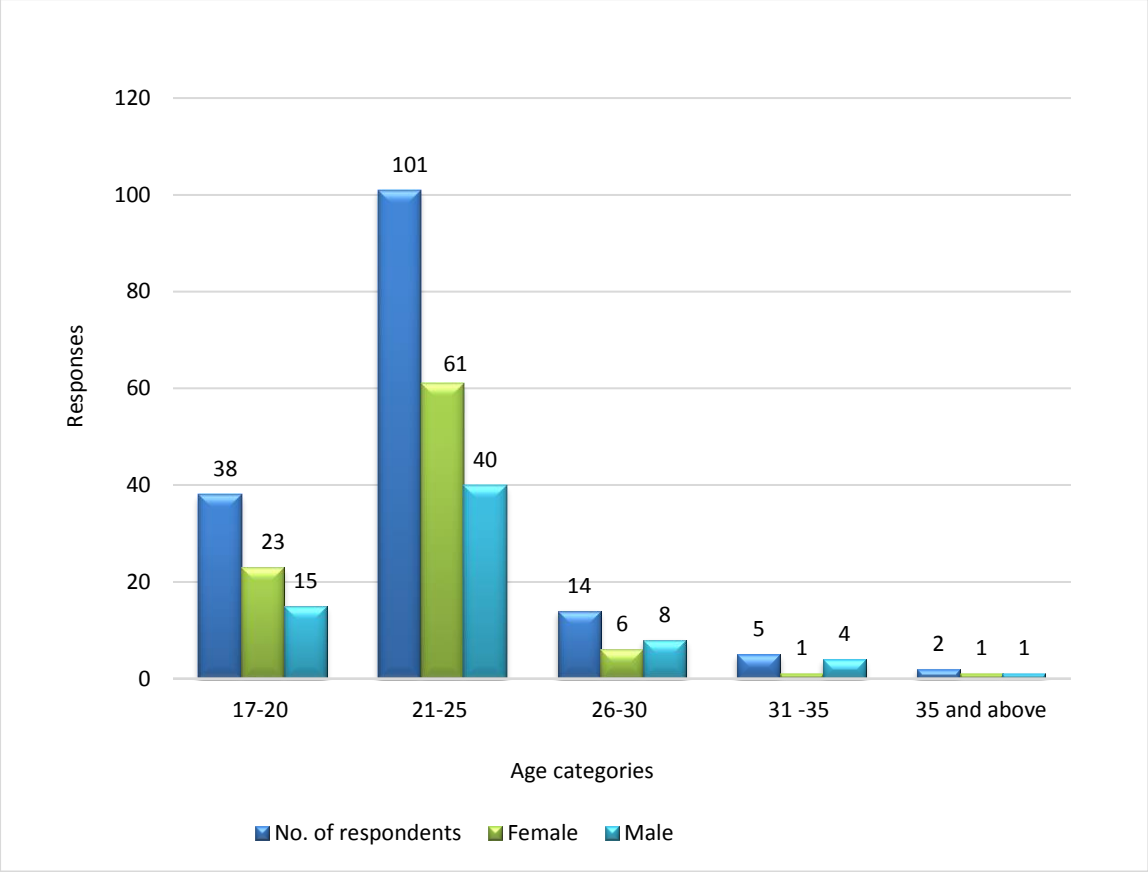

Figure 4.1: Age categories and gender of respondents (n=160)

Question 1.3 & 1.4: *Indicate your level of study below. Indicate the faculty in which you are currently registered*.

The students were predominantly undergraduates (149; 93%) . The Faculty of Economics and Management had the highest number (47; 29%) of respondents , followed by Education (39; 24%), Humanities & Social Science (33; 21%) and Faculty of Science (31; 19%). The Faculties of Law (5; 3%), Health Science (3; 2%), and Agriculture & Natural Resources (2; 1%) are the least represented in this study.

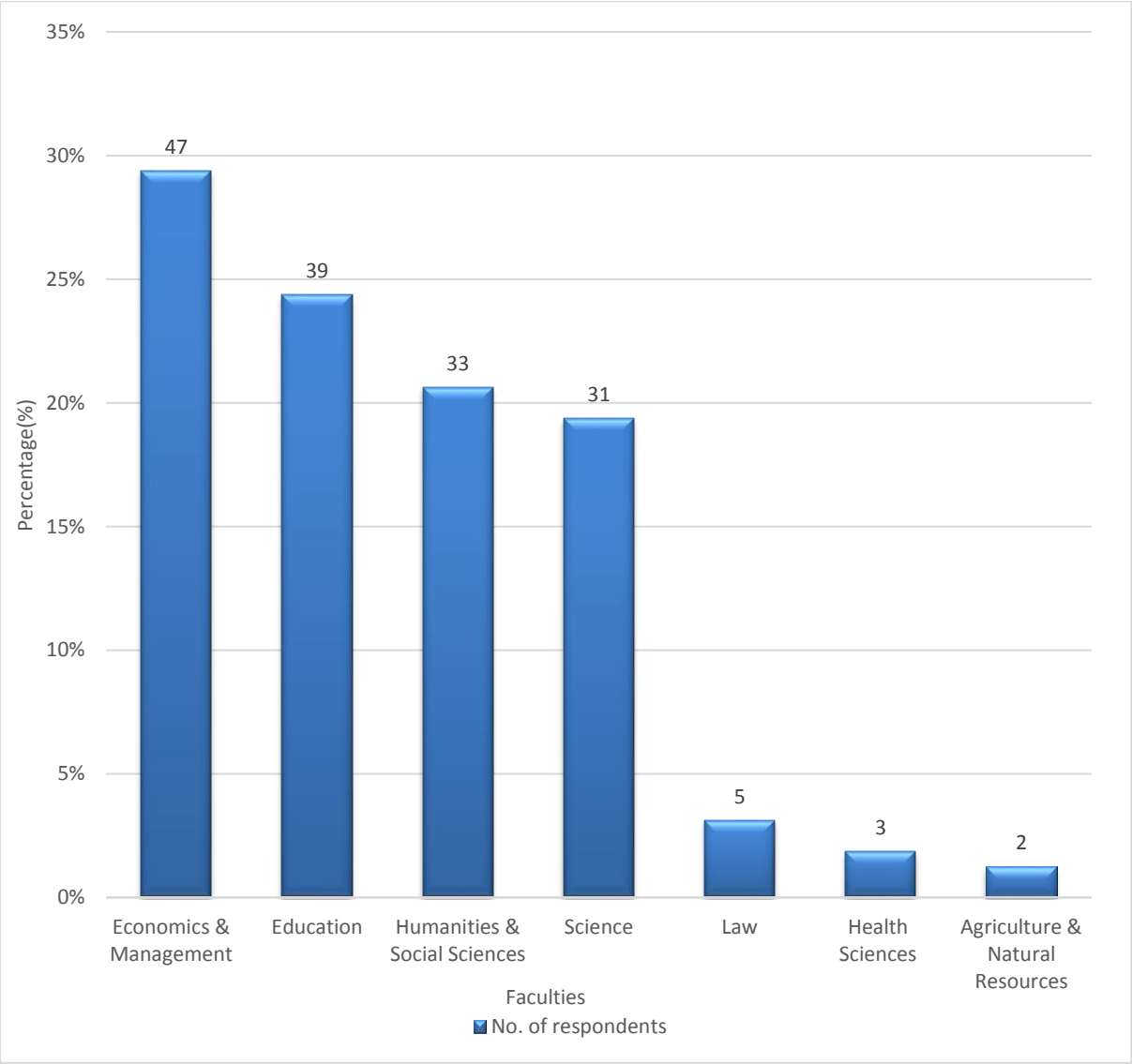

Figure 4.2: Faculties where respondents were registered (n=160)

4.3.1. General use of mobile devices

This section looks at the general use of mobile devices by students at UNAM. The purpose was to find out the type and ownership of mobile devices students use, investigate the mobile device's features that attract students or the social influence that contributes to adoption and use of mobile devices.

Question 2.1: *How many mobile devices of the type listed below do you own, and which mobile device do you find that you use the most?*

In this question, students were asked firstly, to write the number of mobile devices they own of the types listed on the questionnaire, and secondly, to indicate the most used mobile device by ticking in the appropriate block. The purpose of the question was to find the ownership and preference of mobile devices of UNAM students in order to identify factors influencing students to adopt these devices and to identify potential challenges and benefits that students face when accessing library mobile services. Out of 160 students respondents, only three (2%) indicated that they did not own any of the listed mobile devices. These respondents were asked to indicate who owned the mobile devices they were using the most. They revealed that the mobile devices they used belonged to either their cousins or friends.

Unsurprisingly, the most popular mobile device owned by students is a mobile phone (smartphone) (67; 42%); 12 (8%) indicated that they owned at least two smartphones. Moreover, 53 (33%) students revealed that they owned a laptop, and two (1%) of these students indicated that they owned two laptops. The majority (98; 62%) of students indicated that they mostly used a smartphone, while 53 (34%) used a laptop most out of all their devices. Table 4.1 presents the findings on the type of mobile devices owned by students.

Table 4.1: Mobile devices owned by students (n=160)

	Respondents who own one	Percentages of total	Respondents who own two	Percentages of total	Total devices owned
Mobile phone	67	42%	12	8%	**91** (67+12*2)
Laptop	53	33%	2	1%	**57** (53+2*2)
Tablet	18	11%	0	0	**18**
E-book readers	5	3%	0	0	**5**
None	3	2%	0	0	**3**
Total	**146**	**91%**	**28[14*2]**	**9%**	**174**

Table 4.2 presents the findings on the most used mobile devices.

Table 4.2: Mobile devices most used by students (n=160)

		Usage	
Mobile Devices	**Total devices owned**	**Frequency of most used mobile device**	**Percentage (%)**
Mobile phone	91	98	62%
Laptop	57	53	34%
Tablet	18	5	3%
E-book readers	5	2	1%
I don't own any of the above	3	0	0%
Total	**174**	**158**	**100**

Overall, the data show that the most popular and most used mobile devices among UNAM students using the library are mobile phones and laptops. The majority of students each own

at least one mobile phone, and several own a laptop. Tablets and e-book readers seem not yet to be popular among students, as findings indicate low ownership and use.

Question 2.2: *Who influenced you to choose the type of mobile device/s you are using?*

The purpose of this question was to find out which factors influenced students to select and adopt the type of mobile devices they were using. The aim was to identify whether there is a social influence whereby students perceive that important people believe they should choose and adopt the type of mobile devices they are currently using. The findings for this question will assist in identifying the factors influencing adoption of mobile devices; also in determining the adoption rate of mobile devices at UNAM.

Respondents were instructed to tick as many answers as were applicable. The findings showed that 93 (58%) respondents indicated that they made their own choice of the types of mobile devices they were using and were not influenced by family members, friends, lecturers or classmates or by advertisements. Fourteen students (9%) indicated family members influenced them. Ten (6%) respondents indicated that their friends influenced them, while 8 (5%) indicated that lecturers or classmates influenced them. Only 7 (4%) were influenced by advertisements. Then, 12 (8%) indicated that they chose the types of mobile devices because they were influenced by all the listed influences or factors. Other participants (16; 10%) indicated having been influenced by a combination of two or three of the listed influences.

The results in Figure 4.3 illustrate that the majority of students made their own choices in selecting the type of mobile devices they would want to use most without the influence of family members, friends, lecturers or classmates. It can be assumed that the individual's knowledge and understanding of how the innovation works (knowledge stage in the innovation-decision process) could have helped students to choose their own mobile devices.

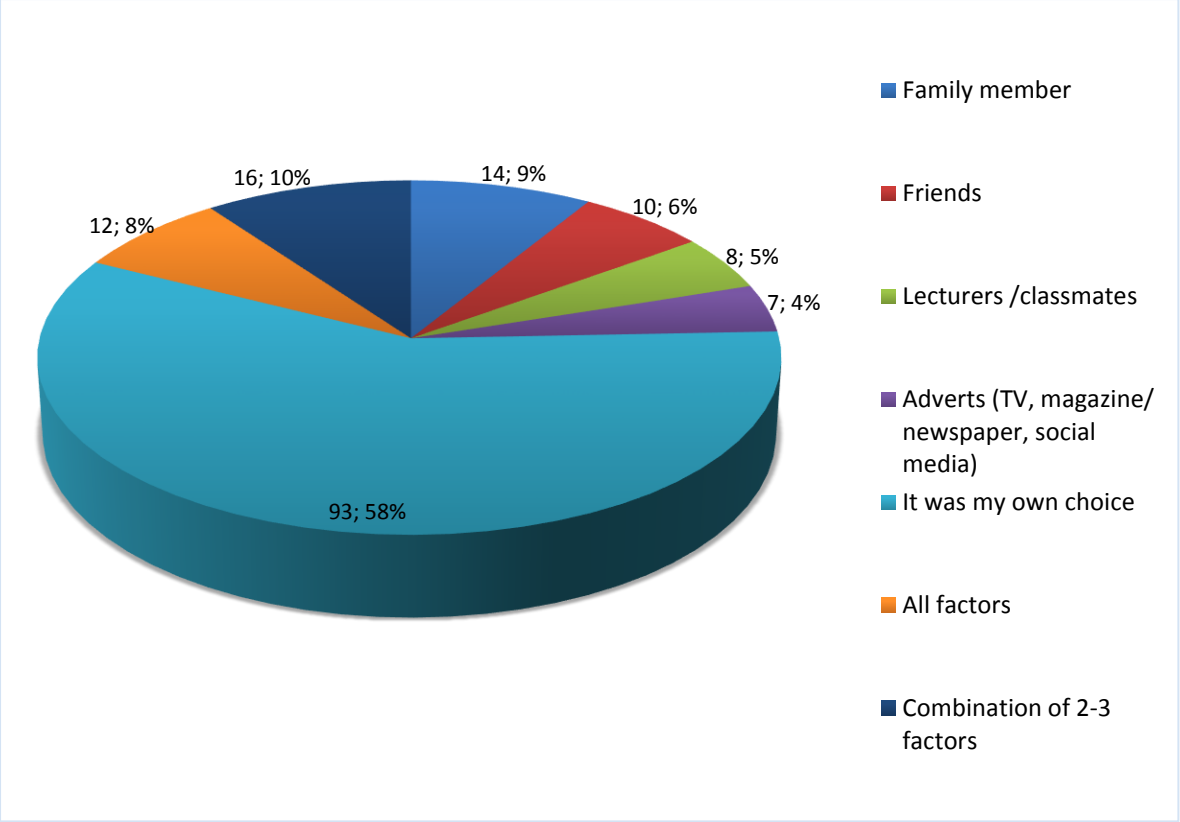

Figure 4.3: Influencers in the choice of type of mobile device (n=160)

Question 2.3: *Which features of the mobile device used most often attracted you to decide to use it?*

This question sought to find out the features of the mobile devices that attracted students to decide to use their preferred mobile devices. The aim of the question was to find out which features of the mobile devices are significant in influencing adoption and use of mobile devices to access library and information services. Respondents were asked to tick as many answers as were applicable.

When students were asked to indicate features of the mobile device that attracted them to decide to use it, 35 (22%) respondents showed that quality and specifications of the device were attractive, however, 25 (16%) indicated being attracted by the ease of use of the mobile device. All features, such as ease of use, size, weight (easy to carry anywhere, anytime), the mobile device brand, and quality and specifications of the device, attracted 24 (15%) respondents. The size of the mobile device was the least attractive feature of all, with only 3

(2%) of the respondents selecting this option. Some respondents indicated a combination of mobile device features that attracted them as shown in Table 4.3.

Table 4.3: Mobile device features that attract students to deciding to use it (n=160)

Features of mobile devices	**Frequency**	**Percentages**
Ease of use	25	16%
Size	3	2%
Lightweight (easy to carry anywhere, anytime)	16	10%
The mobile device brand type	10	6%
Quality and specifications of the device	35	22%
Total	**89**	**56%**
Combination of mobile device features		
Ease of use, Lightweight & Quality	11	7%
Size & Quality	4	3%
Size & Lightweight	2	1%
Lightweight, Brand type & Quality	2	1%
Ease of use & Quality	4	3%
Ease of use, Size & Lightweight	10	6%
Ease of use, Brand type & Quality	9	6%
Brand type & Quality	5	3%
All combined features	24	15%

It seems, therefore, that the most popular features of mobile devices that attract students are: quality and specifications of the device, ease of use and weight (easy to carry anywhere, anytime). Although size is indicated as the least attractive feature, the results showed that all combined features have attracted many students to decide to use the mobile device.

Question 2.4: *Indicate how strongly you agree or disagree with the following statements.*
This question sought to identify the challenges that prevent or slow down the adoption of wireless technologies. These can also be barriers to accessing mobile library and information services. A number of possible statements were listed, and respondents were asked to indicate how strongly they agreed.

The majority (97; 61%) of the respondents strongly agreed that a good Wi-Fi network influences the use of mobile devices and 82 (51%) strongly agreed that mobile devices are essential to their academic performance. Then, 96 (60%) respondents agreed that mobile devices are more convenient, as they are portable. On the cost of airtime and data being too high, 74 (46%) strongly agreed, while 19 (12%) disagreed. Regardless, many of the respondents owned mobile phones and laptops (see Table 4.1.). Table 4.4 shows that 60 (38%) respondents disagreed with the statement that mobile devices are cheaper and more accessible (by implication, than desktop computers), suggesting that some students may not afford mobile devices. Most (66; 41%) of the respondents strongly agreed that mobile devices are expensive, and some students cannot afford them. Despite this feeling, 67 (42%) respondents own mobile phones (Table 4.1).

Table 4.4: The extent to which respondents agree or disagree with the statements (n=160)

Statement	Strongly agree	Agree	Disagree	Strongly disagree	Not sure
1. Mobile devices are cheaper and more accessible.	25 (16%)	55 (34%)	**60 (38%)**	18 (11%)	2 (1%)
2. Mobile devices are more convenient as they are portable.	57 (36%)	**96 (60%)**	2 (1%)	0 (0%)	5(3%)
3. Mobile devices are expensive, and some students cannot afford them.	**66 (41%)**	54 (34%)	15 (9%)	14 (9%)	11(7%)
4. The cost of airtime and data is too high.	**74 (46%)**	53 (33%)	19 (12%)	10 (6%)	4 (3%)
5. A good Wi-Fi network influences the use of mobile devices.	**97 (61%)**	53 (33%)	6 (4%)	1 (1%)	3 (2%)
6. Mobile devices are essential to my academic performance.	**82 (51%)**	60 (38%)	9 (6%)	4 (3%)	5 (3%)

The data presented in Table 4.4 show that none of the respondents strongly disagreed that mobile devices are more convenient as they are portable. And only 5 (3%) respondents indicated that they are not sure whether mobile devices are essential to their academic performance, suggesting that only a few students might not know how the mobile devices function. They might lack the knowledge about the innovation for them to perceive the usefulness of it in order to improve their academic performance.

4.3.2. Types and purpose of mobile technologies used in higher education

This section investigated the types and purpose of wireless technologies used in higher education, in order to identify the learning activities that students perform, time dedicated for learning, and applications and tools used on their mobile devices.

Question 3.1*: What types of mobile devices do you currently use in your studies?*

Having been asked in question 2.1 to indicate what mobile devices they owned, respondents were instructed to indicate the type(s) of mobile devices they used in their studies by ticking all applicable answers. As depicted in Figure 4.4 ,76 (48%) mentioned that they are using both mobile phones (smartphones) and laptops, while 30 (19%) indicated using laptops only. Though mobile phones were indicated to be the most owned and used mobile device in answers to question 2.1 (Tables 4.1 and 4.2), only 28 (18%) respondents were using them for their studies. The data revealed that a mobile phone, laptop and tablet are used by 9 (6%) respondents , while 5 (3%) indicated that they were using a laptop and tablet, while the other 4 (3%) used mobile phones, laptops and e-book readers. The data, therefore, show that students use a combination of mobile phones and laptops, or else just a laptop or mobile phone for their studies.

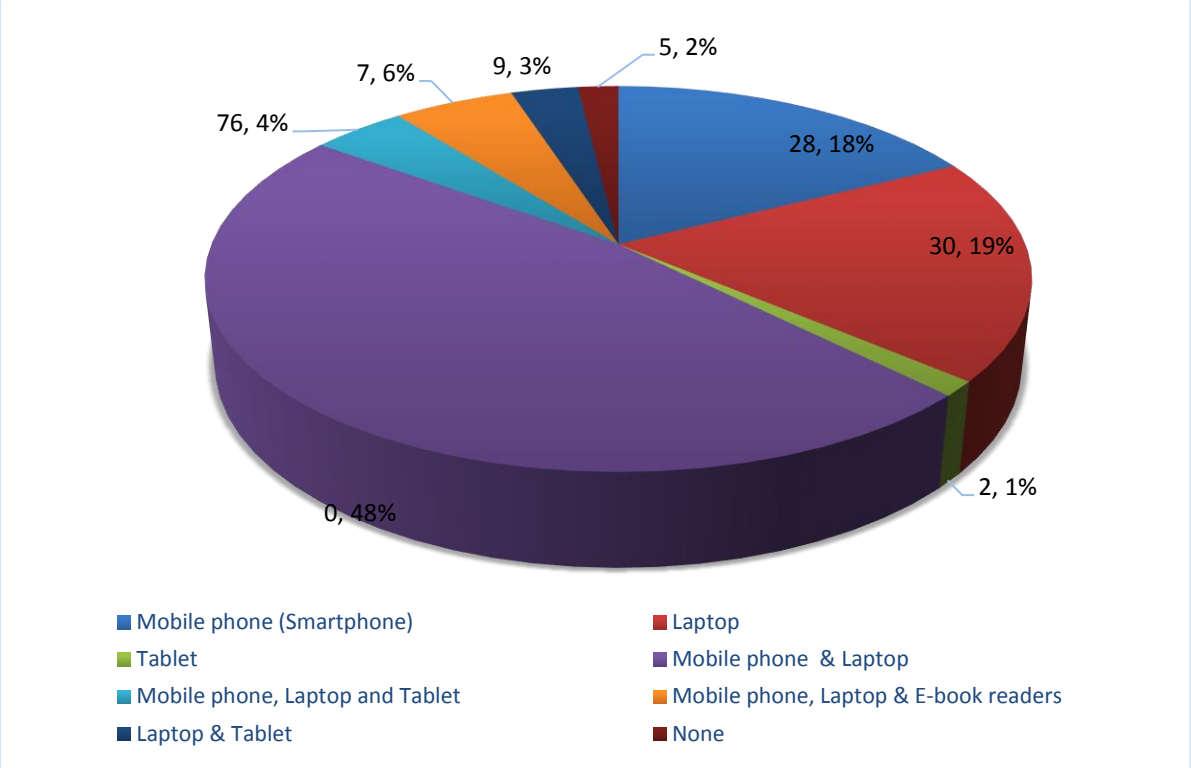

Figure 4.4: The type of mobile devices currently used for studies (n=160).

Question 3.2. *If you use your mobile devices for learning purposes, which of the following learning activities do you perform and how often?*

Respondents were asked to tick as many answers as were applicable according to the phrases "often", "sometimes", "rarely" and "never". Respondents that selected "none" for question 3.1 were instructed to skip this question and answer question 4.7 only. Once the three respondents who indicated "none" for question 3.1 were excluded, the total number of respondents for question 3.2 became 157. Findings showed that students used their mobile devices to utilise relevant course learning materials or tools, with the majority (121; 77%) indicating that they "often" download academic materials. Searching and accessing the OPAC were "sometimes" accessed through mobile devices by 54 (34%) respondents only. Moreover, 59 (38%) respondents showed that they "sometimes" accessed library e-resources or visited online learning websites.

For coursework-related purposes, 113 (72%) respondents "often" completed their assignments with mobile devices, and 74 (47%) "often" downloaded research articles. Seventy (40%) respondents indicated that they "often" submitted assignments online, while

53 (34%) “often” used their mobile devices for note taking. Findings also showed that students used their mobile devices to communicate for learning purpose, 95 (61%) respondents indicated that they “often” communicated with lecturers and classmates, though 90 (57%) had “never” chatted to librarians via the Ask-A-Librarian web page.

For independent and lifelong learning, 132 (84%)respondents indicated that they “often” used their mobile devices for learning on their own. As shown in Table 4.5 , 51 (32%) respondents “often” used their mobile devices for business, finances and banking.

Table 4.5: Learning activities that students performed on mobile devices (n=157)

Learning activities		Often	Sometimes	Rarely	Never
1. To utilise relevant course learning materials/tools	a. Search and access library catalogue (OPAC)	30 (19%)	**54 (34%)**	38 (24%)	35 (22%)
	b. Access library e-Resources	47 (30%)	**59 (38%)**	32 (20%)	19 (12%)
	c. Visit online learning websites	**83 (53%)**	59 (38%)	9 (6%)	6 (4%)
	d. Download academic materials	**121 (77%)**	33 (21%)	0 (0%)	3 (2%)
2. For coursework-related purposes	a. Complete assignments	**113 (72%)**	34 (22%)	5 (3%)	5 (3%)
	b. Note-taking	**53 (34%)**	51 (32%)	36 (23%)	17 (11%)
	c. Submit assignments online	**70 (45%)**	58 (37%)	20 (13%)	9 (6%)
	d. Download research articles	**74 (47%)**	57 (36%)	17 (11%)	9 (6%)
3. To communicate for learning purposes	a. Communicate with lecturers and classmates	**95 (61%)**	46 (29%)	11 (7%)	5 (3%)
	b. Chat to Librarians (Ask-A-Librarian)	6 (4%)	20 (13%)	41 (26%)	**90 (57%)**
	c. Join discussion forums/ online meetings/ video conferences to discuss course work	**48 (31%)**	38 (24%)	38 (24%)	33 (21%)
4**. For independent and lifelong learning**	a. Learning on my own	**132 (84%)**	23 (15%)	1 (1%)	1 (1%)
	b. Doing business, finances and banking	**51 (32%)**	49 (31%)	33(21%)	24(15%)

Question 3.3: *During which time do you mostly use your mobile device for learning?*

This question was included to indicate the dedicated time where students learnt using their mobile devices, as it would help to ascertain time that students access library and information services. This is necessary in finding out whether time is an influencing factor on adoption and use of mobile devices for learning.

Findings showed that the majority (132; 84%) of the respondents used their mobile devices at any time for learning while 16 (10%) used them after 18:00. Only 5 (3%) respondents indicated that they used their mobile devices for learning in the afternoon (12:00-18:00), and 4 (3%) indicated morning (06:00-12:00). It can, therefore, be seen that students were not limited by time when they wanted to use their mobile devices for learning, with just 25 (16%) respondents using them only at specific times of the day.

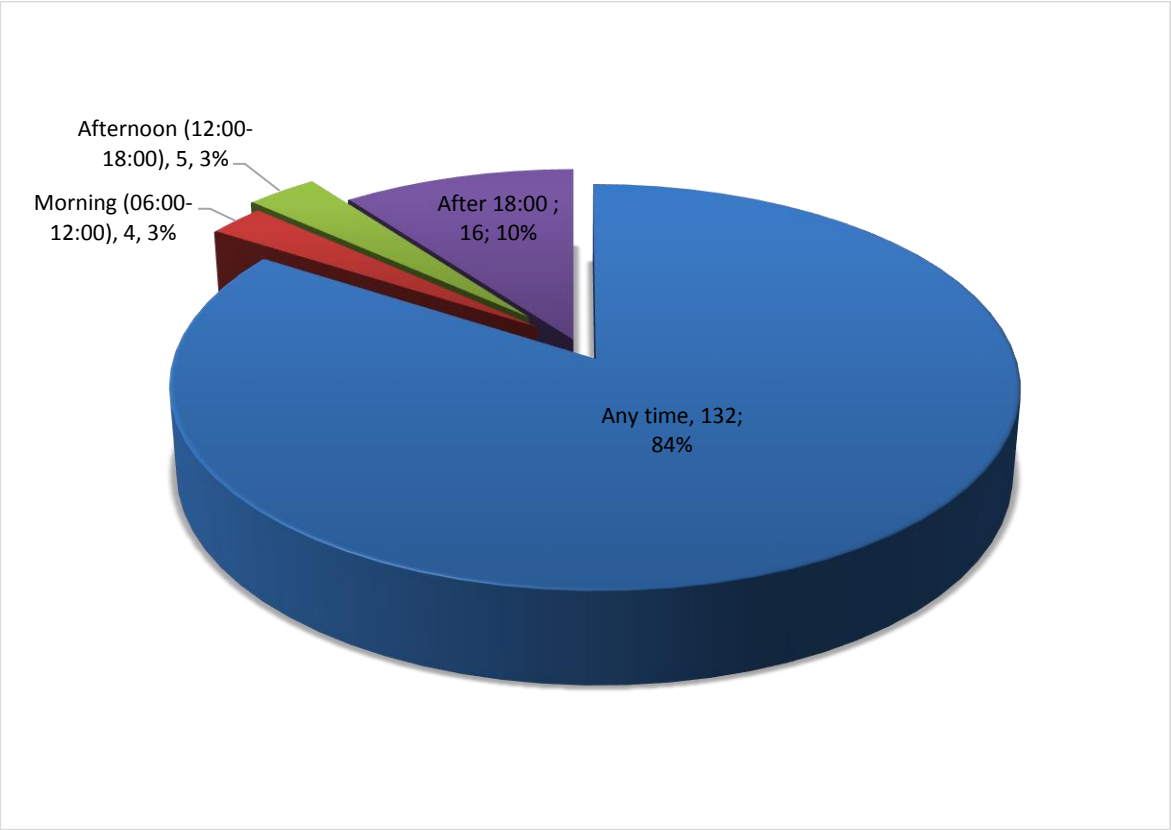

Figure 4. 5: Dedicated time for using mobile devices for learning purposes (n=157)

Question 3.4: *Which of the following applications and tools on your mobile devices do you use for academic purposes and how often?*

The purpose of this question was to identify the type of applications and tools on student's mobile devices that students perceived as easy to use and useful for academic purposes. Respondents were asked to tick the appropriate block according to phrases "often used", "sometimes", "rarely used" and "never used". The findings showed that the majority (112; 71%) of students "often" used emails, and unsurprisingly, all respondents (157) "often" used Google on their mobile devices. Note-taking software such as Evernote and Pocket were

"rarely" used, with 57 (36%) respondents indicating that they had "never" used note-taking tools. As shown in Table 4.6, respondents "often" used WhatsApp (139; 89%), Adobe Acrobat Reader (101; 64%), YouTube (103; 66%), Notes (89; 57%) and Dictionary (85; 54%). For mobile applications and tools that respondents used, but were not listed, 15 (10%) respondents indicated that they "often" used the class timetable downloaded from the university students' portal and 7 (4%) "often" used their phone's calendar. Their mobile device's camera and Google Scholar were both "often used" by 5 (3%) of respondents.

Table 4.6: Applications and tools student use on their mobile devices for academic purposes (n=157)

Apps/Tools	Often used	Sometimes	Rarely used	Never used
1. Calculator	53 (34%)	**62 (39%)**	32 (20%)	10 (6%)
2. Email	**112 (71%)**	41 (26%)	4 (3%)	0 (0%)
3. Google	**157 (100%)**	0 (0%)	0 (0%)	0 (0%)
4. Dictionary	**85 (54%)**	47 (30%)	22 (14%)	3 (2%)
5. Wikipedia	**64 (41%)**	51 (32%)	27(17%)	15 (10%)
6. Evernote, Pocket, Other note taking software	29 (18%)	31 (20%)	40 (25%)	**57 (36%)**
7. Google Drive, Dropbox, Other cloud storage	**57 (36%)**	43 (27%)	33 (21%)	24 (15%)
8. YouTube	**103 (66%)**	44 (28%)	7 (4%)	3 (2%)
9. Notes	**89 (57%)**	38 (24%)	16 (10%)	14 (9%)
10. Adobe Acrobat Reader	**101 (64%)**	35 (22%)	13 (8%)	8 (5%)
11. WhatsApp, Other IM services	**139 (89%)**	15 (10%)	3 (2%)	0 (0%)
When asked to specify tools or apps not listed, the respondents replied as follows:				
Timetables	15 (10%)			
Calendars	7 (4%)			
Cameras	5 (3%)			
Google scholar	4 (3%)			
Total:	31 (20%)			

It can, therefore, be seen that the most often used applications and tools among students were Google, WhatsApp and other Instant Messaging (IM) services, emails, YouTube, Adobe Acrobat Reader, Notes and Dictionaries. Note-taking software, such as Evernote and Pocket, were not yet popular.

4.3.3. Accessing library and information services

This part of the questionnaire investigated how students used their mobile devices to gain access to library and information mobile services, frequency of using mobile devices to access library services, their opinions on the current provision of library mobile services, and the challenges they experienced when accessing these services. The purpose was to determine students' rate of adoption and use of mobile devices specifically for library services, as well as their views of the mobile library services.

Question 4.1*: How do you get access to library and information services when off-campus?*

Students were asked to tick an appropriate block to indicate how they gain access to library and information services when they are off-campus. The question was posed in order to ascertain the facilitating factors regarding access to library and information services.

The majority, (92; 59%) , of the respondents indicated that they bought data from service providers, such as Mobile Telecommunication Company (MTC) and Telecom Namibia Mobile (TN). Only one respondent indicated having fixed-line access at home, while 40 (25%) respondents indicated that they had Wi-Fi at home. Two respondents used their employer's Internet, and 22 (14%) used Wi-Fi at UNAM hostels.

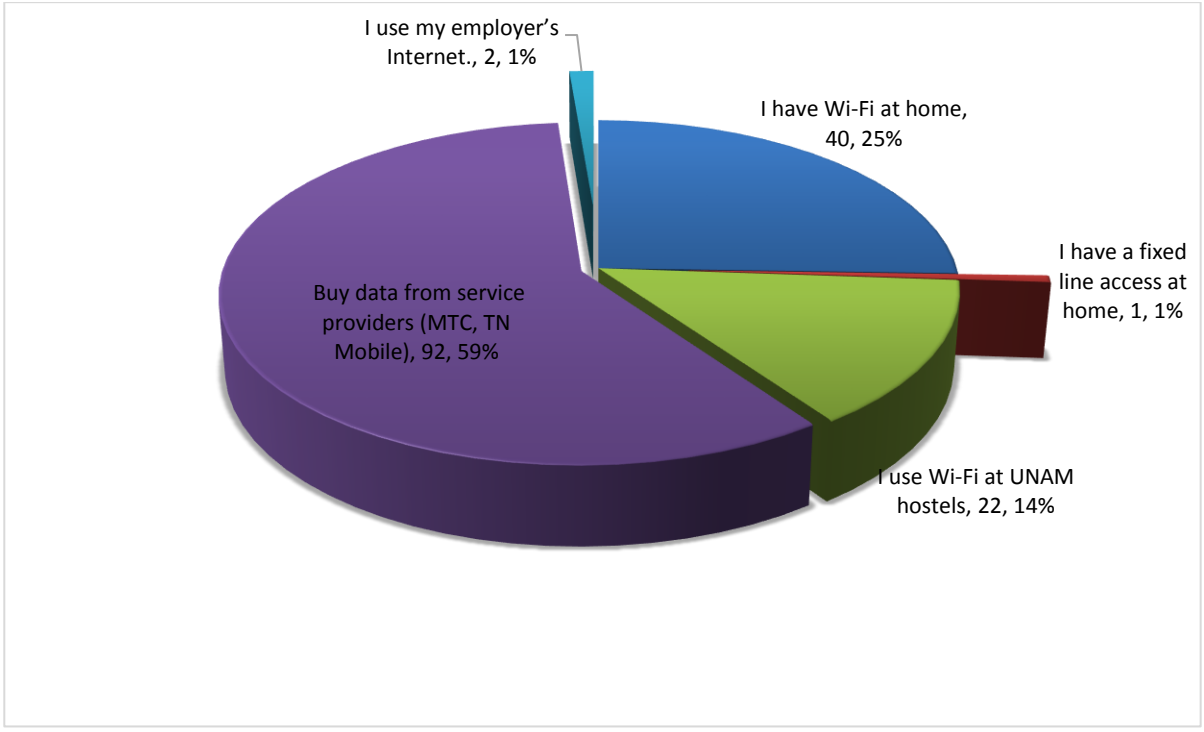

Figure 4. 6: Access to library and information services when off-campus (n=157)

Question 4.2: *How often do you access library and information services on each of the mobile devices listed below?*

The purpose of posing this question was to determine students' frequency of accessing the library and information services on their mobile devices listed, in order to identify the most and least used services. This is important to make recommendations that might help the library to improve services. Respondents were asked to tick as many answers as were applicable according to the phrases "daily", "weekly", "monthly", "less than once a month", "never" and "don't use". Mobile phones and laptops were the most owned mobile devices by students. The majority (80; 51%) indicated that they accessed library and information services daily with their mobile phones (smartphone) while 58 (37%) used their laptops. Tablets and e-book readers were the least used mobile devices in accessing library and information services with 155 (99%) respondents revealing that they did not use them. This result corresponds with the findings in question 3.1 where the majority of students indicated that tablets and e-book readers were least used in their studies.

As depicted in Figure 4.7 , mobile phones and laptops were more popular among the respondents than other mobile devices and they were being utilised to gain access to library and information services on a daily and weekly basis.

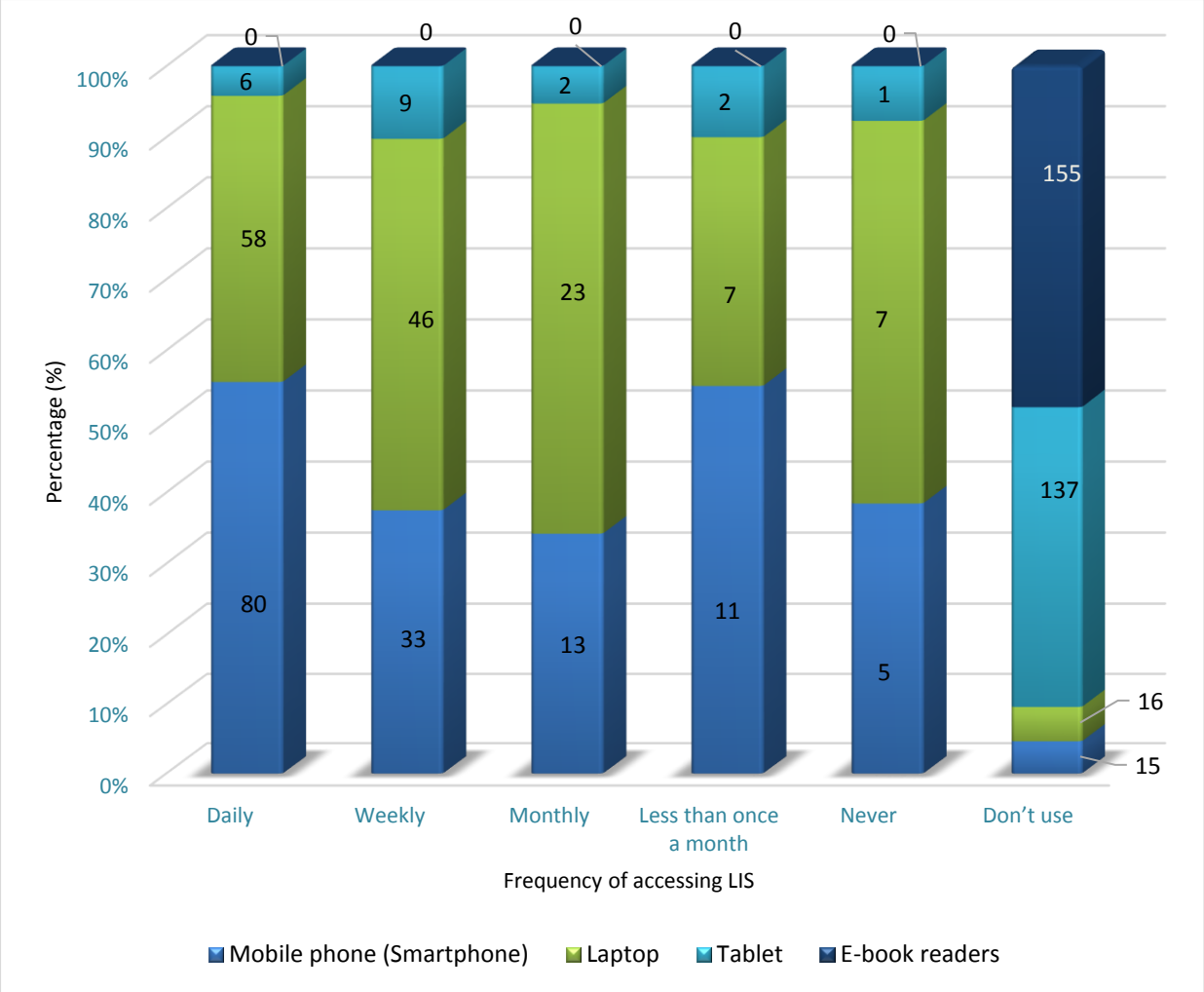

Figure 4. 7: Frequency of accessing library and information services on mobile devices (N=157)

Question 4.3: *How frequently do you use a mobile device to access the following library and information services?*

This question sought to find how often students used their mobile devices to access the listed library and information services in order to identify services that were more popular and most accessed by students. Respondents were instructed to tick appropriate blocks according to phrases, “frequently”, “sometimes”, “rarely” and “never”. Though 44 (28%) respondents indicated that “sometimes” they used mobile devices to search the UNAM Web-based OPAC and 40 (25%) “frequently” did, 53 (34%) “never” viewed their library history, and 83 (53%) indicated that they had “never” used their mobile devices to reserve or request items on loan. Table 4.7 shows that 39 (25%) of the respondents “sometimes” renewed their library items, 46 (29%) “often” searched library databases, while 81 (52%) indicated that they “often” accessed past examination papers. The findings showed that 103 (66%) of the respondents “never” suggested a title for purchase, and 94 (60%) “never” chatted with librarians (Ask-A-Librarian). Only 31 (20%) of the respondents indicated that they “frequently” reserved discussion rooms using their mobile devices. The findings seem to suggest that students were not familiar with the library online services that are accessed through mobile devices, except for the WebOPAC, past examination papers and the library hours. In total, more respondents “rarely” or “never” accessed the services listed via their mobile devices than those who did so “sometimes” or “frequently”.

Table 4. 7: Frequency of using mobile devices to access library and information services (n=157)

Statement	Frequently	Sometimes	Rarely	Never
1. Search Online library catalogue (WebOPAC)	40 (25%)	**44 (28%)**	39 (25%)	34 (22%)
2. View your library history	23 (15%)	33 (21%)	48 (31%)	**53 (34%)**
3. Reserve/Request items on loan	12 (8%)	30 (19%)	32 (20%)	**83 (53%)**
4. Receive alerts relating to library information or services	30 (19%)	40 (25%)	27 (17%)	**60 (38%)**
5. Renew your library items	32 (20%)	39 (25%)	19 (12%)	**67 (43%)**
6. Search library databases	46 (29%)	35 (22%)	29 (18%)	**47 (30%)**
7. Suggest a title for purchase	4 (3%)	19 (12%)	31 (20%)	**103(66%)**
8. View library hours	32 (20%)	**56 (36%)**	32 (20%)	37 (24%)
9. Access past examination papers	**81 (52%)**	46 (29%)	17 (11%)	13 (8%)
10. Chat with librarians (Ask-A-Librarian)	11 (7%)	23 (15%)	29 (18%)	**94 (60%)**
11. Reserve discussion room	31 (20%)	26 (17%)	34 (22%)	**66 (42%)**

Question 4.4: *In your opinion, do you think UNAM library provides adequate services for students using mobile devices to access their services? Please explain.*

To understand student's perceptions of the library and information services provided by UNAM library, students were asked to give their opinions (in a free text field) on whether the library provides adequate services for students using mobile devices. Out of 157 respondents, 93 (59%) thought UNAM library provides adequate services for students using mobile devices. Student comments included:

"UNAM library fairly provides services to students using mobile devices, example; Wi-Fi and electrical sockets on all floors for us (students) to charge our devices when their batteries goes [sic] flat."

"*Access to information is everywhere and anytime if one has a good internet connection."*

"The library provides essential services for our academic progress such as e-resources. I can access Juta on all my mobile devices anytime."

These expressions imply that Wi-Fi provides easy access to electronic resources for students using mobile devices anytime, anywhere, and the provision of electrical sockets means that students did not need to go out to their hostel rooms or classes to charge their mobile devices. While some students appreciated the Wi-Fi, e-resource and electrical sockets in the library, others appreciated regular communications and Information Literacy (IL) training that the library provides. Below are some of the students' comments on communications and IL training:

"The library provides enough services, and it regularly communicates to students by emails, Facebook or post[s] messages at student's portal."

"Adequate services and I like when the library send[s] me a reminder about my overdue books, or when librarians replied [sic] immediately to my emails."

"The library provides relevant services that helps [sic] us to learn and complete our assignments. We also get trainings from the librarians on how to access different materials and facilities."

"Enough library services. And, if I have an article that I cannot access, the librarians get it for me. We also get classes on how to get research articles (e-resources) using the library website which we can access on our mobile devices."

Even though 93 (59%) students indicated that the library provides enough services, 26 (28%) of these 93 students were not entirely satisfied. Students expressed their opinions about library services that are only accessible when on campus, lack of proper mobile devices, lack of awareness of what the library provides, and lack of a library mobile application. Students' views were expressed as follows:

"The library provides access to online materials wherever and anytime, but some services cannot be accessed off-campus, e.g. past exams papers."

"Yes, the services are enough, but some students have no proper mobile devices of their own. Can the library buy more laptops and tablets for students to borrow when they want to use the services within the library?"

"Services are adequate, but not all students are aware [of] or know how to utilise what the library provides."

"Yes, but the library must create an application for mobile devices."

"*Though the library website can be accessible through mobile devices, there are no mobile applications for UNAM to download.*"

Thirty-four percent (54) of the respondents expressed that the library is not providing adequate services to students using mobile devices. Respondents indicated issues concerning poor internet connection, slow and congested network speed, restrictions on some websites, and lack of mobile devices and training. The following are students' views:

"Maybe the library services that are currently provided are adequate; the problem could be the internet connection. The network speed is slow and congested in the morning, so accessibility is tough."

"UNAM internet networks has a lot of (many) restrictions, which prevents us (students) from accessing to some of the websites that are important for learning and completing assignments; e.g. restrictions on YouTube."

"One has to wait for long hours before getting access to e-resources. The internet is not adequate or reliable. One has to struggle first. It does not seem that (library) staff cares [sic] about us. This is so frustrating, and it affects our performance in a [sic] long run."

"The library must lend out mobile devices to students that has [sic] none, because most computers are not functioning."

"We sometimes want to access YouTube to watch video and have a broader understanding on certain topics, but it has been blocked. This is hard for us since we are unable to afford textbooks."

"Some services we don't know how to access or use them, we need someone to train us."

"Accessing library services at the hostel is difficult, most times, no access."

Six percent (10) of respondents indicated that they were not sure whether the library provides enough services for students using mobile devices. This is because they did not use the library very often. In their words:

"I am not sure, if the library services are adequate or not because I do not use the library for information."

"I don't know because I have never used the library databases."

"I hardly use the library, I don't know much about the library services."

"I don't know, because I hardly use the library and my mobile phone does not want to connect to the UNAM Wi-Fi network."

Although many students indicated that UNAM provides adequate library and information services, such as electrical sockets, e-resources, Wi-Fi, regular communication between librarians and students, and IL training, the views expressed by unsatisfied respondents are of importance and need the library to address them to meet the users' information needs. The opinions expressed by respondents about not knowing whether the library and information services provided by UNAM are adequate or not seem to suggest the need for

urgent, aggressive marketing of services and training to attract and encourage students to use the library and information mobile resources.

Question 4.5: *How often do you experience the following challenges when using your mobile devices to access learning and library-related materials?*

The purpose of this question was to identify challenges that students experienced when they were using mobile devices and that could impact the adoption of mobile devices in accessing learning and library related materials. Respondents were asked to tick appropriate blocks according to frequency. The findings presented in Table 4.8 show that incompatibility of websites and applications with mobile devices was experienced “sometimes” by 49 (44%) of the respondents. The majority (100; 64%) of the respondents indicated that they “frequently” experienced slow network speed and network congestion, while 74 (47%) indicated that they “sometimes” experienced problems of lack of specialised mobile applications to support use, learning and library-related activities. The majority (108; 69%) of respondents “frequently” experienced high cost of data, and 75 (48 %) of the respondents indicated that limited network coverage in areas was a challenge that they frequently experienced. Lack of technical support from UNAM was identified by 67 (43%) (67) of the respondents as a challenge experienced “sometimes”, while 69 (44%) indicated that they “frequently” had problems with network downtime due to interference from the environment, for example, bad weather. The majority (92; 59%) of respondents expressed that they “frequently” had challenges of being distracted due to the same device being used for playing games or chatting with family and friends.

Table 4.8: Challenges experienced when students used mobile devices (n=157)

Challenge	Frequently	Sometimes	Rarely	Never
1. Incompatibility of websites and applications with mobile device.	46 (29%)	**69 (44%)**	38 (24%)	4 (3%)
2. Slow network speed /network congestion.	**100 (64%)**	47 (30%)	6 (4%)	4 (3%)
3. Lack of specialised mobile applications to support use, learning and library-related activities.	51(32%)	**74 (47%)**	23 (15%)	9 (6%)
4. Screen size for mobile devices is too small and can strain the eyes.	**64 (41%)**	40 (25%)	25 (16%)	28 (18%)
5. High cost of data	**108 (69%)**	32 (20%)	12 (8%)	5 (3%)
6. Limited network coverage in areas	**75 (48%)**	62 (39%)	13 (8%)	7 (4%)
7. Lack of technical support from the UNAM.	64 (41%)	**67 (43%)**	11 (7%)	15 (10%)
8. Network downtime due to interference from the environment, e.g. bad weather	**69 (44%)**	66 (42%)	17 (11%)	5 (3%)
9. The threat of viruses or being hacked.	30 (19%)	**87 (55%)**	31 (20%)	9 (6%)
10. Distractions due to the same device being used for playing games or chatting with family & friends.	**92 (59%)**	47 (30%)	10 (6%)	8 (5%)

Respondents already mentioned challenges, such as slow network speed, lack of specialised mobile applications to support use, learning and library-related activities, and lack of technical support from UNAM, when they answered question 4.4. Data presented in Table 4.8 indicate that the high cost of data, slow network speed or network congestion, limited network coverage in areas, and distractions due to the same device being used for playing games or chatting with family and friends, were the biggest challenges that students experienced frequently compared to other challenges listed that are only experienced sometimes.

Question 4.6: *On a scale of 1-5 with 1 being poor and 5 being excellent, how do you rate the quality of the UNAM wireless network?*

This question aimed to determine the quality of a facilitating factor (wireless network) that might influence students to adopt mobile devices for library use. Respondents were asked to

rate the quality of the UNAM wireless network (whether it is reliable in terms of speed and access). Many (77; 49%) of the respondents rated the wireless network as neutral (not good and not bad), while 20 (13%) rated the wireless network as poor in terms of speed and access. A quarter (40; 25%) indicated that the wireless network was bad, and 16 (10%) respondents rated the network as good. Only 16 (3%) rated it as excellent. The data presented in Figure 4.8 indicate that the quality of the wireless network at UNAM is not reliable in terms of speed and access. As described by the respondents in question 4.4, the wireless network speed is slow, congested and not reliable, which has made access to library and information services difficult.

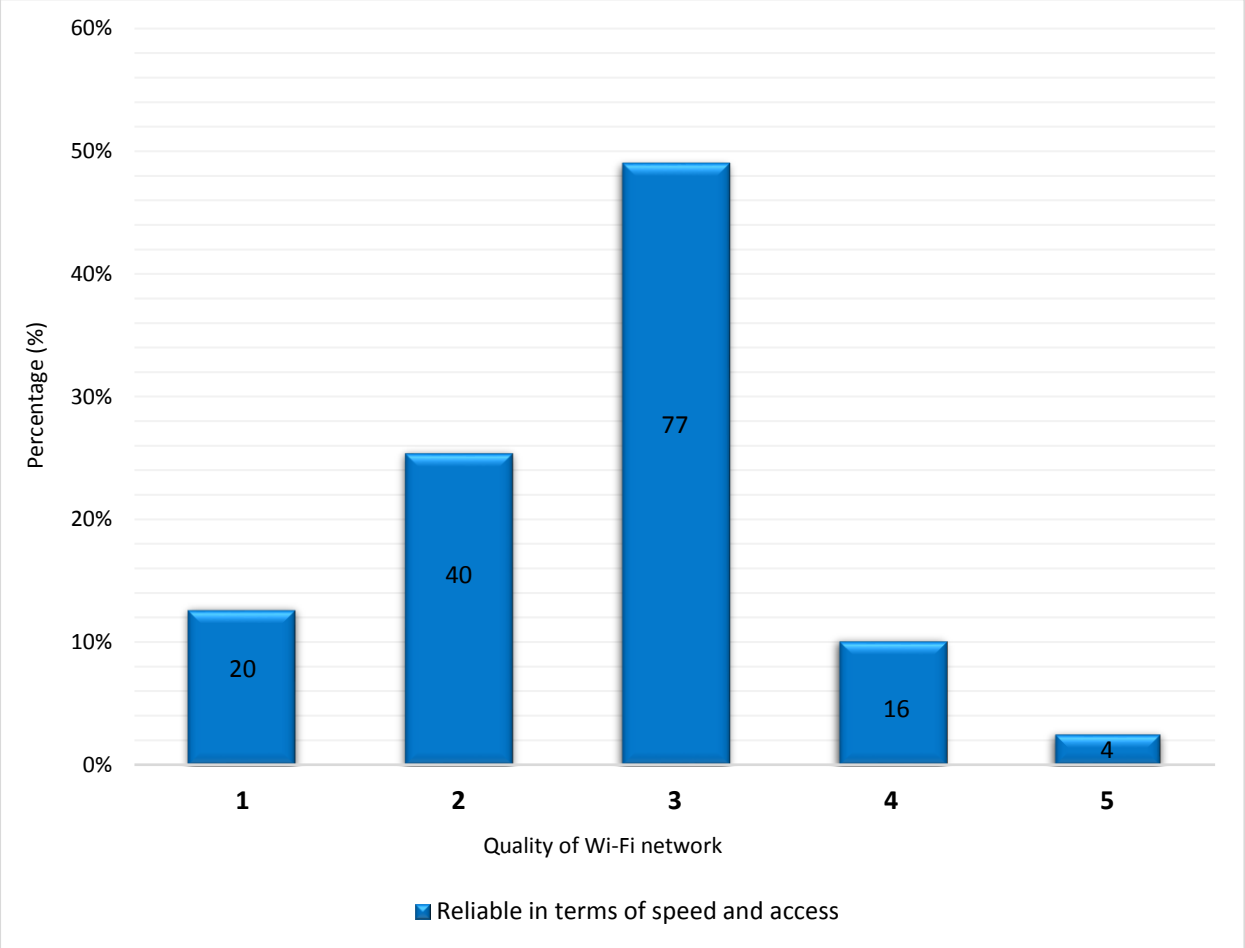

Figure 4. 8: Student rating of the wireless network (n=157)

Question 4.7. *Do you have any suggestions that you want the library to make, in improving the current provision of mobile library and information services*?

This question was posed to find out students' perceptions of the current provision of library and information mobile services. Most suggestions (60; 38%) were about improving the wireless network, which was also identified in question 4.4 and 4.5 as the biggest challenge respondents experienced frequently. Respondents indicated that the wireless network at UNAM Main Campus does not cover all locations on campus and that the network speed is slow and congested, especially in the morning. To avoid overcrowding in the library, respondents suggested that the wireless network be extended to all buildings especially classes (lecture halls) and access at student residential areas (hostel) improved. Students expressed that the challenges of unreliable internet connection prevented them from gaining access to the current library and information services on their mobile devices as follows:

"The network coverage is the problem, it does not cover all areas on campus."

"It is difficult to access library resources because the internet is bad and unreliable".

"UNAM Wi-Fi cannot be accessible in all the lecture venues. Most of the times it's not reliable."

"UNAM Wi-Fi is too slow and only works sometimes."

Forty-seven (30%) of respondents felt that they were not supported enough in terms of technological assistance from UNAM, therefore they suggested that UNAM employ more technicians to provide technical support to students when they have difficulties with their mobile devices. Students expressed that poor internet connection and slow network speed hindered them from connecting their mobile devices to printing facilities, therefore, they suggested that UNAM increase the bandwidth to improve the internet speed. Since not all students can afford a mobile device and there is a lack of adequate computers in the library, the students suggested that the library buy mobile devices, such laptops and tablets, that they can borrow for a certain period of time to access library and information services or use them to complete their academic activities. Students suggested that the library put a time limit on the available computers for all students to have access and be able to complete their assignments.

Other suggestions were for the library to allow students to access past examination papers off-campus; 25 (16%) of respondents made this suggestion. Respondents mentioned that UNAM should allow access to YouTube because it has useful educational videos that supplement class notes. Students suggested that the library develop a mobile application that students can download on their mobile devices. They expressed that the mobile application would easily assist in reserving discussion rooms, booking computers and chatting with librarians, as well as accessing other library and information services.

Other suggestions (17; 9%) were about the marketing of library services and training. They advised the library to market and make the library services known by the students to improve the library usage. Some respondents suggested that the library module (Information Literacy) must be compulsory for all first-year students because they struggle to access relevant library and information services, but others suggested IL training should be offered to all students at different levels of study. Respondents said that, through IL training, students would know how to use the library services and facilities effectively.

4.4. Interview responses

This section presents data collected through interviews with three purposively selected UNAM library staff.

4.4.1. Librarian's work experience and qualifications

Question 1-3: *What is your job title? What is your highest LIS qualification? How long have you been working in the library?*

Interviewees were asked to talk about their work experience and LIS qualifications. Those interviewed were an e-resources librarian, an assistant librarian in the reference section and an assistant ICT librarian. Two of the interviewees had Honours degrees while the other had a Master's degree in library and information studies. Participants' work experience ranged from three to six years.

4.4.2. Library services

Question 4: *Can you list web-based library and information services at UNAM that are currently provided, and that students can access on mobile devices?*

All three interviewees confirmed that the library catalogue (WebOPAC), e-resources databases, Institutional Repository and other communication platforms (Facebook, Twitter and email) where librarians communicate with students are all accessible on mobile devices. Students can access web-based library and information services with their mobile devices if they have a good internet connection. These web-based library and information services can also be accessed off-campus.

Question 5: *Can you list the library and information services that are most used by students with mobile devices? Can you provide evidence for your answer (e.g. website/database stats)?*

All respondents stated that email and telephone services are the most used. One of the respondents indicated that librarians receive various queries through a generic email address (library@unam.na) which is frequently used by students. The respondents emphasised that students post queries especially when they experience problems with accessing information resources, specifically, failure to access e-resources and log in to the proxy server. The researcher asked one of the respondents about the use of Chat to Librarians (Ask-A-Librarian) and the interviewee's response was: "The creation of Chat to Librarians (Ask-A-Librarian) was never up to standard and the marketing of this service was very weak; students don't use it." The telephone is the most-used communication tool in enquiring about reference services, though one of the interviewees pointed out that it is difficult to determine whether the user is calling from a mobile device or the landline.

Another interview respondent stated that there are excellent databases with good statistics to show that students are using online information services. The most-used databases mentioned are ScienceDirect, SpringerLink, JSTOR, EBSCOhost and Emerald. The interviewee expressed that, just like the telephone, even though the library collects statistics from the subscribed databases, it is not certain whether the user has used a mobile device or not to access the library databases. The other interviewee stated that there is no statistical evidence of how students use their mobile devices in accessing library and information services. The

only statistics the library has are those extracted from databases. The interviewee expressed that it is difficult, maybe because the library does not have its own mobile application that could indicate how many students have downloaded it, and which services have been accessed on it.

4.4.3 Staff perceptions of students' use of the library and information mobile services

Question 6*: In your opinion, do you think the use of mobile devices to access library and information services has an impact on students' academic performance? Please explain*.

Respondents gave different views on how they think the use of mobile devices to access library and information services has an impact on students' academic performance. One interviewee elaborated that students have full access to online library and information services at whatever time, wherever they are; and they can download articles with their mobile devices while they are home or in a taxi. The respondent further indicated that the impact of using mobile devices to access the library and information service on student performance could be assessed and determined if students are well equipped through IL training, with relevant skills on how to locate, identify, search and access information. The respondent emphasised that it is important to teach students how to use and share information properly.

Another interviewee indicated that she could not talk about students' academic performance because the library has not yet done a study that assesses how students are using the resources and how it affects their academic performance. However, in terms of students finding information using mobile devices, the respondent felt that somewhere, somehow there is a positive impact. The respondent elaborated that mobile devices have made student life easier, since students can access the library and information services anywhere, anytime if there is a good internet connection.

The other respondent thinks that the library is not quite sure if the students are using their mobile devices to access online information services or not. Nevertheless, the respondent assumed that students are using mobile devices because of the queries that the library receives from students, especially when they cannot access the information they need. The respondents expressed that the impact of using mobile devices could be easily assessed if the

library had its own mobile application linked to Sierra (the library automation software) whereby students could renew their library items, download articles and e-books, and access other library services, such as chatting to librarians or just viewing library operational hours.

Question 7*: Generally, what do you think about the way that mobile devices have influenced the use of the library?*

According to one of the interviewees, Wi-Fi has brought many changes to how the library functions and how users access information. The respondent elaborated that, previously, library users depended only on the printed collection, and had to be in a physical library to access to them, but, currently, users have access to electronic resources anytime, anywhere and e-resources are used in parallel with the printed collection. The respondent indicated that e-resources are more popular among students, especially at the postgraduate level.

Another interviewee indicated that her observations were that the number of students coming to the library every day has not dropped, but increases daily. The interviewee explained that students sometimes called the library to seek help on how to access and search certain databases, but if the librarian's explanation on the phone was not satisfactory, then the students could come to the library to contact a librarian for one-on-one training. The respondent indicated that there is a growth in library usage because students continue to refer their friends and peers to librarians to obtain help for their queries. Most students' queries include how to access, search and download e-resources, and issues of internet connectivity, especially when they fail to connect their mobile devices to the wireless network or to printing machines, the respondent explained.

The other interviewee communicated that the mobile device has influenced the use of the library, especially now that the library is experiencing a problem of a limited number of computers that are functional; students are more likely to use their mobile devices to avoid long queues for a library computer to print or complete an assignment. The interviewee said that, with Wi-Fi, students can connect their mobile devices wirelessly to print or access the online library and information resources.

Question 8: *Do you think students are satisfied with the current library and information mobile services? Please explain. What do you think the library should do to satisfy users?*

One interviewee felt that the library users are not fully satisfied with the current services provided. The interviewee referred to the LibQUAL survey results of 2014, where users indicated that they were just satisfied with the current library services. There were issues that students raised, one of which was the slow internet network which frustrates students when they want to use the library online resources, and the other issue was to increase IL training and provide online tutorials to assist students to access library and information resources independently, as explained by the respondent. The interviewee further stated that there was no complaint in terms of the IL content, but many complaints were about the limited number of computers, congested network and slow internet speed for both Wi-Fi and wired networks. The respondent expressed that the 4G data speed devices (4th Generation: "a telephone technology that enable[s] high speed access to data services" (Aharony, 2013:358)), that students received as an alternative when the internet was slow or when the network was down, have not been reliable and all these issues are contributing to the dissatisfaction of students and other library users. As a follow-up question, the respondent was asked to suggest what the library should do to satisfy users. The respondent suggested that UNAM invest in improving the internet network (both Wi-Fi and wired networks) by increasing the bandwidth. The library must empower students by training them on how to effectively search and utilise all library and information resources. The interviewee indicated that the library is currently working on how IL can be embedded into the curriculum; this is because students seem to give less attention and value to IL training, since it is not evaluated on the same level as other courses.

The other interview respondent thinks that students are satisfied with the current library and information mobile services because there have been no comments received from students either through the suggestion box or via emails that complained of anything about the online services. Though there are no comments and complaints from students, the respondent indicated that the internet connection can be frustrating, and it affects the use of online information services. The respondent suggested that UNAM improves the wireless network to encourage students to use their mobile devices in accessing library and information resources.

According to one of the interview respondents, students are not satisfied because some online services, such as the help desk, are either not working or the assistance is unsatisfactory. The respondent expressed that past exams papers is also an online library service that students cannot access when they are off-campus and students' dissatisfaction could be due to late responses from librarians providing information requested. The delay in librarians' responses is caused by a technical error of the electronic help desk, making it difficult for librarians to know which query has gone to which person since all queries are in one domain group. The interviewee suggested that the library consider further communication strategies, such as using social media, having another help desk on the library Facebook page, Twitter, or creating a WhatsApp account whereby students with simple queries can receive immediate responses.

4.4.4. Influence and adoption

Question 9*: How do you market the library and information mobile services?*

One interviewee commented that, for marketing and promotion of library and information services, the library usually uses posters, brochures, IL training and the UNAM Communication and Marketing email, which goes to both UNAM staff and students. According to this interviewee, the library has a Marketing Committee that promotes the library services. The library also hosts events regularly such as *Know Your Librarian* whereby faculty librarians present and promote library and information services for the faculty they represent.

The other two interviewees responded that, apart from IL training, librarians also market the library and information services through conducting orientation and library tours, during career fair events, library exhibitions (*Know Your Librarian*), Facebook page and flyers/brochures which are currently under review to update information.

Question 10: *Do students receive training on how they can access and use library and information services with/through their mobile devices? Please explain.*

All interviewees responded that students receive IL training on how to access library and information services, but the training is done in a training room that is equipped with

computers. Since the library and information services are web-based, students can still use their mobile devices to access them anytime they need such services. One interviewee indicated that the library is currently working on creating online tutorials and LibGuides to assist students in learning on their own. However, the respondents said that some databases are not compatible with mobile devices and that makes it difficult for students to access some e-resources.

4.4.5 Challenges and opportunities

Question 11: *What benefits do you think students get when using wireless technologies, as opposed to the wired network, to access library services?*

All the interviewees responded that the benefits of using wireless technologies are that access to online library and information services is anytime and anywhere, and students are not bound to the physical library to use the computers that are connected to a wired network. Respondents indicated that, in most cases library computers are limited in numbers, and to avoid waiting in long queues for someone to finish using a computer, students with mobile devices can connect to the Wi-Fi to access the online information resources, print or complete their academic activities. One interviewee said, "the advantages of using wireless technologies save [sic] time and cost because students do not need to pay for transport to go to the library".

Question 12: *What do you think are the main challenges that students face when using wireless technologies when accessing library services?*

All three interviewees highlighted that the main challenge that students face when using wireless technologies is the slow network speed and network downtime, which force students to wait for long hours to reconnect to the wireless network. One interviewee expressed that "students are forced to buy and use their [own] data because the network can be very slow, down, jammed or congested especially in the morning and that's so frustrating". The interviewee thinks that the increasing number of students admitted at UNAM Main Campus in Windhoek could cause the poor internet network; the network cannot accommodate the high volume of student logins. Another interviewee explained that students' frustration

increases even more when the wired network is off and they cannot access the printing machines to print out their notes, articles or assignments.

4.5. Summary

This section presents the summary of findings from both the questionnaire and interviews to show contradictory or confirmed responses from students and staff.

This chapter focused on the analysis and presentation of findings. Data were collected in the form of questionnaires and interviews. Questionnaires were disseminated to the library-user population made up of undergraduate and postgraduate students, while the interviews collected data from the library staff. Both library staff interviewed and students indicated that smartphones and laptops are the most popular mobile devices among students, and that students use them to access online library and information services, for communication and for learning purposes. Email and telephone are identified as the most popular modes of communication used between students and librarians.

The next chapter will discuss the main findings in terms of the study objectives, the context of the literature reviewed for the study, and the theoretical framework of the study. Thereafter, conclusions will be drawn and recommendations made.

CHAPTER 5

DISCUSSION OF MAIN FINDINGS, CONCLUSIONS AND RECOMMENDATIONS

5.1. Introduction

The previous chapter focused on the analysis of quantitative data collected through the questionnaire and the content analysis of the qualitative data from the interviews. This chapter presents the discussion and interprets the main findings of the study based on the research questions and the theoretical framework. Conclusions are drawn and recommendations are made.

5.2. Discussion of findings

Research findings are discussed in order of the research objectives listed in section 1.4.

5.2.1. Factors influencing the adoption of wireless technologies among students

From the analysed data, it can be seen that UNAM students are in the implementation and confirmation phases of Rogers' innovation-decision process. The majority of students own mobile devices (mostly mobile phones and some laptops) and use them to access library and information mobile services on a daily and weekly basis, though OPAC, library hours and past examination papers are by far the most frequently accessed services. The majority of respondents were undergraduate and people aged between 17 and 25 years. Different factors can influence the adoption or rejection of wireless technologies among students. In this study, Rogers' "attributes of innovation" (Rogers, 2003:164) were used to consider factors influencing the adoption of these technologies that enable students to access library and information services at UNAM Main Campus. This section discusses the five characteristics of an innovation (wireless technologies) that would influence its adoption and links them to the use of UNAM library and information mobile services.

a) Relative advantage

Rogers (2003:15) stated that the greater the perceived relative advantage of an innovation, the higher the rate of adoption. In the study results, smartphones and laptops were indicated as the most owned and used mobile devices among UNAM students, compared to tablets and e-book readers. The rate of adoption and use of these mobile devices among students could have been accelerated by the perception of the devices being important to their learning and academic success, as well as the ability to provide engagement and increased interaction anytime from any place. Though the rate of adoption of tablets and e-book readers is lower, their use among UNAM students is present and will gradually increase.

b) Complexity

As indicated by Rogers (2003), potential users (in this case, students) who lack skills may perceive the use of mobile devices as a difficult and complex activity. This could lead to a slow adoption rate of using mobile devices for library and information services. Equipping students with relevant skills, through IL training on how to locate, access and use mobile library services, is significant in the adoption of mobile devices for learning. The study data show that students frequently experience lack of technical support from UNAM, which may discourage students from using their mobile devices for learning.

c) Compatibility

This study showed that there was low usage of e-book readers and tablets among students, and a high rate of usage of smartphones and laptops. This means that smartphones and laptops were compatible with the existing needs (communication and learning) of UNAM students. As emphasised by Rogers (2003:15), any innovation that is incompatible with the existing needs of the potential adopters risks the chance of not being adopted.

d) Trialability

Trialability gives an individual a chance to test the innovation before deciding whether to adopt or reject it. In the study findings, students agreed that a good Wi-Fi network influences the use of mobile devices; however, they showed that they were not satisfied with the quality of UNAM's Wi-Fi in terms of speed and reliability. The network speed was slow, congested during peak hours and unreliable when accessing library and information services. This has a

negative impact on students' learning and academic performance, and it slows down the rate of adopting mobile devices for this purpose.

e) Observability

In the study, the popularity of the usage of library databases accessed via mobile devices meant many students were accessing library and information resources using wireless technologies. The increase in the usage of databases could be because of the influence of librarians, lecturers or their peers, through demonstrations and training. According to Rogers (2003:232), the "observability of an innovation, as perceived by members of a social system, is positively related to its rate of adoption".

Based on the above, it is concluded that Rogers' "attributes of innovation" (Rogers, 2003:164) can be considered to be influencing students to adopt and use wireless technologies that enable them to access library and information services at UNAM.

5.2.2. Challenges and benefits students face when accessing library and information services using mobile devices

Though students disagreed that mobile devices are relatively cheap and accessible, the majority of them own mobile phones and laptops with many choosing them by considering features that are important to them, such as quality and specifications of the device, and ease of use. Students strongly agreed that these technologies are essential to their academic performance and particularly in accessing library and information services. That the majority of students own and are using mobile devices in their learning already can be considered a benefit.

The advantage of innovations can be discussed in terms of the benefits that students gain when accessing library and information services using wireless technologies for their learning. Due to mobility and flexibility, wireless technologies are perceived in the studies of Liao et al. (2015) and Kim, Mims &Holmes (2006) to have improved learning and academic performance because they provide students with access to resources. The findings of this study showed that students are not limited by time when they want to use their mobile devices to access library and information services for learning purposes.

Wireless technologies provide an advantage of saving transport costs as students no longer need to be present in the library to access information services. Because of mobility and convenience that mobile devices provide, communication from students to library staff has been found to be done via emails and telephones. As the number of library computers is limited, students connect their mobile devices to the university's Wi-Fi network to gain access to library e-resources, printing services or to complete course-related activities, which saves them time by avoiding long queues to use a computer.

Among challenges that are experienced by students at UNAM, slow network speed or network congestion was the most highlighted problem on both wired and Wi-Fi networks during peak hours. It seems that the problem of slow or unreliable internet networks has been an unsolved issue at UNAM since it was raised in the LibQUAL survey results of 2014, as highlighted by library staff interviewees. UNAM must upgrade bandwidth to improve network speed. Library staff explained that students are frustrated by both unreliable Wi-Fi and wired networks because they struggle to obtain access to the online library and information services. Because accessing library and information mobile services is difficult due to poor internet connection, students feel like UNAM internet networks have many restrictions which prevent students from accessing some good websites vital to their learning and completion of their assignments. This finding indicates that network speed negatively affects students' learning progress as they have either to be denied access or wait for a long time to retrieve and download online resources, such as journal articles and e-books. Heavy streaming of materials from online websites was, however, listed as a possible cause of the network congestion in the study of Ming, Mahmud and Razak (2012). Slow network speed and network congestion have a negative impact on students who need to access library and information services.

Limited network coverage in areas is another challenge experienced frequently, especially at students' residences. As expressed by students, it is difficult to access library and information services at residences because the Wi-Fi coverage is weak and limited; most of the time, there is no access.

The network downtime due to interference from the environment, for example, bad weather, is a frequently experienced challenge at UNAM as indicated by students. The limited Wi-Fi coverage and the network downtime could be explained as the factors that may have pushed students to revert to mobile service providers such as MTC and TN Mobile to buy airtime and data, even though the cost of data is high. Rawash et al. (2015:309) assert that access to the university Wi-Fi is vital for students, since some cannot afford to purchase data from internet service providers. This study has found that the university wireless network is unreliable and limited network coverage, slow network speed or network downtime, and the cost of data restrict students' access and use of library and information mobile services.

Incompatibility of library and information services websites and applications with mobile devices is sometimes a challenge, as indicated by students. Although the library staff interviewed did not mention which databases or websites are incompatible with mobile devices, it was agreed that this was the case with some library databases.

When students were asked how often they experience the challenge of lack of specialised mobile applications to support mobile use, learning and library-related activities, they indicated that this only occurs sometimes; however, through comments, the majority suggested that the library must design a mobile app that will help in creating awareness of what the library offers. This suggestion is in agreement with the response of library staff that the library mobile app may be helpful in assisting to retrieve accurate statistics on the use of library and information services, and possibly result in the use of library and information services that are never used.

The challenges of a lack of technical support from UNAM and threats of viruses or being hacked were also found. UNAM students stated that they need some IT personnel to assist them when they have trouble connecting their mobile devices to the Wi-Fi. This practice will help to persuade students to use their mobile devices more for accessing library and information services for learning.

Though students agreed that mobile devices are more convenient, as they are portable and considered essential to students' academic performance, students indicated that these devices are expensive and some students cannot afford them. In this study, three students revealed that they do not own any of the devices listed. Not owning a mobile device may disadvantage students academically.

5.2.3. Students' perceptions of the library and information mobile services

The majority of students think UNAM library provides adequate services for students using mobile devices. Study results show that regular communications between students and library staff, for example about reference queries, book due dates, newly acquired materials or changes in operating hours, are perceived as being relevant and responding to their information needs. The library staff indicated that the librarians mainly communicate with students via emails; platforms such as Facebook and Twitter are also used by the library to post updates and interact with users instantly. Most students' queries include how to access, search for and download e-resources, and issues of internet connectivity, especially when they fail to connect their mobile devices to the wireless network or to printing machines, as explained by the library staff. These findings demonstrate the library's effort to use every platform to reach students and promote the use of library and information services.

Although some students perceive library and information mobile services provided as adequate, some indicated that they were not entirely satisfied. These unsatisfied students expressed that some library services, such as past examination papers (the most frequently accessed mobile library service), are only accessible when on-campus, thus they suggested unlimited access to past examination papers.

UNAM students come from different backgrounds and respondents pointed out that some students from less privileged communities cannot afford proper mobile devices. They felt that the library must support the less privileged students by lending laptops and tablets for a period to students with no mobile devices. Students also indicated that the library is not doing enough in marketing its mobile services, since students lack awareness of what the library provides. This implies that there is a need for librarians to market and create awareness about

the information resources and services that meet the demands of mobile users. Furthermore, having marketing events and IL training on a regular basis would attract more users to the library, as well increase the use of mobile information services.

Some of the students perceived that the library and information mobile services currently provided are not adequate for students using mobile devices, while some students revealed that they rarely use the library and information mobile services. Students that hardly use the library and information mobile services highlighted challenges such as: limited network coverage in areas; slow network speed due to congestion; restrictions on the use of YouTube; and lack of mobile devices, library mobile application, computers and training. Although the above-mentioned are not all library services, they are facilitating factors that are needed to provide access to library and information services and are significant to influence the use made of library and information mobile services. Some students' perceptions of the library and information services are that they are difficult to locate and access using mobile devices or they believe that the library does not have the mobile information to meet their needs. Lack of awareness and of marketing of library and information mobile services could be the main reasons that students are not using their mobile devices regularly to access information services. Nevertheless, students showed interest in being trained in how to access and use library and information services, and these would include the mobile services. The library provides IL training to all students, but library staff felt that these trainings are not valued the same as academic courses at UNAM, which contributes to poor attendance.

5.3. Recommendations

In light of the discussion of the main findings, the following recommendations are made:

- UNAM library staff should be creative in marketing and creating awareness of information resources and services to attract more students and increase usage. Librarians must ensure that students understand the benefits of using mobile devices in accessing library and information services, and how such resources and services may improve their academic performance.

- Library staff must focus on providing IL training for students to know how to access information resources and services on their mobile devices. Librarians should engage and collaborate with faculties and departments to integrate library resources with course content (Sun et al., 2011:327) and to design appropriate assessments for students to learn lifelong skills. The creation of online tutorials and LibGuides are useful because they "encourage active learning and allow students to respond to what is taught while self-assessing their own learning", as Sun et al. (2011:329) explained. Thus, students learn on their own, at their desired time.

- The library should design a mobile application that will assist in providing speedy library mobile services to users with mobile devices. The mobile app will be helpful also if linked to Sierra to provide statistics about the number of students downloading the application and to determine which services have been accessed using mobile devices. The library will be able to assess the use of popular apps and tools that students use on their mobile devices for academic purposes, if they are linked to the library mobile app.

- The university should invest in appropriate technology to increase the bandwidth to improve network speed, and increase the number of wireless hotspots to provide access to all areas on campus. This is necessary to provide flexibility and mobility to users with mobile devices, as well to promote access to library and information services anytime, anywhere.

- It is important, as suggested by Jambulingam (2013:1268), for the university to engage in new business deals with service providers (namely, MTC and TN Mobile) to offer affordable charges for students to support them in using mobile technology for learning.

5.4. Future studies

The findings of this study indicated several areas that need to be addressed by future studies.

- The researcher used a convenience sampling method to select respondents who were exiting or entering the Main Campus library so that an acceptable response rate could be achieved. The sampling method may be considered a limitation, as the study was

investigating the use of mobile devices in accessing library and information mobile services and those outside of the physical library would also be valid respondents.

- The questionnaire was used in this study as a data collection instrument for students. For future studies, in-depth interviews could be used to collect students' rich opinions on the use of mobile devices to access library and information services and how mobile devices impact their academic performance.
- The study indicated that librarians teach students digital literacy skills through IL training in order to access, manage and evaluate digital resources. Future research studies could investigate students' skills in accessing, evaluating and managing information for academic purposes to determine if they require additional training to support the library mandate.

5.5 Summary and conclusion

This chapter discussed the main findings of the study in relation to the objectives of the study and the theory that informed the study. Several aspects raised in the discussion led to the conclusions and recommendations on how to improve the present state of library and information mobile services, including areas for further studies. The study used the theory of DOI to identify and explain the factors influencing students' adoption and perceptions of the use of the library and information mobile services at UNAM Main Campus. The findings indicated that students have accepted and adopted the use of mobile devices, such as laptops and smartphones, in their learning. The students' perceptions of the current library and information mobile services provided by UNAM are that the services are adequate for users with mobile devices, but the usage is hindered by challenges, such as slow network speed, limited wireless hotspots, and lack of awareness of what the library offers.

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Appendices

Appendix A: Questionnaire for students

Student adoption and perceptions of the library and information mobile services at the University of Namibia.

Kindly complete the questions below. Please be ensured that all questions are optional and responses will be treated confidentially. Kindly be ensured that your participation in this research is voluntary. Thank you.

Please do NOT write your name!

SECTION 1: DEMOGRAPHIC INFORMATION

1.1. Please indicate your gender (**Please write your answer in the space provided**)

1.2. Indicate in which age category you fall **(Tick the appropriate block)**

Under 17 years	
17-20	
21-25	
26-30	
31 -35	
35 and above	

1.3. Indicate your level of study below **(Tick the appropriate block)**

1. Undergraduate	
2. Postgraduate	

1.4. Indicate the faculty in which you are currently registered (**tick the appropriate block**)

1. Agriculture & Natural Resources	
2. Economics & Management	
3. Education	
4. Humanities & Social Sciences	
5. Law	
6. Health Sciences	
7. Science	

SECTION 2: GENERAL USE OF MOBILE DEVICES

2.1. How many mobile devices of the type listed below do you own, and which mobile device do you find that you use the most? (**Please write the number and tick the appropriate block**)

	Number owned (1, 2, 3…)	**Most used** (√)
1. Mobile phone (Smartphone)		
2. Laptop		
3. Tablet		
4. E-book readers (Kindle, Nook)		
5. I don't own any of the above. Please indicate who owns the mobile device you are using the most.		

2.2. Who influenced you to choose the type of mobile device/s you are using? (**Tick all applicable answers**)

1. Family member	
2. Friends	
3. Lecturers /classmates	
4. Adverts (TV, magazine/ newspaper, social media)	
5. It was my own choice	

2.3. Which features of the mobile device used most often attracted you to decide to use it (**Tick as many as applicable**)

1. Ease of use	
2. Size	
3. Lightweight (easy to carry anywhere, anytime)	
4. The mobile device brand type	
5. Quality and specifications of the device	
6. Other, please specify:	

2.4. Indicate how strongly you agree or disagree with the following statements (**Tick appropriate blocks**)

	Strongly agree	**Agree**	**Disagree**	**Strongly disagree**	**Not sure**
7. Mobile devices are cheaper and more accessible.					
8. Mobile devices are more convenient as they are portable.					
9. Mobile devices are expensive, and some students cannot afford them.					
10. The cost of airtime and data is too high.					
11. A good Wi-Fi network influences the use of mobile device					
12. Mobile devices are essential to my academic performance.					

SECTION 3: TYPES AND PURPOSE OF WIRELESS TECHNOLOGIES USED IN HIGHER EDUCATION

3.1. What types of mobile devices do you currently using in your studies? (**Please tick all applicable answers**)

1. Mobile phone (Smartphone)	
2. Laptop	
3. Tablet	
4. E-book readers (Kindle, Nook)	
5. None	

3.2. If you use your mobile devices for learning purposes, which of the following learning activities do you perform and how often? (**Tick as many as applicable**).

Skip this question if you selected 'None' for question 3.1 and answer question 4.7 only.

		Often	Sometimes	Rarely	Never
1. To utilise relevant course learning materials/tools	a. Search and access library catalogue (OPAC)				
	b. Access library e-Resources				
	c. Visit online learning websites				
	d. Download academic materials				
2. For coursework-related purposes	a. Complete assignments				
	b. Note-taking				
	c. Submit assignments online				
	d. Download research articles				
3. To communicate for learning purposes	a. Communicate with lecturers and classmates				
	b. Chat to Librarians (Ask-A-Librarian)				
	c. Join discussion forums/ online meetings/ video conferences to discuss course work				
4. For independent and lifelong learning	a. Learning on my own				
	b. Doing business, finances and banking				

3.3. During which time do you mostly use your mobile device for learning? (**Tick the appropriate block**)

1. Any time	
2. Morning (06:00-12:00)	
3. Afternoon (12:00-18:00)	
4. After 18:00	

3.4. Which of the following applications and tools on your mobile devices do you use for academic purpose and how often? (**Please tick appropriate blocks**)

	Often used	**Sometimes**	**Rarely used**	**Never used**
12. Calculator				
13. Email				
14. Google				
15. Dictionary				
16. Wikipedia				
17. Evernote, Pocket, Other note taking software				
18. Google Drive, Dropbox, Other cloud storage				
19. YouTube				
20. Notes				
21. Adobe Acrobat Reader				
22. WhatsApp, Other IM services				
If not listed above, please specify:				

SECTION 4: ACCESSING LIBRARY AND INFORMATION SERVICES

4.1. How do you get access to library and information services when off-campus? (**Please tick an appropriate block**)

1. I have Wi-Fi at home	
2. I have a fixed line access at home	
3. I use Wi-Fi at UNAM hostels	
4. Buy data from service providers (MTC, TN Mobile)	
5. I use my employer's Internet.	

4.2. How often do you access library and information services on each of the mobile devices listed below? (**Please tick appropriate blocks**)

	Daily	**Weekly**	**Monthly**	**Less than once a month**	**Never**	**Don't use**
1. Mobile phone Smartphone)						
2. Laptop						
3. Tablet						
4. E-book readers (e.g. Kindle, Nook)						

4.3. How frequently do you use a mobile device to access the following library and information services? (**Please tick appropriate blocks**)

	Frequently	**Sometimes**	**Rarely**	**Never**
12. Search Online library catalogue (WebOPAC)				
13. View your library history				
14. Reserve /Request items on loan				
15. Receive alerts relating to library information or services				
16. Renew your library items				
17. Search library databases				
18. Suggest a title for purchase				
19. View library hours				
20. Access past examination papers				
21. Chat with librarians (Ask-A-Librarian)				
22. Reserve discussion room				

4.4. In your opinions, do you think UNAM library provides adequate services for students using mobile devices to access their services? Please explain.

4.5. How often do you experience the following challenges when using your mobile devices to access learning and library-related materials?

	Frequently	**Sometimes**	**Rarely**	**Never**
11. Incompatibility of websites and applications with mobile device.				
12. Slow network speed /network congestion.				
13. Lack of specialised mobile applications to support use, learning and library-related activities.				
14. Screen size for mobile devices is too small and can strain the eyes.				
15. High cost of data				
16. Limited network coverage in areas				
17. Lack of technical support from the UNAM.				
18. Network downtime due to interference from the environment, e.g. bad weather				
19. The threat of viruses or being hacked.				
20. Distractions due to the same device being used for playing games or chatting with family & friends.				

4.6. On a scale of 1-5 with 1 being poor and 5 being excellent, how do you rate the quality of the UNAM wireless network?

	Poor				Excellent
	1	**2**	**3**	**4**	**5**
It is reliable in terms of speed and access					

4.7. Do you have any suggestions that you want the library to make, in improving the current provision of mobile library and information services?

Thank you for your participation!

Appendix B: Interview guide for library staff

Student adoption and perceptions of library and information mobile services at the University of Namibia, Main Campus Library.

Librarian's work experience and qualifications

1. What is your job title?
2. What is your highest LIS qualification?
3. How long have you been working in the library?

Library services

4. Can you list web-based library and information services at UNAM that are currently provided, and that students can access on mobile devices?
5. Can you list the library and information services that are most used by students with mobile devices? Can you provide evidence for your answer (e.g. website/database stats)?

Perceptions

6. In your opinion, do you think the use of mobile devices to access library and information services has an impact on students' academic performance? Please explain.
7. Generally, what do you think about the way that mobile devices has influenced the use of the library?
8. Do you think students are satisfied with the current library and information mobile services? Please explain. (What do you think the library should do to satisfy users?)

Influence and Adoption

9. How do you market the library and information mobile services?
10. Do students receive training on how they can access and use library and information service with/through their mobile devices? Please explain.

Challenges and Opportunities

11. What benefits do you think students get when using wireless technologies, as opposed to the wired network, to access library services?
12. What do you think are the main challenges that students face when using wireless technologies when accessing library services?

Thank you!

Appendix C: Ethical Approval from UCT

Library and Information Studies Centre
University of Cape Town
Upper Campus

Private Bag X1, RONDEBOSCH, 7701 South Africa
Level 6 Hlanganani, The Chancellor Oppenheimer Library
Tel: +27 (0) 21 650 4546 Fax: +27 (0) 21 650 2529
E-mail: lisc@uct.ac.za
Internet: www.lib.uct.ac.za/lisc

Ref No.: UCTLIS2017803-01

17 March 2018

Ms Charlotte Nakanduungile
Library and Information Studies Centre
Chancellor Oppenheimer Library
University of Cape Town

Ethics approval for Master's research

Dear Ms Nakanduungile

I am pleased to inform you that ethics clearance has been granted by an Ethics Review Committee of the Library and Information Studies Centre, Faculty of Humanities, for you to proceed with collecting data for your Master's study on '**Student adoption and perceptions of the library and information mobile services at the University of Namibia**'.

As a next step, please ensure that you obtain approval from the ethics committee to collect data at your data collection site, as necessary.

We wish you well with your data collection and the completion of your research.

Yours faithfully,

Signature Removed

Mr Richard Higgs
Chair: Department (LISC) Research Ethics Committee

Appendix D: Ethical Approval from UNAM

UNAM
UNIVERSITY OF NAMIBIA

ETHICAL CLEARANCE CERTIFICATE

Ethical Clearance Reference Number: EXT /391/2018 **Date: 6 June, 2018**

This Ethical Clearance Certificate is issued by the University of Namibia Research Ethics Committee (UREC) in accordance with the University of Namibia's Research Ethics Policy And Guidelines. Ethical Approval Is Given In Respect Of Undertakings Contained in the Research Project outlined below. This Certificate is issued on the recommendations of the ethical evaluation done by the Faculty/Centre/Campus Research & Publications Committee sitting with the Postgraduate Studies Committee.

Title of Project: STUDENT ADOPTION AND PERCEPTIONS OF LIBRARY AND INFORMATION MOBILE SERVICES AT THE UNIVERSITY OF NAMIBIA, MAIN CAMPUS LIBRARY.

Researcher: CHARLOTTE NDEUTALA NAKANDUUNGILE

Student Number: NKNCHA005

Supervisor(s): Michelle Kahn

Faculty: Library and Information Studies Centre, University of Cape Town

Take note of the following:

(a) Any significant changes in the conditions or undertakings outlined in the approved Proposal must be communicated to the UREC. An application to make amendments may be necessary.

(b) Any breaches of ethical undertakings or practices that have an impact on ethical conduct of the research must be reported to the UREC.

(c) The Principal Researcher must report issues of ethical compliance to the UREC (through the Chairperson of the Faculty/Centre/Campus Research & Publications Committee) at the end of the Project or as may be requested by UREC.

(d) The UREC retains the right to:

(i) Withdraw or amend this Ethical Clearance if any unethical practices (as outlined in the Research Ethics Policy) have been detected or suspected,

(ii) Request for an ethical compliance report at any point during the course of the research;

UREC wishes you the best in your research.

Dr. J.E. de Villiers: UREC Chairperson

Signature Removed

Ms. P. Claassen: UREC Secretary

Signature Removed

Appendix E*:* Consent form for the Questionnaire

Student adoption and perceptions of library and information mobile services at the University of Namibia, Main Campus Library.

Researcher

Charlotte N. Nakanduungile

nkncha005@myuct.ac.za

+264 81 8114768

Supervisor

Michelle Kahn

michelle.kahn@uct.ac.za

+27 21 6501851

Please note!

Before you decide to participate in the study, please take the time to read the following information carefully as it may influence your decision to participate. Please ask the researcher if there is anything that is not clear or if you need more information.

Dear Student

My name is Charlotte Nakanduungile, a master's student in the Library and Information Studies Centre at the University of Cape Town. I would like to invite you to participate in my research by completing a brief survey. This survey is gathering information about the student adoption and perceptions of the library and information mobile services provided at the University of Namibia library. The purpose is to examine the library and information services available to students using mobile devices, determine the challenges/opportunities that students face when accessing library and information services using mobile devices and to investigate factors influencing students' adoption of wireless technologies.

There are no known risks to you associated with this study, and the researcher will not try to identify you with your responses to the questionnaire, or name you as a participant in the study. Please be informed that your responses will be treated confidentially.

Kindly note, your participation in this research is voluntary and you can choose to withdraw from the research at any time without penalty. You will not be requested to supply any identifiable information, ensuring anonymity of your responses.

This research has been approved by the Ethics Review Committee (Faculty of Humanities, UCT), and UNAM Research Ethics Review Committee.

The survey will take approximately 20 minutes to complete. To participate, please sign below.

Signature: **Date**:

Should you have any questions, please feel free to contact me on nkncha005@myuct.ac.za.
Thank you for your participation.

Appendix F : Interview consent for library staff

Student adoption and perceptions of library and information mobile services at the University of Namibia, Main Campus Library.

Researcher

Charlotte N. Nakanduungile
nkncha005@myuct.ac.za
+264 81 8114768

Supervisor

Michelle Kahn
michelle.kahn@uct.ac.za
+27 21 6501851

Please note!

Before you decide to participate in the study, please take the time to read the following information carefully as it may influence your decision to participate. Please ask the researcher if there is anything that is not clear or if you need more information.

Research description

This study is conducted as part of my master's degree in Library and Information Studies at the Library and Information Studies Centre, University of Cape Town. This survey is gathering information about the student adoption and perceptions of library and information mobile services provided at the University of Namibia library. The purpose is to examine the library and information services available to students using mobile devices, determine the challenges/opportunities that students face when accessing library and information services using mobile devices and to investigate factors influencing students to adopt wireless technologies.

Participation in the study

You are being humbly requested to participate in the research study through an interview that will take approximately 30 minutes. The questions seek the librarians' opinions on the students' use of wireless technologies in accessing library and information services at UNAM and views about the impact of wireless technologies on the library usage.

Benefits

There will be no direct benefits to you for your participation in this study. However, the researcher anticipates that your responses might help bring to the attention of UNAM Library Management ideas for improvement of the current provision of mobile library and information services.

Anonymity and Confidentiality

Please be assured that any information obtained in this study will be treated confidentially. Any identifying information will be removed, and participants will be referred to as A, B, C, etc. for anonymity. Information from this research will be used solely for this masters' dissertation and any publications that may result from this study.

Voluntary participation and withdrawal

Kindly note that your participation in this study is voluntary. It is up to you to decide whether to take part in this study. If you decide to participate in this study, you will be asked to sign a consent form. Though you have decided to participate in this study, you are still free to withdraw at any stage. You are free not to answer questions that make you feel uncomfortable. Please be assured that this will not affect the relationship you have with the researcher. With your permission, the interview session will be recorded.

Queries and ethical concerns

This research has been approved by the Ethics Review Committee (Faculty of Humanities, UCT), and UNAM Research Ethics Review Committee. Any queries or ethical concerns related to the study may be forwarded to the researcher or the supervisor.

Please indicate your consent by circling "Yes" or "No" to the statements below:

I agree to participate in the study conducted by Ms. Charlotte Nakanduungile.	Yes	No
I agree that this interview can be audio-recorded.	Yes	No
I have been informed about the study and I understand the information provided.	Yes	No

I have been assured that I will be given an opportunity to ask questions.	Yes	No
I understand that I am participating voluntarily and may withdraw at any time.	Yes	No

Signature: **Date**: